

GUIDE TO INTENSIVE AQUACULTURE IN MANITOBA

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GUIDE TO INTENSIVE AQUACULTURE IN MANITOBA

INTRODUCTION

Aquaculture, or fish farming, has been practised in Manitoba since the late 1960s. It began with experimental studies on "pothole" lakes in the Erickson area in southwestern Manitoba. To date, Manitoba operations have primarily taken the form of hobby farming, involving the release of fingerlings into farm dugouts or ponds on private lands, or into small lakes on Crown lands. These fish are then used primarily for recreational purposes. A good source of information on this type of activity, referred to as "extensive" fish farming, is the booklet "Trout Farming in Manitoba", available from the Fisheries Branch of the Manitoba Department of Water Stewardship.

"Intensive" aquaculture, which takes the form of fish rearing in cages, tanks, or raceways, is relatively new in Manitoba, and there are currently only a few commercial aquaculture operations of this magnitude in the province. However, increasing interest has been expressed in developing larger commercial operations, creating a demand for better advice and guidelines on how to start an intensive aquaculture business.

The purpose of this brochure is to attempt to provide this advice. It is not intended to provide all the details on commercial aquaculture. Intensive operations are still very much in the developmental stage in Manitoba, with new techniques being developed all the time. The brochure will, however, make the prospective fish farmer aware of the potential legal requirements, environmental concerns, relevant agency contacts, and general good business practices that will contribute towards increasing the potential for success of an intensive aquaculture operation.

AQUACULTURE IN MANITOBA

Aquaculture was initiated in Manitoba in the late 1960s, largely through experimental stocking by the Freshwater Institute and the Manitoba Government of very productive potholes located in southwestern Manitoba. Rainbow trout quickly became the species of choice due to their rapid rate of growth and their general hardiness. They continue to be the primary species raised in Manitoba.

In the early 1990s, there were four private hatcheries that sold fingerlings; three of these operators also sold eggs. These producers were also "grow-out" operations, selling "pan-sized" fish (greater than 6 inches long) for eating. Generally, these fish were in the 2-4 pound range. At this point, prices for rainbow trout were dropping and Arctic char was rapidly becoming of major interest to Manitoba operators. Some fish farmers were experimenting with various species of salmon.

AgPro Fish Farms in Winnipeg, established in 1986 under the name of Elders Aqua Farms, was originally the only intensive grow-out operation in the province for trout and Arctic char. In the mid-1980s, the Freshwater Institute (Canada Department of Fisheries and Oceans) in Winnipeg began experimenting with production of Arctic char at their Rockwood Hatchery located in Manitoba's interlake region.

Subsequently, as part of a technology transfer agreement between Elders and DFO, the company converted its malting plant into a grow-out facility to initiate intensive Arctic char and rainbow trout production. The company later began experimenting with kokanee salmon. Despite AgPro's apparent success, the Head Office in Saskatchewan decided to close down the Winnipeg operation in 1994 while maintaining a cage culture facility on Deifenbaker Lake in southern Saskatchewan (now called Cangro). Around the same time, a long-time fingerling producer located at LaBroquerie, southeast of Winnipeg, also closed its doors.

Annually in Manitoba, there are between 25 and 30 licensed commercial operators who raise fish for sale. They primarily farm private waters, although a few are licensed to use Crown waters. There are also approximately 500-600 unlicensed hobby fish farmers who buy fingerlings from licensed fish farmers to stock private waters for their own use.

There are four major operators in Manitoba. One fingerling producer, Arctic Aquafarms located near Garson, also operates a grow-out facility and a fee-for-fishing operation. The federal Rockwood Hatchery at Gunton has been sold to private interests, and has changed hands several times over the past few years; Agassiz Aqua Tech took over in the summer of 2001 and operates a hatchery and grow-out operation at this site, producing primarily arctic char. The Manitoba Rainbow Trout Farmers Association at Erickson and Clear Springs Aqua Farms near Roblin, are primarily brokers who import fingerlings from the U.S. and distribute them in the spring.

In 1999, Manitoba fish farmers reported selling 196,000 rainbow trout fingerlings. Grow-out operations sold 4,260 kgs of rainbow trout and 3,962 kgs of arctic char. In 2000, fingerling sales dropped slightly to 172,000 rainbow trout. Grow-out sales increased slightly to 6,884 kgs of rainbow trout and 7,273 kgs of arctic char. In 2001, fish farmers reported sales of 190,000 rainbow trout fingerlings, 15,530 kgs of rainbow trout, and 27,730 kgs of arctic char. Fingerling sales remained stable at 190,000 rainbow trout in 2002, while grow-out sales increased to 16,050 kgs of rainbow trout, and 47,000 kgs of arctic char.

There are three fee-for-fishing (or "U-catch-em") businesses, where customers pay to fish in privately stocked ponds. Equipment is supplied, if needed. Such ponds are very popular in the U.S. and offer opportunities for fish farmers near larger urban centres. These ponds are easily accessible and can be fished from shore; ideal for small children and individuals who are unable to access sport fishing otherwise.

Commercial fish farming operations and the services they offer are listed in more detail in the brochure "**Manitoba Fish Farming Operations**", available from Manitoba Water Stewardship.

AQUACULTURE IN CANADA

In 1988, the Federal Department of Fisheries and Oceans (DFO) commissioned Price Waterhouse to assess the growth potential of the Canadian aquaculture industry to the year 2000. The resulting report, "Long Term Production Outlook for the Canadian Aquaculture Industry", issued in 1989 and updated in 1990, discussed the major species cultivated, including rainbow trout and Arctic char, the primary species produced in Manitoba. Highlights of this report follow.

Trout Farming

- Commercial aquaculture in Canada began in the 1950s, with production focused on trout culture in Ontario and British Columbia, and oyster culture in B.C., Prince Edward Island, and New Brunswick. Trout farming in Canada is carried out primarily in fresh water. However, with the growth of marine culture, producers have been rearing marine trout in sea cages, primarily in Nova Scotia.
- Rainbow trout is the primary species of fish raised on Canadian freshwater fish farms. It has been bred and reared for many decades and is now a domesticated fish with a rapid rate of growth, high resistance to disease, and a good tolerance to crowding.
- The production of trout in Canada serves three major markets:
 - Pond fishing;
 - Lake and river stocking; and
 - Human food consumption.
- Freshwater trout production in Canada for 1989 was approximately 2,500 MT, about 80% of which was from Ontario. Approximately 4% came from the Prairie Provinces and the Territories, collectively. This compared with annual production figures of 32,000 MT in Italy, 30,000 in Denmark, 22,000 in the U.S. and 20,000 MT in France. At that time, Japan was producing between 15,000 and 20,000 MT per year.
- Price Waterhouse projected total Canadian production at between 3,400 MT and 5,200 MT of freshwater trout by 1995, and between 4,100 MT and 7,300 MT by the year 2000. Trout farming in the prairies and territories was thought to be at the developmental stage. Under an optimistic scenario, these provinces would produce about 200 MT by 1995 and about 400 MT by the year 2000. [More recent figures show total trout production in Canada reached 5,900 MT in 1994, of which 305 MT was from Saskatchewan and Alberta. No data were available for Manitoba.]
- In 1987, Canada imported 1,062 MT of trout including 252 MT of fresh trout, 540 MT of frozen trout, and another 270 MT of other trout products. Almost 90% of these imports went to Ontario, Quebec and B.C. Imports have remained at around 1,000 MT since 1981, despite the growth in trout production in Canada of over 1,000 MT during that same period. This is largely because the Canadian products do not compete directly with the imported products. Canadian trout are sold fresh with increasing amounts being sold smoked or as fillets rather than pan-sized. The majority of imported trout from Idaho are sold frozen, at an average weight of about 250 g and for a lower price than the Canadian product.

- Because the Canadian product had the potential to be sold fresh all year round, the potential to displace imports was not considered indicative of the size of the total market. Moreover, similar to other fish products, there had been little advertising and promotion directed at the consumer market.
- Opportunities for export were likely to be limited except perhaps to the U.S. Northeast. However, there was likely to be increasing competition from states like Montana which were starting to look at trout growing with interest.
- A key challenge facing the freshwater and marine trout industries was developing markets in an environment which had become increasingly competitive. The ability to remain competitive would be a challenge to industry. The freshwater trout farming sector yielded only modest returns to owner-operators and investors.
- Major constraints facing the Canadian trout industry included:
 - market competition both domestically and internationally;
 - relatively high production costs, causing reduced profitability;
 - financing and cash flow; and
 - limited access to high quality grow-out sites.
- The strengths of the industry were:
 - proximity to a large domestic and U.S. market;
 - a well-established infrastructure and network of experts;
 - ready availability of fingerlings; and
 - the production of a high-quality product.

The Arctic Char Farming Industry

- Research and development into Arctic char farming began in 1978. Commercial production was only in its early stages at the time the Price Waterhouse report was written. [Total production of Arctic char in Canada was estimated at approximately 7 MT in 1990. It reached 71 MT in 1994.]
- Constraints facing the industry included:
 - inadequate supplies of broodstock;
 - insufficient refinement of techniques for rearing char;
 - size variability of the end product;
 - lack of research into appropriate feed mixtures;
 - a relatively long grow-out period; and
 - lack of market recognition for the fish.
- Strengths of the industry included:
 - Char is a premium food fish;
 - It is relatively easy to culture;
 - It is suitable for cold waters; and
 - It enjoys a strong market demand, with potential for increased demand.

In addition to the above information on Arctic char from the Price Waterhouse report, a comprehensive analysis of existing and potential Arctic char markets was presented in "Market Interaction of Canadian Farmed and Wild Arctic Char", prepared by Western Management Consultants (R. Smith) for the federal Department of Fisheries and Oceans (Economic and Commercial Analysis Report No. 22, November, 1989). Primary conclusions of the report were as follows:

1. Wild Arctic Char Production

- The production of wild Arctic char had declined particularly from Labrador in the late 1980s.
- At the time of writing, prices for 4-7 pound char were close to farmed Atlantic salmon prices.
- The wild char industry sold about 136 tonnes in Canada and exported 54-57 tonnes to the U.S., the majority of which came from Labrador.

2. Aquaculture of Arctic Char

- Almost all of the 6.8 tonnes of farmed Arctic char sold per year were in the pan size. It was considered that this did not represent any threat to the prices or volumes of the wild Arctic char.
- It was estimated that there were about 400,000 eggs, fry and adult Arctic char in the aquaculture system in Canada, with the potential for another 425,000 eggs to be added in 1989. [Note this is a 1989 report.]
- It was concluded that farmed Arctic char production would increase on an annual basis over the next 5-10 years. Western Management Consultants estimated that by 1994, farmed char sales could be at least 454 tonnes and by 1999, in the range of 907-1,361 tonnes. [In reality, sales were 71 tonnes in 1994.]

3. Markets

- Although 60% of the fish distribution industry carried Arctic char, it did not amount to a large volume. Arctic char was not being promoted in Canada, as it had always had such a limited volume that it did not justify major coordinated promotional efforts.
- The U.S. offered a major market opportunity if it was developed carefully with sound marketing strategies and promotional plans. Certain areas of the U.S. were not favourably inclined towards the consumption of salmon, trout, or other red-fleshed fish, however the western and northern states did offer an opportunity in this market. Specifically, Western Management Consultants had this to say about the U.S. market:
 - The quantity of Arctic char being sold at that time in the U.S. was so low, only 2 of the 13 firms interviewed carried or had carried the product.

- In 1988, FFMC sold only 2.7% (1.2 tonnes) of its char production into the U.S. In 1987, FFMC sold 2.7 tonnes or 4.5% of production to the U.S. Sales varied from 0.1% to 3.7% of production for the three previous years. Considering the size of the central and western U.S. marketplace, this was a negligible amount.
- Estimates of the quantity of Labrador char sold into the eastern U.S. market varied between 50 and 68 tonnes a year. Considering the size of the New York and Boston marketplace (over 20 million people), this was a very small quantity.
- Interviews with U.S. wholesalers, retailers, and food service companies revealed there was very little familiarity with Arctic char, even at the wholesaler level. Fish wholesalers in Minnesota and Illinois claimed they could not get sufficient Arctic char to make it worthwhile ordering.
- Fish wholesalers indicated they would be interested in carrying Arctic char as it appeared to them to be a unique and unusual fish product, but they did not anticipate that they could pay more than the going price for salmon of equal quality and they had to have a steady supply.
- Food service operators were very interested in a product that sounded different and had a high quality "clean" image. However, they were not familiar with the product and felt that it should be presented to them for their review. Food service operators did not anticipate paying any more for comparable quality salmon.
- The pan-size (8-12 ounce) salmon market in the U.S. was estimated by one of the largest brokerages to be no larger than 1,361 tonnes per year. The price for 10-12 ounce salmon in Seattle was \$3/lb (1989 \$Cdn.) compared to Idaho trout at \$2.52/lb and the larger (2-4 pounds) red-fleshed trout at \$3.18/lb. This distributor was not familiar with Arctic char and did not perceive that there was a significant pan-size market in the U.S. [Note the average price of char in 1994 was \$4 to \$5 (Cdn).]
- The market was very satisfied with the quality of Arctic char and did not notice a significant difference in quality between the product from the Atlantic or Central Canada. The differential in prices between the two areas was mainly due to the size of the individual fish.
- Western Management Consultants concluded that there was a market for distinct products such as the frozen wild fish, the 8-10 ounce pan-size fish, and the 4-7 pound char. The least desirable product was the 2-4 pound char. The trade indicated a willingness to pay a small premium for fresh product, delivered on a regular and consistent basis.
- Trout were definitely not a substitute product for Arctic char and were seen by the trade as being considerably lower on the exotic or quality scale.
- Although wholesalers perceived salmon as a substitute product for Arctic char, this view was not held by retailers or restaurants.

CANADIAN AQUACULTURE UPDATE

Programs/Policy

Following the review of Canada's aquaculture industry in the late 1980s, the federal Department of Fisheries and Oceans (DFO) launched the Federal Aquaculture Development Strategy which was finalized in 1995, after further stakeholder consultation. The Strategy was intended to be a tool for fostering partnerships and cooperation between industry and all levels of government towards maximizing sustainable use of aquatic resources and increasing the industry's productivity.

The federal government saw its primary role being the creation of an environment supportive to aquaculture development in terms of harmonization of federal and provincial policies and regulations, recognition of the industry as a legitimate user of water, and support for R&D and technology transfer. However, it also stated that aquaculture was a private sector initiative and that the principal responsibility for commercial development rested with the industry.

In December, 1998, DFO appointed a Commissioner for Aquaculture Development who would report to the Minister of DFO and who would be responsible for implementing the 1995 Federal Aquaculture Development Strategy. For general information, contact the national Office of the Commissioner for Aquaculture Development (OCAD) at the following address:

OCAD
427 Laurier Avenue West
Suite 1210
Ottawa ON K1A 0E6
Phone: (613) 993-8603
Fax: (613) 993-8607
Website: <http://ocad-bcda.gc.ca/>

The Freshwater Advisor is:

Éric Gilbert
OCAD
3230 rue De Blois
Trois-Rivières, Québec G8Z 1R5
Phone: (819) 371-5118
Fax: (819) 371-5117
E-mail: GilbertE@dfo-mpo.gc.ca

In June, 1999, DFO held a roundtable of national stakeholders, including representatives from industry, aboriginal groups, academia, environmental and conservation organizations as well as provincial and territorial governments. The purpose of the roundtable was to review the current state of the aquaculture industry in Canada and recommend areas for future action. Participants generated a number of recommendations under six themes:

1. Legitimacy and recognition;
2. Communication and education;
3. Research and development;
4. Markets and marketing;
5. Sustainability of the industry and the environment; and
6. Implementation and action.

Key messages were as follows:

1. Legitimacy and Recognition

- The industry must be given legitimacy and recognition through a specific regulatory and policy framework that supports and furthers its competitiveness.
- A clear, long-term and equitable approach to tenure and site access.
- Aquaculture must be patterned after the agricultural model both in policies and programs:
 - Access to agricultural support programs, particularly crop insurance
 - Access to Canadian Adaptation and Rural Development programs
 - Tax policies as primary producers of food
 - Financing
- Lead Role – Governments

2. Communication and Education

- There is a need to communicate in a coherent, structured and consistent manner with the public to educate about:
 - The socio-economic benefits of the industry
 - The environmental benefits of the industry and its approach to sustainable development
 - Myths and inaccuracies related to aquaculture
 - The nutritional benefits, quality and reliability of the products
- Lead Role – Industry
- Support Role – Governments

3. Research and Development

- Aquaculture research and development needs:
 - Setting of priorities
 - Co-ordinating mechanism for federal, provincial industry efforts (but not central control)
 - Increased investment (but not financing via levies or association fees)
 - Closer linkage between fundamental and applied research and marketing requirements
 - A biological improvement program, including access to best performing stocks
 - New species development
 - Genetics, therapeutants, new technologies and culture techniques
 - Environmental monitoring and impact assessment.
- Partners – Governments, Industry, Academe

4. Sustainability

- The aquaculture industry must be, and be seen as, a model of sustainable development, both economic and environmental
- All stakeholders must be involved in arriving at and operating a sustainable industry
- There is need for national codes of practice
- Lead Role – Industry
- Support Role – Governments

5. Markets and Marketing

- There is a need for an integrated domestic and export aquaculture marketing strategy and campaign and this involves, for example:
 - Increasing market research and intelligence
 - Developing product quality standards
 - Developing recognition of industry quality similar to agricultural products
 - Developing recognition of the industry as environmentally responsible
 - Ensuring consistency of supply
 - Effectively communicating product benefits and value to consumers
 - Ensuring foreign market access including aquaculture in trade negotiations
 - Developing market alliances
 - Enhancing export development initiatives by government
- Lead Role – Industry
- Support Role – Governments

6. Implementation and Action

- Implement quickly the Federal Aquaculture Development Strategy
- In addition, governments must move quickly to:
 - Clean up the regulations and implement the results
 - Resolve jurisdictional issues
 - Provide the resources required to support the industry's development
- Stakeholders must be kept informed and involved, including a process for reporting on the outcome of and follow-up to the Rounds Tables.
- Lead Role – Governments

Aquaculture Partnership Program

In October, 1999, DFO and the Aquaculture Commissioner announced the federal Aquaculture Partnership Program (APP). The \$600,000 program was directed at helping the aquaculture industry in various regions of Canada to develop partnerships and to work together on projects of national or regional significance. While the program ended in 2002, a report on program activities is available from the Office of the Commissioner of Aquaculture Development. Contact Éric Gilbert (see above) or go to the OCAD website at: <http://www.ocad-bcda.gc.ca/epartnershipprogram.html>

Aquaculture Collaborative Research and Development Program

In May, 2001, DFO announced the federal Aquaculture Collaborative Research and Development Program (ACRDP). The \$20 million, 5-year program was created to increase the level of collaborative research between the aquaculture industry and DFO researchers, resulting in new information and technology that will increase industry activity in Canada. Aquaculture producers are invited to submit proposals. General information on the program is attached in Appendix 1, or go to the website: http://www.dfo-mpo.gc.ca/science/aquaculture/acrdp_e.htm

Aquaculture Production

Canada's "Aquaculture Industry", a discussion document prepared by G.C. Vernon and Associates (1999) notes that aquaculture production in Canada almost doubled during the 1990s from 44,600 tons in 1991 to 87,200 tons in 1997. The primary finfish species produced were salmon and trout. Total finfish production was 63,725 tonnes. The remainder of Canadian production came from shellfish – mussels, manila clams and oysters.

Production in the Prairies and the Territories for 1997 was listed at about 1% of Canadian aquaculture production, with trout and char being the primary species produced. In contrast, Ontario produced most of the trout in Canada – about 3,725 tons. Rainbow trout accounted for over 90% of Ontario aquaculture production. About 70% of Ontario trout is produced in cages, with the balance coming from ponds, raceways, and circular tanks.

In their annual report "Net Results - Northern Aquaculture Statistics", Price Waterhouse Coopers reported Canadian production of freshwater rainbow trout in 1998 at 7,600 tonnes, with Ontario producing the majority (4,500 tonnes). Canadian production of other finfish species, primarily Arctic char, was 300 tonnes. In 1999, Canadian freshwater rainbow trout production was reported as stable, with Ontario still the largest producer. Only minor amounts of Arctic char were reported, from Atlantic Canada. In 2000, freshwater rainbow trout production was still reported as stable, with Ontario production being up slightly. Arctic char production from the Yukon had increased. In 2001, once again trout production was stable with a slight increase in Ontario production. Trout production in both years was down in Saskatchewan. DFO aquaculture statistics for 2002 show total Canadian trout production at 7,080 tonnes, of which 4,650 tonnes (66%) came from Ontario, 914 tonnes (13%) from Saskatchewan and 850 tonnes (12%) from Quebec. (Only 0.2% came from Manitoba.) Total arctic char production was unknown.

The report "Arctic Charr (*Salvelinus alpinus*) Aquaculture Review" (March 2001) prepared by Brian Rogers (Rogers Consulting Inc.) and Willie Davidson, Ph.D. is available under the archived reports section on the website for the Office of the Commissioner of Aquaculture Development:

<http://ocad-bcda.gc.ca/enewsarchivesreports.html>

TECHNICAL ASPECTS OF INTENSIVE AQUACULTURE

Intensive aquaculture is differentiated from extensive aquaculture by the degree of environmental control, stocking densities, feeding, and capital investment. Whereas extensive aquaculture is carried out in potholes and dugouts, intensive aquaculture in the prairies involves growing fish inside buildings under controlled conditions using tanks or raceways (land-based), or in cages moored in deep lakes.

Natural and artificial ponds, while adequate for "U-catch-em" operations, generally are not suitable for intensive aquaculture for a number of reasons including: reduced water quality due to low water turnover and the accumulation and degradation of waste products and unused feed; inadequate flushing of wastes which could contribute to disease problems; fluctuations in water temperature; harvesting difficulties because of aquatic vegetation and irregular pond configuration; lack of uniformity in size of fish produced; and difficulties in overwintering fish because of ice cover and potential for winterkill (Ontario Ministry of Natural Resources 1986).

In establishing an intensive aquaculture operation, there are many requirements that have to be considered. These requirements include site selection; area needed; water supply (source, quantity, quality, temperature); type of operation (egg producer, fingerling producer, grow-out, or any combination of these); facility design and layout; water use, reuse, and recirculation; hatchery pollutants (treatment and disposal); nutrition; proximity to markets; and access to transportation networks.

Intensive aquaculture operations in the Prairie Provinces have typically raised fish in circular fish tanks and rectangular raceways. The fish tanks resemble large circular swimming pools. Raceways are large rectangular units where water flows through quickly, entering at one end and exiting at the other. Through the use of screens, raceways allow fish to be separated by size.

Raceway and fish tank systems both require substantial amounts of water, although the water requirement is less for fish tanks than raceways. A good source of high quality groundwater (well or spring) of sufficient quantity is critical for a commercial aquaculture operation. Water quality characteristics significant to trout farming are shown in Appendix 2.

More recently, there has been interest in cage culture, similar to the major operations along the east and west coasts of Canada. Cage culture involves the rearing of fish in small enclosures constructed of plastic netting suspended from floating wooden or metal platforms. The cages can be anchored in deep lakes or protected areas of rivers. Experiments conducted with cage culture of rainbow trout in Northern Manitoba in the early 1980s showed some success from a technological point of view, however costs of transporting supplies into the area and fish out of the area proved prohibitive. There continues to be interest in cage culture and there may be opportunities further south or in rivers off the major lakes.

Cangro runs an apparently successful cage culture operation on Diefenbaker Lake in Saskatchewan. They grow rainbow trout and market them as "steelhead". Their operation consists of about 36 cages attached to either side of one long walkway about 100 yards long, with small walkways in-between the cages. The whole operation is encircled by an outer walkway. The cage nets are about 45 feet deep.

Feed is stored in big bins and a compressed air system automatically feeds out over the water. Divers regularly check the cages for rips or holes, and remove dead fish and debris. Cangro produced about 2 million kgs from their Lake Diefenbaker operation in 2001. Recent rainbow trout prices are about \$2 per pound.

While it is becoming of greater interest, cage culture brings with it other concerns, including potential impacts on the aquatic environment and potential conflicts with other users of the aquatic resource.

Intensive aquaculture is still largely at the developmental stage in Manitoba; new systems and technologies are continually being developed and it is impossible to describe all the systems or equipment available. The federal Department of Fisheries and Oceans offers support to the Canadian aquaculture industry through its recently established Office of the Commissioner for Aquaculture Development. For further information and technical advice, check their website at:

<http://ocad-bcda.gc.ca/>

or contact: Éric Gilbert, Freshwater Advisor
 Office of the Commission for Aquaculture Development
 3230 rue De Blois
 Trois-Rivières, Québec G8Z 1R5
 Phone: (819) 371-5118
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ECONOMIC ASPECTS OF INTENSIVE AQUACULTURE

It is important for prospective fish farmers to realize that intensive aquaculture operations involve significant levels of capital investment and operating expenses. Estimates of initial expenditures to set up a major land-based operation have ranged from \$200,000 to \$600,000.

Cage culture can involve lower initial expenditures, depending on the number of cages. One estimate for start-up was as follows:

- | | |
|---|---------------------|
| • Two 50" X 50" cages with 12-foot centre walkway (delivered) - | \$45,000.00 |
| • Anchors/buoys - | \$10,000.00 |
| • Nets - | \$6,000.00 |
| • Fish food - | \$60,000.00 |
| Total - | <u>\$121,000.00</u> |
- Other costs relate to training staff, maintenance (upkeep, diver checks, etc.), processing, management, day-to-day care and feeding of fish, security, and marketing.

Feed, fingerlings, interest, and insurance represent significant cost components in the commercial production of trout (Ontario Ministry of Natural Resources 1986). The cost of feed alone is estimated to represent between 40% and 70% of the cost of producing the fish. Feed costs in Ontario increased almost 10% between 1997 and 1998 (Ontario Aquaculture Research and Services Committee Annual Report 1998). The brochure, "Trout Farming in Manitoba", available from the Department of Natural Resources, lists sources of commercial fish feed for Manitoba fish farmers.

The high cost of fingerlings can be partially offset by the purchase of eggs instead and the rearing of trout from the egg stage to market weight. Further savings may be realized if producers acquire brood stock to produce their own eggs. Obviously, the benefits of keeping brood stock will have to be weighed against the cost of their maintenance (Ontario Ministry of Natural Resources 1986). In recent years, with the increase in cage culture operations, Ontario fish farmers have tended to segregate between hatchery and grow-out operations (Stechey, personal communication).

The interest cost on borrowed money represents a significant outlay of funds, particularly for the investor starting out with limited financial resources. Insurance on equipment and against possible loss of stock is expensive but essential, particularly if the operator lacks the financial resources to survive a loss of inventory due to disease or equipment failure (Ontario Ministry of Natural Resources 1986).

In "Investment Analysis of Commercial Aquaculture in Central Canada", a report prepared for the Canada Department of Fisheries and Oceans by W.C. Pfeiffer and H. Jorjani (1986), the authors undertook a benefit-cost analysis of the commercial aquaculture industry in Ontario. They developed schedules for recording aquaculture enterprise data and a system for financial analysis of this data, including the preparation of balance sheets, income statements, and indicators of financial performance (Appendix 3). They concluded:

"The enterprise carries a high degree of risk. Results showed the aquaculturists to be vulnerable to unforeseen market forces. Aquaculturists were also seen to be turning profits back into their enterprises at a rapid rate, presumably to increase their equity to reduce short-run financial vulnerability. All aquaculturists in the study expressed plans to continue in the business."

Trout farming yields modest returns which are comparable to those earned in other agricultural ventures. The risks associated with trout farming are somewhat greater and the modest returns may limit investment and thus industry growth in the future.

There have been a number of studies in Quebec and in Ontario which have investigated the viability of growing freshwater trout. In Ontario, a review conducted by the provincial government suggested that the return to trout farming was modest in view of the investment costs and risks associated with trout production in Ontario. The average revenue per kg of fish produced for a 22,700 kg operation (50,000 pounds) was estimated at \$5.13 per kg. This compared with variable and fixed expenses of \$4.31 per kg before considering the salary level of the owner-operator but after interest expenses assuming 70% debt. This model farm was intended to be of sufficient size to allow the owner-operator to obtain his livelihood from the farm which was estimated at \$18,500 a year (Department of Fisheries and Oceans 1989).

A study of trout farming in Quebec indicated that the industry was less profitable in Quebec than in Ontario. Trout farmers in Quebec earn, before taxes, an average net return on equity of 9.8% and a return on assets of 5.8%. The survey also determined that the most profitable operations were those oriented towards the growth of fingerlings and hatcheries rather than grow-out farms. These returns were considered to be minimum values. In any event, the results showed that trout farming seemed less profitable than other agricultural ventures (Department of Fisheries and Oceans 1989).

Although these studies indicate that trout farming does not yield very attractive returns, this information is dated and does not deal with the cage culture operations that are more common in Ontario today. The feasibility of fish farming is very site-specific and can vary with species of fish being raised and the technology being used. Moreover, fish farming is often combined with other agricultural ventures which can make it more attractive.

However, the larger Manitoba operators continue to cite difficulties in obtaining bank financing, insurance, and business development support, as well as high costs of feed, as major challenges to aquaculture development in the province. Also, there currently is no Manitoba aquaculture association and most fish farmers have developed their operations by doing their own research, and/or hiring consultants to do feasibility studies on their specific situations.

REGULATIONS AND REGULATORY ASPECTS OF INTENSIVE AQUACULTURE IN MANITOBA

1. Fish Farming Licence - \$15.00 fee

A Fish Farming Licence is required for a commercial operation or for fish farming in water bodies surrounded by Crown land. The licence is valid from April 1st to the following March 31st, and is issued by the appropriate Regional Fisheries Manager, depending on the location of the operation or water body. A Fish Farming Licence grants the holder rights for any of the following types of operations:

- To stock and harvest fish for commercial market sale. The fish may be sold directly to local consumers, or to wholesalers, retailers, and restaurants, providing the fish have been processed in a manner approved by a Health Inspector.
- To stock fish in a water body for sale to the public by means of angling, commonly known as a "U-catch-'em" or "fee for fishing" pond. People angling at such an establishment do not require a provincial angling licence, but must retain a receipt showing the source of the fish for their own protection.
- To act as a broker, importing live fish from suppliers outside the province and reselling them in smaller lots to private or commercial fish farmers in Manitoba.

Generally, licences are issued only for self-contained water bodies (without inlets or outlets) surrounded by private lands. However, the use of lakes bordered by Crown lands will be considered on a case-by-case basis by the Regional Fisheries Manager responsible for those water bodies. It should be noted that licences will not be issued for water bodies located within natural brook trout watersheds in the Northeast Region of Manitoba. Regional fisheries offices are listed at the end of this publication.

For convenience, licences may also be issued from Fisheries Branch Head Office in Winnipeg, which will communicate with the Regional Biologist for the necessary approval. For further information, contact:

Barbara Scaife
Manitoba Water Stewardship
Fisheries Branch
Box 20 - 200 Saulteaux Crescent
Winnipeg, Manitoba
R3J 3W3
Phone: (204) 945-0559
E-mail: Bscaife@gov.mb.ca

It should be noted that the Fish Farming Licence is only a small part of the approval process for a new operation. The onus is on the prospective fish farmer to meet other regulatory requirements listed below which may apply, depending on specific situations. Regional fisheries contacts can assist you in ensuring you meet all regional requirements. General information and contacts are provided below.

2. Manitoba Water Stewardship Water Rights Licence

Intensive fish farming operations require a water source, either from wells or a surface source, such as a stream or river. Anyone using water for other than domestic purposes must apply for a water licence to:

Manitoba Water Stewardship
Water Branch
Water Licensing Section
200 Saulteaux Crescent
Winnipeg, Manitoba
R3J 3W3
Phone: (204) 945-6474

The prospective fish farmer must first fill out an application form describing the proposed operation, and submit it to the Water Branch, who will issue an exploration permit. Water Resources will require information on how much water is required, whether the source can sustain such use, how much wastewater will be generated, and where that wastewater will be expelled. Whether the fish farmer operates a flow-through system or a recirculating system, wastewater will be generated. Therefore, the fish farmer will have to contact the municipality to ensure the wastewater will be accepted, particularly if the farmer intends to discharge it into a municipal drain. Once the above questions have been answered satisfactorily, and any necessary approvals from the municipality have been obtained, the Water Licensing Section will issue a water licence to the fish farmer.

3. Environmental Licence

3.a) Provincial Process

An intensive aquaculture operation must be licensed under the Manitoba Environment Act. To apply for an Environmental Licence, prospective fish farmers should contact:

Environmental Approvals
Manitoba Conservation
Union Station Building
123 Main Street
Winnipeg, Manitoba
R3C 1A5
Phone: (204) 945-7071

Manitoba Conservation will require information on the proposed water source, what impact the use of that source will have on surrounding users, where the water will be discharged and potential environmental impact of that discharge, where the water will be discharged in winter, and any other considerations of an environmental nature.

A proposed intensive aquaculture operation is considered to be a Class 1 development under Manitoba's Environment Act, and must be announced under a Public Notice of Intent. If serious objections to the operation arise, public hearings will be scheduled.

3.b) Federal Process

The federal Department of Fisheries and Oceans (DFO) screens aquaculture applications under the mandate of the federal Fisheries Act, the Navigable Waters Protection Act (NWPA), and the Canadian Environmental Assessment Act (CEAA). A cage culture operation on a provincial Crown water will require submission of an application for approval to the Navigable Waters Protection Program (NWPP) under the Canadian Coast Guard of DFO. For more information, contact:

Central and Arctic Region
Regional Superintendent
Navigable Waters Protection
Canadian Coast Guard
Suite 703, 201 North Front Street
Sarnia ON N7T 8B1
Phone: (519) 383-1862
Fax: (519) 383-1989

In most cases, an application to the NWPP will trigger the federal environmental review process under the CEAA. DFO is in the process of developing a consistent and coordinated approach to aquaculture site approvals. The NWPP contact listed above should be able to assist with current requirements.

4. Rural Municipality Approval/Planning District Approval

The prospective fish farmer must apply to the relevant Rural Municipality office for a development permit which will ensure any planned development meets with approval under municipal zoning by-laws. In addition, many Rural Municipalities fall within a larger Planning District, which also has its own zoning by-laws and development guidelines. In this case, operators require a resolution approving the proposed development from both the RM and the Planning District. It should be noted that there is no general uniformity among municipalities as to what permits or licences are required. Processing fees may be involved.

5. Manitoba Conservation Crown Land Permit

Occasionally, prospective fish farmers may wish to construct facilities on Crown land. To legally occupy the land, one option is to apply for a lease, but leasing is expensive and the operator would also have to pay for a legal survey of the land. The cost may discourage some prospective fish farmers from choosing this option when start-up costs are already high. Other operators may still prefer to lease as a more secure option in view of their capital investment in structures on the land. A second option is to apply for a Crown Land Permit. If there are no objections to the proposed development and the permit is issued, the operator would pay a rental fee. The permit must be renewed annually, however renting instead of leasing the land gives the operator some time to determine the viability of the operation before making a substantial investment in leasing of the land.

To inquire about leasing provincial Crown land or to apply for a Crown Land Permit, contact the Regional Office of Manitoba Conservation in your area, or contact:

Lands Branch
Manitoba Conservation
123 Main Street
Neepawa, Manitoba
R0J 1H0
Phone: (204) 476-3441

6. Manitoba Conservation Work Permit

While the Crown Land Permit basically allows the prospective fish farmer to occupy a parcel of Crown land, a Work Permit is necessary to undertake any sort of activity on that land. Work permits typically outline conditions specific to the proposed development. They can be obtained from any Manitoba Conservation District Office.

7. Federal Food and Drug Act and Regulations

The mandate of the Bureau of Veterinary Drugs (BVD) under the authority of the Food and Drugs Act and Regulations is to ensure that drugs used in animals are safe and effective, and do not leave harmful residues in animal products for human consumption. Once a drug has been approved by the BVD, a Notice of Compliance (NOC) is issued to the manufacturer as well as a Drug Identification Number (DIN) which must appear on all drug labels.

The Food and Drugs Regulations do allow a manufacturer to sell an unapproved new drug which does not have a DIN to a practitioner for treatment of an emergency in a patient under his direct care. Authorization for sale of unapproved drugs for use in veterinary medicine is given by the BVD.

The following drugs and chemicals have been approved in Canada for use in treating fish. They can be obtained by aquaculturists and used according to label directions:

<u>Purpose</u>	<u>Chemical</u>	<u>Brand Name</u>
Antimicrobials	<ul style="list-style-type: none"> • sulfadimethoxine and ormetoprim • oxytetracycline • sulfadiazine/ trimethoprim • florfenicol 	Romet 30 Terramycin-AQUA Tribrisen 40 Aquaflor
Anesthetics	<ul style="list-style-type: none"> • tricaine methanesulphonate • metomidate 	Aqua Life TMS Powder Marinil
Anti-Fungal (used on incubating eggs)/ Parasitic	<ul style="list-style-type: none"> • formalin 	Parasite-S
Sea Lice Treatments	<ul style="list-style-type: none"> • formalin 	

The following are also used to treat fish but have not been approved. As they do not have a DIN, they can only be sold to a veterinary practitioner following authorization from the BVD:

<u>Purpose</u>	<u>Chemical</u>	<u>Brand Name</u>
Hormones	<ul style="list-style-type: none"> • GnRH • pituitary extract • estradiol 	OVAPRIM
Disinfectants (when used on fish eggs)	<ul style="list-style-type: none"> • iodophors (generally povidone) 	WESCODYNE BETADINE BIODINE OVADINE BRIDINE ACTOMAR K30 ARGENTYNE
Antibacterials (treatment of bacterial gill disease)	<ul style="list-style-type: none"> • chloramine T 	

The use of unapproved drugs and chemicals in fish which are destined for human consumption must be under the supervision of a veterinary practitioner. For a veterinary practitioner to purchase and use a drug in fish which has no DIN, authorization or further information may be obtained by contacting:

Bureau of Veterinary Drugs
Health Protection Branch
Health Canada
Room 290, Sir Frederick G. Banting Building
Tunney's Pasture
Ottawa, Ontario, K1A 0L2
Phone: (613) 957-3824
Fax: (613) 957-3861

It is not necessary for a fish farmer to wait for a disease outbreak to contact a veterinarian to obtain these drugs. Some disease problems can be anticipated, and operators should contact their local veterinarian at the beginning of the season to initiate purchase of these drugs and thus ensure they are in stock in the event of an outbreak.

8. Fish Health Certification

Manitoba fish farmers intending to export their fish interprovincially must apply for a Fish Health Certificate from the federal Department of Fisheries and Oceans. Fish health is determined by a Fish Health Official, a qualified fish pathologist, through a schedule of inspections and diagnostic procedures. Further information is available from:

Canada Department of Fisheries and Oceans
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Phone: (204) 983-5125

9. Canadian Food Inspection Agency (CFIA) Quality Management Program (QMP)

Federal regulations require stringent controls for the export and processing for export of aquacultured fish. Live aquacultured fish can be exported out of province by a holder of a fish export licence issued by CFIA but, any processing of fish, for export, raised in an aquaculture operation must be carried out in an establishment registered pursuant to the Federal Fish Inspection Regulations.

The registration of an establishment requires the development and implementation of a Quality Management Program. The Quality Management Program (QMP) is a regulatory-based system that requires all federally registered fish processing plants in Canada to develop and implement an in-plant quality control program. As set out in the Fish Inspection Regulations, all establishments in Canada that process fish and seafood for export or inter-provincial trade must be registered with the Government of Canada. To become federally registered, a fish processor is legally required to develop a QMP plan of their own, following the "QMP Reference Standard"; submit it to the CFIA for review and acceptance; and apply it to their processing operations.

The QMP uses the principles of "HACCP" (Hazard Analysis Critical Control Point), an internationally recognized system for ensuring safe production, to provide a high level of assurance that fish and seafood products produced in Canada are safe and wholesome to eat. However, the QMP also deals with non-safety issues, including fish quality and federal regulatory requirements such as labelling.

CFIA charges fees for inspection services including ones associated with establishment registration. The fees for registration are dependent on the size of the facility and the type of processing carried out in the facility.

For more information on the Quality Management Program, the Fish Inspection Regulations and the QMP Reference Standard, please refer to the CFIA, Quality Management Program website at:

<http://www.inspection.gc.ca/english/anima/fispoi/qmp/qmppgqe.shtml>

Or contact:

Dr. Peter Arntfield
 Canadian Food Inspection Agency (CFIA)
 Fish Inspection, Winnipeg Office
 613 - 269 Main Street
 Winnipeg, Manitoba
 R3C 1B2
 Phone: (204) 983-1741
 Fax: (204) 984-6008
 E-mail: parntfield@inspection.gc.ca

10. Public Health Inspection

Fish farmers wishing to sell their fish directly to the consumer, to restaurants, or to retail stores within the province should have their operation inspected by a Provincial Health Inspector. For further information, contact:

Manitoba Conservation
 Health Inspections
 200 Saulteaux Crescent
 Winnipeg, Manitoba
 R3J 3W3
 Phone: (204) 945-3311

In addition, fish farmers wishing to sell their fish in Winnipeg may require a vendor's licence. For further information, contact:

City of Winnipeg Licence Branch
 18 - 30 Fort Street
 Winnipeg, Manitoba
 R3C 4X3
 Phone: (204) 986-6420

The Licence Branch will refer the application to the City Health Department which will require a City of Winnipeg Public Health Inspector to check the vehicle used for distribution to ensure it has adequate refrigeration, etc. The Public Health Inspector will also contact the Provincial Health Inspector to ensure the fish farming facility meets provincial health standards.

11. Freshwater Fish Marketing Corporation (FFMC) Regulations

As stated above, a Fish Farming Licence allows the operator to sell directly to local consumers, retailers, restaurants, etc. However, under the Freshwater Fish Marketing Act, the Freshwater Fish Marketing Corporation (FFMC) has the exclusive right to market fish for interprovincial and export trade for most species of fish caught or raised in Manitoba, including the commonly farmed species, rainbow trout and Arctic char.

Due to the small quantities of rainbow trout and other species raised, for cultured fish, FFMC decided to defer the requirement that operators sell to markets outside the province through the Corporation, and in fact, now state that their mandate does not cover cultured fish. However, some fish farmers have approached the FFMC to contract the Corporation to process their farmed fish. For further information, contact:

Stephen Kendall
 Freshwater Fish Marketing Corporation
 1199 Plessis Road
 Winnipeg MB R2C 3L4
 Phone: (204) 983-6600

12. Resource Regulations

Under the Manitoba Fisheries Regulations, no person may bring into Manitoba, possess, or release into any waters of Manitoba fish eggs or live fish of the following species:

- Bowfin
- Gizzard shad
- Herrings
- Pallid sturgeon
- Shovelnose sturgeon
- Utah chub
- Gars
- Grass carp
- Paddlefish
- Shortnose sturgeon
- Smelts
- Walking catfish

No person may transport salmonid fish species into Manitoba without an Importation Permit. Importers of other fish species will require a Live Fish Handling Permit to transport live fish, once in the province. Hobby fish farmers transporting fish within Manitoba require a Live Fish Handling Permit, unless they have purchased these fish from a Manitoba hatchery for the purpose of stocking their operations, in which case a receipt from the hatchery is sufficient.

Imported fish or fish eggs must come from a disease-free source. Requests for Importation Permits or Live Fish Handling Permits are reviewed on a case-by-case basis.

Private stocking of public waters has been allowed, including cage culture operations. However, problems occasionally arise because the public is still permitted to fish these waters although the stocked fish belong to the private operator. Thus, anyone other than the owner of the fish, who is caught with a stocked fish could technically be charged with theft. This is less of a problem where a community interest group has stocked public waters for the area residents to enjoy.

To obtain an Importation Permit or a Live Fish Handling Permit, or for further information on sources of brood stock or fingerlings, contact:

Ms. Laureen Janusz
Manitoba Water Stewardship
Fisheries Branch
200 Saulteaux Crescent
Winnipeg, Manitoba R3J 3W3
Phone: (204) 945-7797
E-mail: Ljanusz@gov.mb.ca

INTENSIVE AQUACULTURE IS A BUSINESS!

If the number of inquiries is any indication, there is a definite "romance" to fish farming, which sometimes tends to overshadow the casual inquirer's perception of the economic feasibility of intensive aquaculture operations. It is important to remember that aquaculture at this level IS A BUSINESS, and as with any business, prospective operators must research their subject carefully to increase the odds of success.

The Business Plan

Developing a business plan should be an essential step in establishing an intensive aquaculture operation. The business plan is a document that you prepare to explain why you want to start a business, what your business is all about, and how it will operate. Creating a business plan involves everything from assessing your personal skills and finances, determining your product and markets, and estimating your financial requirements for start-up and operation, to determining potential alternate sources of funding, and deciding on the legal structure your company will take. The success of any business depends on good planning and careful research.

Sources of Information

There are numerous provincial and federal government programs and services available related to business development. These include assistance in developing business plans and other start-up information.

The Small Business Branch (Manitoba Industry, Economic Development & Mines), which is also the general office for the Canada/Manitoba Business Service Centre, has information on programs and services, the Business Start Program, starting specific businesses, start-up information, publications and fact sheets. The Centre also has information on legal requirements, including licences and permits that may be required within Winnipeg and outside the city, the form of business organization most appropriate to your operation, as well as taxes and duties. They may be contacted at:

Small Business Branch
 Manitoba Industry, Economic Development & Mines
 c/o Canada/Manitoba Business Service Centre (Head Office)
 P.O. Box 2609, 250-240 Graham Avenue
 Winnipeg, Manitoba R3C 4B3
 Phone: (204) 984-2272 or toll free 1-800-665-2019
 Fax: (204) 983-3852
 Website: <http://www.cbsc.org/manitoba/index.html>
 E-mail: manitoba@cbsc.ic.gc.ca

The Canada/Manitoba Business Service Centre also has regional offices throughout the province, listed in Appendix 5 and on the following website:

<http://www.cbsc.org/manitoba/index.cfm?name=satellit>

The Business Development Bank of Canada (BDC) also offers support and resource materials on how to start a business, including developing that essential business plan! More information should be available through the Canada/Manitoba Business Service Centre, or go to the BDC website at:

<http://www.bdc.ca/flash.asp>

or contact BDC directly at:

Winnipeg

Suite 1100 - 155 Carlton Street
Winnipeg, Manitoba
R3C 3H8
Phone: (204) 983-7900
Fax: (204) 983-0870

Brandon

940 Princess Street
Brandon, Manitoba
R7A 0P6
Phone: (204) 726-7570
Fax: (204) 726-7555

Industry Canada (IC) is also a source of information of all aspects of business, with program areas on developing industry and technology capability, fostering research, and promoting small business development. For further information on IC's services, contact:

Industry Canada
4th Floor – 400 St. Mary Avenue
Winnipeg, Manitoba
R3C 4K5
Phone: (204) 983-5851
Fax: (204) 983-3182
Website: <http://www.ic.gc.ca/cmb/welcomeic.nsf>

One of Industry Canada's programs is Aboriginal Business Canada, which provides business services to Canadian status and non-status Indians, Inuit, and Metis individuals, associations, partnerships or other legal entities which are wholly or partly owned or controlled by Aboriginal people, on or off reserve. For further information on their programs and services, contact:

Aboriginal Business Canada
Industry Canada
4th Floor – 400 St. Mary Avenue
Winnipeg, Manitoba
R3C 4K5
Phone: (204) 983-7316
Fax: (204) 983-4107
E-mail: abc.winnipeg@ic.gc.ca
Website: <http://strategis.ic.gc.ca/epic/internet/inabc-eac.nsf/en/home>

Manitoba Agriculture, Food & Rural Initiatives (MAFRI) provides farm management specialists who are available to advise prospective fish farmers as to general farm management practices. For more information on the Department's programs and services, go to the following website:

<http://www.gov.mb.ca/agriculture/programs/index.html>

For a list of farm management specialists throughout the province, see Appendix 4 or go to the following website:

<http://www.gov.mb.ca/agriculture/contact/farmmgmt.html>

MAFRI also provides assistance through its Agri-Ventures Support Program, including advice and technical information on business development, marketing, financing, production technology and economics of value-added agricultural products. For more information, contact your local agricultural office or go to the following website:

<http://www.gov.mb.ca/agriculture/programs/aaa22s02.html>

Marketing

Marketing information for Manitoba aquaculture products is limited; studies on trout and Arctic char have been referred to earlier in this brochure, but they are somewhat dated. A recent study of the market outlook for the Ontario aquaculture industry is attached in Appendix 5. The study found that the greatest market demand existed for salmonid species of fish. Rainbow trout and arctic char rated highly when technological and economic feasibility was taken into account. Economic projections suggested that raising Chinook and Atlantic salmon in conventional raceways and tanks would be financially unrewarding. As for non-salmonid species, while walleye and yellow perch displayed good market potential, from a technological perspective they were poor candidates for commercial aquaculture in Ontario.

The seafood industry is very competitive and, as stated above, the Freshwater Fish Marketing Corporation does not deal with cultured fish. Potential fish farmers will have to rely primarily on their own research to initially assess their market.

The business development sources listed above can assist with assessing the market, determining your marketing strategy, implementing the strategy, and evaluating the effectiveness of your marketing plan. They may refer you to the following contact:

Mr. Gordon Kramer
Executive Director
Manitoba Marketing Network Inc.
Canada/Manitoba Business Service Centre
250-240 Graham Avenue
Winnipeg, Manitoba
R3C 4B3
Phone: (204) 945-1230; toll free: 1-866-219-7932
Fax: (204) 983-3852
E-mail: kraemer.gord@cbsc.ic.gc.ca

The Manitoba Department of Agriculture is active in market development for Manitoba's agricultural products. However, the Department to date has not been involved in marketing aquaculture products, due to lack of volume of aquaculture production. The Department does not have support services for individuals, but would be amenable to assisting fish farming cooperatives to participate in organized marketing activities such as mall displays or international food product conventions. For further information, contact:

Bob Ward
Manager, Market Development & Promotion Section
Manitoba Agriculture, Food & Rural Initiatives
Room 903 Norquay Building
401 York Avenue
Winnipeg, Manitoba
R3C 0P8
Phone: (204) 945-4491
Fax: (204) 945-6134

Financing

Again, the business development contacts listed above can help familiarize potential entrepreneurs with the essentials of planning their financial requirements, including developing a business finance plan, and identifying external and internal sources of funding.

Prospective fish farmers must be prepared to rely on their own resources to finance their operations as financial institutions have been reluctant to finance fish farming operations because of the risks involved. However, the Canada/Manitoba Business Service Centres can help fish farmers identify potential funding sources.

Producers interested in investigating new methods or technology may also be able to obtain assistance from the Aquaculture Collaborative Research and Development Program. (See Appendix 1.) For more information on aquaculture support programs, contact:

Éric Gilbert, Freshwater Advisor
Office of the Commissioner for Aquaculture Development (OCAD)
3230 rue De Blois
Trois-Rivières, Québec G8Z 1R5
Phone: (819) 371-5118
Fax: (819) 371-5117
E-mail: GilbertE@dfm-mpo.gc.ca
Website: <http://ocad-bcda.gc.ca/>

The Municipal Assessment Act defines fish farming as a farming activity and gives fish farmers the same tax advantages as other farmers.

The provincial Retail Sales Tax Act includes fish farming in the same class as livestock production. Fish farmers should be able to receive a sales tax exemption at time of purchase of major supplies and equipment. For further information on specific exemptions, contact:

Retail Sales Tax Branch
101 Norquay Building
401 York Avenue
Winnipeg, Manitoba
R3C 0P8
Phone: (204) 945-6444 (general office)
(204) 945-5603 (Tax Inquiries & Interpretations)
1-800-782-0318 (toll free)
Fax: (204) 945-0896
E-mail: MBTax@gov.mb.ca

Commercial fish farmers are treated as commercial fishermen under the GST. Fish farmers registered under the GST are able to purchase tax-free certain major equipment or supplies necessary for their business (e.g. boats, nets, cages, fish feed). Also, fish sold for food are not taxed under the GST. (However, bait fish are taxable.) For further information on how the GST would affect your operation or for general business information, contact:

Canada Revenue Agency
Winnipeg Tax Services Office
325 Broadway Avenue
Winnipeg, Manitoba
R3C 4T4
Phone: (204) 983-3918 or 1-800-959-5525 (in Winnipeg) or
1-800-959-5525 (outside Winnipeg)
Fax: (204) 983-2066

or visit the Canada Revenue Agency website at: www.cra-adrc.gc.ca

IN SUMMARY ...

As you can see, intensive fish farming is a major commitment, requiring considerable financial and physical resources, as well as a keen business sense. To help you get started in your planning, a fish farming planning checklist has been included in Appendix 6.

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APPENDIX 1

Aquaculture Collaborative Research and Development Program

Aquaculture Collaborative Research and Development Program (ACRDP)

PROGRAM INFORMATION

1. OBJECTIVE

The Aquaculture Collaborative Research and Development Program (ACRDP) is a Department of Fisheries and Oceans (DFO) initiative to increase the level of collaborative research and development activity between the aquaculture industry and the department, and in some instances with other funding partners. ACRDP is an industry-driven program that teams industry with DFO researchers. Projects will be conducted at DFO Research facilities or possibly industry partner facilities. The program will allocate ACRDP funds to collaborative research projects that are proposed and jointly funded by aquaculture producer partners. ACRDP funding is approximately \$4.5 million per year and will be subdivided regionally.

The key goals of the program are to:

- Improve the competitiveness of the Canadian aquaculture industry;
- Increase collaboration between the department and industry on scientific research and development that will enhance aquaculture in Canada;
- Facilitate and accelerate the process of technology transfer and research commercialization through closer collaboration with the Canadian aquaculture industry; and
- Increase scientific capacity for essential aquaculture research and development in the aquaculture sector.

The broad research and development objectives are threefold, as outlined below, with the priorities provided under each objective.

Best performance in fish production

- Improved diets for fish
- Access to broodstock and superior strain development
- Husbandry methods to ensure the production of high quality products
- Avoidance strategies and husbandry methods to control fouling and predators
- Improved grow out systems (offshore, land-based, recirculation)
- New species development

Optimal fish health

- Disease resistance
- Disease surveillance and detection
- Life cycle studies on causative agents (pests, pathogens and parasites)
- Health management

Industry environmental performance

- Influence of environment on aquaculture
- Treatment of land-based fish farm discharge
- Interaction of aquaculture and the environment (e.g., refugia, escapees)
- Carrying capacity and coastal zone modeling
- Real time biological and environmental monitoring

National and regional priorities have been established under these broad objectives.

2. ELIGIBLE APPLICANTS

Eligible industry applicants are aquaculture producers operating within Canada who are directly involved in producing an aquatic species for pre-commercial or commercial purposes. Aquaculture production is defined as growing an aquatic species and further, that the aquaculture producer has ownership of the product or has an aquaculture license or lease to culture the product. Producers undertaking commercial or developmental production activities on existing or new aquaculture species or aquaculture companies or associations involved with sea ranching mariculture operations are eligible to apply. Industry producer associations or consortia of producers are also eligible to apply. Other aquaculture sector stakeholders are eligible to participate as a partner with an industry producer.

3. REVIEW PROCESS

Proposals will be made by applicants based on a standard Application Form and Proposal Format. The Application Form and Proposal will contain information used to evaluate project eligibility and merit. Proposals will be reviewed by DFO officials to ensure completeness, accuracy and eligibility under ACRDP criteria. All eligible projects will then undergo a two part peer-review: first, a technical review by internal DFO and (or) when appropriate, external scientists, followed by a comprehensive review by a Regional ACRDP Committee, comprised of representatives from DFO, provinces, industry and others. The Committee will make recommendations to the Regional Director of Science, who has the authority for project approvals.

Proposals will be evaluated against the following criteria:

Technical Review

- The project has scientific merit.
- The project is original.
- The problem and objectives are well defined.
- There is a clear and sufficient description of the experimental methodology.
- The scientific approach is valid.
- The project team is qualified to conduct the work in a thorough and professional manner.

Comprehensive Review

- The project is consistent with the program objectives and regional industry R&D priorities.
- The project addresses a significant constraint to the Canadian aquaculture sector.
- The project contributes significantly to the advancement or competitiveness of the industry partner or sector.
- The project contributes to the skills and knowledge required to advance the industry partner.
- The project has sufficient industry input to generate potential practical benefits. This can include input from other funding partners, which is desirable and encouraged.
- The project facilitates technology transfer and (or) research commercialization through closer collaboration with the Canadian aquaculture industry.
- The project is cost effective.
- The overall project objective and methodology is described in a clear manner.

4. COLLABORATIVE ARRANGEMENT

The collaborative arrangement will consist of a formal agreement between the Department of Fisheries and Oceans and the industry partner, and in some instances other funding partners. A schedule to the agreement will contain a detailed description of the Project (activities, deliverables, timeframes to be carried out by DFO and the industry partner under the agreement or by a third party under contract agreement to DFO and the industry partner), with estimated amounts to be expended on each activity. The agreement will set out the method and schedule of payment to DFO and reporting requirements. DFO will be authorized to transfer funding between budget items in consultation with the partner. A schedule listing categories of eligible expense including sources of funding from other than the program, will also be included as part of the agreement. If appropriate an Intellectual Property agreement will be negotiated.

5. CONTRIBUTIONS

A formula will be negotiated for each project, taking into account in-cash and in-kind contributions of both parties to the agreement. Industry cash contributions to a project will be managed through a DFO Specified Purpose Account (SPA). The minimum industry contribution will target 25% in 2003/04 and 30% in 2004/05, of which no more than half can be an in-kind contribution. The industry contribution is based on the ACRDP contribution.

6. ELIGIBLE PROJECT EXPENSES

Expenses covered by ACRDP include:

- Wages and salaries plus associated required payroll benefits of project personnel (scientific and technical) or post-doctoral or graduate student support;
- Equipment directly related to the work;
- Laboratory and field supplies;
- Travel costs directly related to the goals of the project;
- Other expenses agreed to be necessary to the success of the project.

7. REPORTING

Industry and DFO partners will be required to provide progress reports at 6 months, annually, and a final report.

8. OTHER CONSIDERATIONS

- All applications must conform to the application form and proposal guideline format.
- Budgets should be broken down into fiscal year increments. Details of budget line items need to be explained on a separate sheet.
- Applicants must declare other direct sources of funding for the project, whether in place, requested or anticipated to be requested, including sources from other government programs.
- The ACRDP will only be used to fund research and development projects.
- The ACRDP will not support projects on transgenic aquatic organisms.
- Although the validity and merit of an application will be the primary consideration in its review, the Regional ACRDP Committee may also consider amounts requested and the anticipated schedule of money flowing to the project in order to ensure that accepted projects do not exceed available funds.
- The Regional ACRDP Committees will rank all applications according to regional industry research and development priorities and national program objectives.
- The Regional ACRDP Committees will categorize applications as fully recommended, recommended with changes or conditions, or not recommended.

9. DEADLINES TO SUBMIT YOUR APPLICATION ARE:

There will be three deadline dates for project proposal submission throughout the year: January 15, April 15, and September 15. Regional ACRDP Committees will review and evaluate proposals in a timely manner and final notification of the project assessment will be provided no later than 60 days after the deadline dates.

10. PLEASE SEND THE APPLICATION TO:

Applicants wanting information or assistance on the ACRDP, or to submit an application and proposal, should contact the DFO Regional ACRDP advisor listed below:

Central and Arctic Region

Tom Johnston
Fisheries and Oceans Canada
867 Lakeshore Road
Burlington, Ontario L7R 4A6
Phone: (905) 336-6231
Fax: (905) 336-6437
Email: JohnstonT@dfo-mpo.gc.ca



Aquaculture Collaborative Research and Development Program (ACRDP)

PROPOSAL GUIDELINES

Please submit a proposal giving the following details:

1. Project title
2. Name, address and position of project manager
3. Description of project work team and required qualifications for key positions (with names, addresses, titles, and CV's where available; maximum length 4 pages per team member)
4. Project problem / rationale (maximum length ½ page)
5. Project objectives (maximum length ½ page)
6. Description of work and experimental protocol (maximum length 2 pages)
7. Description of how this project meets the goals, objectives and priorities of the program (maximum length 1 page)
8. Detailed deliverables of project (must include final project report)
9. Milestones and timelines
10. Organisation profile (maximum length ½ page)
11. Partner(s) profile, including contact name and information (if applicable) (maximum length ½ page)
12. Estimated budget – provide details of each budget item, a budget summary for each fiscal year, if applicable, and a total project budget summary.



Aquaculture Collaborative Research and Development Program (ACRDP)

Budget Summary by Fiscal Year _____ (1 April – 31 March)

Please provide a budget for the total project with each fiscal year detailed on separate attached sheets. Details for each of the line items should also be documented on separate sheets.

Description	Industry Cash Contribution	Industry In-kind Contribution	ACRDP Contribution	DFO In-kind Contribution	Partner Contribution ¹	Total
Salary						
Scientist						
Biologist						
Technicians						
Post-Doc / Students						
Sub-total						
Equipment						
Computer Equipment						
Lab Equipment						
Field Equipment						
Other						
Sub-Total						
Material and Supplies						
Lab						
Field						
Publication costs						
Other						
Sub-Total						
Travel						
Field						
Meetings						
Conferences						
Other						
Sub-Total						
Other						
Administrative						
Facilities						
Other expenses						
Sub-Total						
Grand Total						
% OF CONTRIBUTIONS						

1. If more than one partner, please provide details of contribution from each one.

APPENDIX 2

Water Quality Characteristics

APPENDIX 2

Water Quality Characteristics of Significance in Trout Farming

Parameter	Range or Level	Comment
Temperature	Optimum 15°C For growth 5-20°C Lower lethal -1°C Upper lethal 25°C	The most significant factor in controlling fish growth. For rainbow trout, growth is slower or less efficient at temperatures above and below 15°C*. At 8°C, growth is half that at 15°C. Dissolved oxygen levels are affected by temperature. As temperature increases, oxygen concentration decreases. *Similarly, other fish species will grow over a range of temperatures but will also have an optimum.
Dissolved Oxygen (D.O.)	Greater than 5.0 mg/L (ppm)	At no location in the fish-rearing facility and at no time, should the D.O. fall below 5 mg/L. Water entering the facility should be as close to saturation as possible. Increasing altitude and temperatures reduce the oxygen carrying capacity of water.
Dissolved Nitrogen	Less than 102% of saturation	Groundwater (water taken from the head of springs, artesian wells or pumped from underground) is often deficient in oxygen and supersaturated with nitrogen. Fish held in water supersaturated with nitrogen may develop gas-bubble disease as nitrogen gas is released from the blood. Young fish are particularly susceptible to the effects of dissolved nitrogen.
pH (acidity)	Recommended 7.5 - 8.0 Suitable 6.7 - 8.6	Low pH increases susceptibility to disease - probably by decreasing the ability of mucous to protect the fish. pH affects the balance between harmful and harmless forms of ammonia. (See information on ammonia which follows.)

Water Quality Characteristics of Significance in Trout Farming (cont'd)

Parameter	Range or Level	Comment
Ammonia	Less than 0.012 mg/L (ppm) NH ₃	Some natural water sources may have unacceptably high levels of ammonia. Ammonia is also a major by-product of metabolism in fish. Ammonia exists in two forms, NH ₃ and NH ₃ ⁺ , dependent on pH. The un-ionized form, NH ₃ , which is toxic, becomes more prevalent at higher pH. Ammonia levels in facilities are dependent on fish density and rate of metabolism (affected by D.O., feeding rate, temperature, etc.).
Alkalinity (hardness generally associated with levels of dissolved calcium carbonate)	20 - 200 mg/L (ppm)	Soft and hard water refer to alkalinities of less and more than 100 mg/L, respectively. Low alkalinity results in "failure to thrive" - slow growth and poor condition.
Suspended Solids	Less than 80 mg/L (ppm)	Sufficient suspended solids to make water slightly cloudy may clog gill tissues decreasing growth rates and increasing susceptibility to bacterial gill disease.
Hydrogen Sulfide	Less than 0.002 mg/L (ppm)	This gas is often present in artesian waters and is detrimental to fish production.
Iron	Less than 1.0 mg/L (ppm) (0.3 ppm for hatching eggs or small fish)	Various dissolved minerals including iron may be present at levels which would make the water unsuitable for fish farming.

Source: Ontario Ministry of Natural Resources. 1986.
Aquaculture in Ontario.

APPENDIX 3

Financial Tables

TABLE 1. Schedule for Aquaculture Enterprise Budget

INCOME DATA:

CURRENT \$

CASH INCOME:

Eggs	_____
Fry (0-5cm)	_____
Fingerlings (5-20cm)	_____
Table size fish	_____
Operation of a Fishing Preserve	_____
Export Sales	_____
Specialty items	_____
Miscellaneous farm income	_____

INCOME FROM SALE CAPITAL ITEMS:

Brood stock	_____
Machinery and equipment	_____
Consulting services	_____
Real estate	_____
Miscellaneous	_____

EXPENSE DATA:

CASH EXPENSES:

Hired labour (full time)	_____
Hired labour (part time)	_____
Purchased feeds	_____
Purchased seed stock (eggs, fry, fingerlings)	_____
Other expenses	_____
Veterinary	_____
Drugs and chemicals	_____
Water quality expenses	_____
Other	_____
Custom machinery hire	_____
Automobile (farm share)	_____
Truck	_____
Freight and hauling	_____
Fuel oil (heating, gasoline, lube)	_____
Machinery and equipment repairs	_____
Building and structures - maintenance	_____
Administrative costs (secy., phone, etc.)	_____
Taxes (real estate)	_____
Taxes (income tax)	_____
Insurance	_____
Rents and leases	_____

TABLE 2. Schedule for Aquaculture Enterprise Financial Records

<u>ASSETS:</u>	<u>CURRENT \$</u>
CURRENT:	
Cash on hand	_____
Bank deposits	_____
Other	_____
INTERMEDIATE:	
Brood stock	_____
Machinery and equipment	_____
Other	_____
FIXED:	
Land and improvements	_____
Buildings and support facilities	_____
Water system	_____
 <u>LIABILITIES:</u>	
OPERATING LOANS:	
Total annual interest payments	_____
Total annual principal payments	_____
INTERMEDIATE-TERM LOANS:	
Total annual interest payments	_____
Total annual principal payments	_____
Total principal outstanding	_____
LONG-TERM LOANS:	
Total annual interest payments	_____
Total annual principal payments	_____
Total principal outstanding	_____
MORTGAGES:	
Buildings:	
Total annual interest payments	_____
Total annual principal payments	_____
Total principal outstanding	_____
Land:	
Total annual interest payments	_____
Total annual principal payments	_____
Total principal outstanding	_____
 <u>RECEIVABLES AND PAYABLES:</u>	
Accounts receivable (end-beginning)	_____
Accounts payable (current)	_____
 <u>INVENTORIES (value):</u>	
Fry (0-5cm) (beginning)	_____
Fry (0-5cm) (ending)	_____
Fingerlings (beginning)	_____
Fingerlings (ending)	_____
Table size fish (beginning)	_____
Table size fish (ending)	_____
Farm supplies (beginning)	_____
Farm supplies (ending)	_____

TABLE 3. Schedule for Managerial Goal Setting

BUSINESS REQUIREMENTS:

SHORT-TERM SURVIVAL: (cash requirement)

Owner-family labour (opportunity cost)

LONG-TERM SURVIVAL: (asset replacement)

Investment:

Machinery and equipment (mkt. value \$)

Buildings and structures (mkt. value \$)

Maintenance Rates (%):

Machinery and equipment (%)

Buildings and structures (%)

Depreciation rates (%):

Machinery and equipment (%)

Buildings and structures (%)

LIVING: (Opportunity cost)

Expected rate of return to management (%)

GROWTH: (Opportunity cost)

Expected rate of return to equity (%)

TABLE 4. Format for Income Statement - Aquaculture Enterprise

	<u>CURRENT \$</u>
CASH INCOME:	
Eggs	_____
Fry (0-5cm)	_____
Fingerlings (5-20cm)	_____
Table size fish	_____
Operation of a fishing preserve	_____
Export sales	_____
Specialty items	_____
Miscellaneous farm income	_____
INCOME FROM SALE CAPITAL ITEMS:	
Brood stock	_____
Machinery and equipment	_____
Consulting services	_____
Real estate	_____
Miscellaneous	_____
TOTAL FARM CASH SALES:	
Plus: Accounts Receivable, closing	_____
TOTAL FARM SALES:	
Plus: Inventory change (end-begin.)	
Fry (0-5cm) (end-begin.)	_____
Fingerlings (end-begin.)	_____
Table size fish (end-begin.)	_____
Farm supplies (end-begin.)	_____
GROSS FARM INCOME:	_____
CASH EXPENSES:	
Hired labour (full time)	_____
Hired labour (part time)	_____
Purchased feeds	_____
Purchased seed stock	_____
Other expenses	_____
Veterinary	_____
Drugs and chemicals	_____
Water quality expenses	_____
Other	_____
Custom machinery hire	_____
Automobile (farm share)	_____
Truck	_____
Freight and hauling	_____
Fuel oil (heating, gasoline, lube)	_____
Machinery and equipment repairs	_____
Building and structures - maintenance	_____
Administrative costs (secy., phone, etc.)	_____
Taxes (real estate)	_____
Taxes (income tax)	_____
Insurance	_____
Rents and leases	_____
Interest	_____

TABLE 4. Income Statement (cont'd)

DEPRECIATION:

Machinery and equipment

Buildings and structures

NON-CASH ADJUSTMENTS:

Value of owner-family labour

Accounts payable

TOTAL CASH EXPENSES

NET FARM INCOME

TABLE 5. Format for a Balance Sheet - Aquaculture Enterprise

	<u>CURRENT \$</u>
ASSETS:	
CURRENT:	
Cash on hand	_____
Bank deposits	_____
Accounts receivable	_____
Ending inventories:	
Fry (0-5cm)	_____
Fingerlings	_____
Table size fish	_____
Farm supplies	_____
Other current assets	_____
TOTAL CURRENT ASSETS:	_____
INTERMEDIATE:	
Brood stock	_____
Machinery and equipment	_____
Other intermediate assets	_____
TOTAL INTERMEDIATE ASSETS:	_____
FIXED:	
Buildings and facilities	_____
Land and improvements	_____
Water system	_____
TOTAL FIXED ASSETS:	_____
TOTAL FARM ASSETS	_____
LIABILITIES:	
CURRENT: (1 YR)	
Operating loans payable	_____
Accounts payable	_____
Rent payable	_____
Taxes payable	_____
Interest payable	_____
Plus: Principal payments due	
within 1 year on	
a) Intermediate term loans (1-10 yrs)	_____
b) Long term loans (>10 yrs)	_____
TOTAL CURRENT LIABILITIES:	_____
INTERMEDIATE: (1-10 YRS)	
Intermediate term loans payable (balance)	_____
Less: Principal payments due	
within 1 year on IT loans	_____
TOTAL INTERMEDIATE LIABILITIES:	_____
LONG TERM: (>10 YRS)	
Building mortgages (balance)	_____
Land mortgages (balance)	_____
Other LT loans (balance)	_____
Less: Principal payments due within	
1 year on LT loans and mortgages	_____
TOTAL LONG TERM LIABILITIES:	_____
TOTAL FARM LIABILITIES	_____
TOTAL OWNER'S EQUITY	_____
TOTAL LIABILITY AND EQUITY	_____

TABLE 6. Financial Ratios

PROFITABILITY:

1. Percent return to assets (%) -	$\frac{(\text{Net farm income} + \text{interest})}{(\text{Total farm assets})}$
2. Percent return to equity -	$\frac{(\text{Net farm income})}{(\text{Equity})}$

EFFICIENCY:

3. Capital turnover (years) -	$\frac{(\text{Total farm assets})}{(\text{Gross farm income})}$
4. Operational efficiencies (%)	
a. $\frac{(\text{Total purchases} - \text{interest})}{(\text{Gross farm income})}$	
b. $\frac{(\text{Interest})}{(\text{Gross farm income})}$	
c. $\frac{(\text{Depreciation})}{(\text{Gross farm income})}$	
d. Cost Control (%) -	$\frac{(\text{Net farm income})}{(\text{Gross farm income})}$

LIQUIDITY:

5. Current ratio -	$\frac{(\text{Current assets})}{(\text{Current liabilities})}$
6. Debt structure ratio (%) -	$\frac{(\text{Current liabilities})}{(\text{Total liabilities})}$

SOLVENCY:

7. Debt:Asset ratio -	$\frac{(\text{Total farm liabilities})}{(\text{Total farm assets})}$
8. Debt:Equity (leverage) ratio -	$\frac{(\text{Total farm liabilities})}{(\text{Owner's equity})}$

Source of Figures: Pfeiffer, W.C. and H. Jorjani. 1986. Investment Analysis of Commercial Aquaculture in Central Canada. Canada Department of Fisheries and Oceans. Canadian Industry Report of Fisheries and Aquatic Sciences No. 160. 70 p.

APPENDIX 4

Business Contacts

The Canada/Manitoba Business Service Centre's Regional Offices

The Canada/Manitoba Business Service Centre has established a network of satellite offices to act as intermediaries for the main centre. Each regional office has access to the same program information available in the Winnipeg location as well as a small collection of magazines, books, and audio-visuals materials.

Ashern

Super Six Community Futures Development Corporation/Fieldstone Education and Training Centre

Mail: Box 68

Delivery: Main Street, TBJ Mall

Ashern, MB R0C 0E0

Contact: Debbie Falk

Ph: 204-768-3351

Fax: 204-768-3489

Home Page: <http://www.supersix.mb.ca>

E-mail: supersix@supersix.mb.ca

Brandon

Manitoba Industry, Economic Development and Mines

Mail: P.O. Box 23

Delivery: 107-340 9th Street

Brandon, MB R7A 6C2

Contact: Charlotte Kalmakoff

Ph: 204-726-6257

Fax: 204-726-6403

Home Page: <http://www.wheatbelt.mb.ca>

E-mail: ckalmakoff@gov.mb.ca

Wheat Belt Community Futures Development Corporation

141 Rosser Avenue

Brandon, MB R7A 0J6

Contact: Russ Danielson

Ph: 204-726-1513

Fax: 204-727-5832

Home Page: <http://www.wheatbelt.mb.ca>

E-mail: bdc@wheatbelt.mb.ca

Churchill

Churchill Community Development Corporation

Mail: Box 399

Churchill, MB R0B 0E0

Contact: Steacy Courtney

Ph: 204-675-8871

Fax: 204-675-2934

Home Page: <http://www.townofchurchill.ca>

E-mail: town@churchillmb.net

Dauphin

Dauphin Community Economic Development Centre
Mail/Delivery: 100 Main Street
Dauphin, MB R7N 1K3
Contact: Jana Watt
Ph: 204-622-3229
Toll free: 1-877-566-5669
Fax: 204-622-3290
Home Page: <http://www.city.dauphin.mb.ca>
E-mail: ced_manager@city.dauphin.mb.ca

Flin Flon

Flin Flon Public Library
Mail/Delivery: 58 Main Street
Flin Flon, MB R8A 1J8
Contact: Phyllis Stadnick
Ph: 204-687-3397
Fax: 204-687-4233
E-Mail: lib196758@yahoo.ca

Greenstone Community Futures Development Corporation
Mail/Delivery: 228-35 Main Street
Flin Flon, MB R8A 1J7
Contact: Lois (Bunny) Burke
Ph: 204-687-6967
Fax: 204-687-4456
Home page: <http://www.greenstone.mb.ca/>
E-mail: greencom@mb.sympatico.ca

Gimli

Evergreen Technological Entrepreneurship Centre
Mail: P.O. Box 190
Delivery: 234 Tudor Lane, Gimli Industrial Park
Gimli, MB R0C 1B0
Contact: Gail Emms
Ph: 204-642-5496
Fax: 204-642-4189
Home page: <http://www.esd.mb.ca/>
E-mail: emmsg@merlin.mb.ca

Grandview

Parkland CFDC
Mail: Box 516
Delivery: 421 Main Street
Grandview, MB R0L 0Y0
Contact: Carissa Caruk
Ph: 204-546-5100
Fax: 204-546-5107
Home page: <http://www.pcfdc.mb.ca/>
E-mail: reception@pcfdc.mb.ca

Headingly

Dakota Ojibway Community Futures Development Corporation
Mail/Delivery: c/o 4820 Portage Avenue
Headingly, MB R4H 1C8
Contact: Olga Starr
Ph: 204-988-5373
Fax: 204-988-5365
Home page: <http://www.docfdc.mb.ca/>
E-mail: info@docfdc.mb.ca

Lac du Bonnet

Winnipeg River/Brokenhead Community Futures Development Corporation
Mail: P.O. Box 505
Delivery: 4 Park Avenue
Lac du Bonnet, MB R0E 1A0
Contact: Janice Walker
Ph: 204-345-8691
Toll free: 1-888-298-9023
Fax: 204-345-6334
E-mail: walkerj@wrbcfdc.mb.ca

Lynn Lake

North West Manitoba Community Futures Development Corporation
Mail: Box 188
Delivery: 499 Sherrit Ave
Lynn Lake, MB R0B 0W0
Contact: Alyssa George
Ph: 204-356-2489
Fax: 204-356-2785
E-Mail: crediger@mts.net

Morden

Morden & District Chamber of Commerce
Mail/Delivery: 102 - 195 Stephen Street
Morden, MB R6M 1V3
Contact: Cheryl Link
Ph: 204-822-5630
Fax: 204-822-2041
Home Page: <http://www.mordenmb.com>
E-Mail: chamber@mordenmb.com

Morris

Triple R Community Futures Development Corporation
Mail: Box 190
Delivery: 220 Main Street N.
Morris, MB R0G 1K0
Contact: Allysse Champagne-Parent
Ph: 204-746-6180
Toll free: 1-800-275-6611
Fax: 204-746-2035
E-mail: info@triplercfdc.mb.ca

Neepawa

Neepawa Area Development Corporation (NADCO)

Mail: Box 598

Delivery: 290 Davidson Street

Neepawa, MB R0J 1H0

Contact: Amanda Naughton

Ph: 204-476-2055

Fax: 204-476-5456

Home Page: <http://www.town.neepawa.mb.ca>

E-mail: nadco@mts.net

Norway House

Kinosao Sipi Business Development Corporation

Mail: Box 760

Norway House, MB R0B 1B0

Contact: Tony Scribe

Ph: 204-359-6967

Fax: 204-359-6053

Notre-Dame-de-Lourdes

CDC Lourd on

Mail: C.P. 336

Delivery: 51 rue Rodgers

Notre-Dame-de-Lourdes, MB R0G 1M0

Contact: Monique Adams

Ph: 204-248-7273

Fax: 204-248-2049

E-mail: madam@gov.mb.ca

Peguis

Peguis Development Corporation

Mail: Box 159

Peguis First Nation, MB R0C 3J0

Contact: Cheryl Bear

Ph: 204-645-3405

Fax: 204-645-2198

Home Page: <http://www.peguis.ca>

E-mail: pegdev@mts.net

Portage la Prairie

Heartland Community Futures Development Corporation

Mail/Delivery: 11 - 2nd Street NE

Portage la Prairie, MB R1N 1R8

Contact: Barb Kitching

Ph: 204-239-0135

Toll free: 1-877-472-7122

Fax: 204-239-0176

Home Page: <http://www.heartlandcfdc.com>

E-mail: bkitching@heartlandcfdc.com

Riverton

NEICOM Development
Mail: Box 10
Delivery: 12 Main Street North
Riverton, MB R0C 2R0
Contact: Claudia Krawchuk
Ph: 204-378-5106
Fax: 204-378-5192
Home Page: <http://www.neicom.mb.ca>
E-mail: neicom@mts.net

St. Laurent

Rural Municipality of St. Laurent
Mail: P.O. Box 220
Delivery: 436 Veterans Memorial Road
St. Laurent, MB R0C 2S0
Contact: Diane Friesen
Ph: 204-646-2259
Fax: 204-646-2705
E-mail: rmstlaur@mb.sympatico.ca

St-Pierre-Jolys

Bilingual Service Centre
Mail: Box 28
Delivery: 427 rue Sabourin
St-Pierre-Jolys, MB R0A 1V0
Contact: Murielle Bugera
Ph: 204-433-2580
Fax: 204-433-3842
E-Mail: mbugera@chaboille.mb.ca

Selkirk

North Red Community Futures Development Corporation
Mail/Delivery: 355 Main St.
Selkirk, MB R1A 1T5
Contact: Peter Mandryk
Ph: 204-482-2020
Fax: 204-482-2033
Home Page: <http://www.northredcfdc.mb.ca>
E-Mail: info@northredcfdc.com

Southport

White Horse Plains Community Futures Development Corporation
Mail: P.O. Box 66
Delivery: Room 109, 36 Centenaire Dr.
Southport, MB R0H 1N0
Contact: Ken Arundell
Ph: 204-428-6000
Fax: 204-428-6006
Home Page: <http://www.whpcfcd.ca>
E-Mail: info@whpcfcd.ca

Swan River

Swan Valley Enterprise Centre
Mail: P.O. Box 370
Delivery: 120 - 6th Avenue N.
Swan River, MB R0L 1Z0
Contact: Darlis Collinge
Ph: 204-734-3417
Fax: 204-734-5271
Home Page: <http://www.svec.mb.ca>
E-mail: svec@svcn.mb.ca

The Pas

Cedar Lake Community Futures Development Corporation
Mail: P.O. Box 569
Delivery: #1 St-Godard
The Pas, MB R9A 1K6
Contact: Martin Klatt
Ph: 204-627-5450
Fax: 204-627-5460
Home page: <http://www.cedarlake-cfdc.com>
E-mail: admin@cedarlakecfcd.ca

Thompson

North Central Community Futures Development Corporation
Mail: P.O. Box 1208
Delivery: #2 - 3 Station Road
Thompson, MB R8N 1P1
Contact: Jacqueline Meneer
Ph: 204-677-1498
Toll free: 1-888-847-7878
Fax: 204-778-5672
E-mail: e-biz@northcentraldevelopment.ca

Winnipeg

Canada/Manitoba Business Service Centre (head office)
Mail: P.O. Box 2609
Delivery: 250 - 240 Graham Avenue
Winnipeg, MB R3C 4B3
Ph: 984-2272 or 1-800-665-2019
Fax: 983-3852
Home Page: <http://www.cbosc.org/manitoba>
E-mail: manitoba@cbosc.ic.gc.ca

Asper Centre for Entrepreneurship
Mail/Delivery: Room 526, 5th Floor Drake Centre
University of Manitoba
181 Freedman Crescent
Winnipeg, MB R3T 5V4
Contact: Brenda Bailey
Ph: 204-474-8443
Fax: 204-474-7698
Home Page: http://www.umanitoba.ca/management/acdep_navset.htm
E-mail: bbailey@ms.umanitoba.ca

Indian & Métis Friendship Centre of Winnipeg, Inc.
Mail/Delivery: 45 Robinson Street
Winnipeg, MB R2W 5H5
Contact: Violet Raven
Ph: 204-586-8441
Fax: 204-582-8261
Home Page: <http://www.mac.mb.ca/wfc/index.htm>
E-mail: wpg.fc@shawbiz.ca

Kitayan CFDC
Mail/Delivery: 345-260 St. Mary Avenue
Winnipeg, MB R3C 0M6
Contact: Darlene Landon
Ph: 204-982-2170
Fax: 204-943-3412
Home Page: <http://www.kitayan.ca>
E-mail: kcfdc@kitayan.ca

Louis Riel Capital Corporation
Mail/Delivery: 340 - 150 Henry Avenue
Winnipeg, MB R3B 0J7
Contact: Rose Beaulieu
Ph: 204-589-0772
Toll free: 1-800-387-6004
Fax: 204-589-0791

St. Boniface Bilingual Service Centre
Mail/Delivery: 100-614 DesMeurons Street
Winnipeg, MB R2H 2P9
Contact: Jason Lacasse
Ph: 204-945-4025
Toll free: 1-866-267-6114
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APPENDIX 5

Ontario Marketing Study

AGRICULTURE AND FOOD RESEARCH FUND
Research Projects Summary

AG2073 - Opportunities for Enhanced Development of Commercial Aquaculture in Ontario: A Technological and Economic Analysis of Alternative Species

RESEARCHER: Daniel Stacey, Canadian Aquaculture Systems

FUNDING: \$11,050

OBJECTIVES:

1. To evaluate the market outlook for each species on the Ontario "list of culture species" as an initial step toward focusing industry expansion.
2. To assess the technological feasibility of those species demonstrating good market potential and opportunity.
3. To assess the commercial feasibility of those species which are technologically feasible for culture in Ontario's temperate climate.
4. To conduct in-depth market research to determine consumer usage and attitudes toward these species.
5. To recommend an action plan for the development of an expanded aquaculture industry in Ontario.

EXPECTED BENEFITS:

1. Enhanced viability of the Ontario aquaculture industry through improved profit potential, reduced competition, broadening of the supplier and service sectors, and increased visibility and public awareness.
2. Enhancement of the general economy of the province due to increased construction, creation of employment opportunities for both skilled and unskilled labour, provision of an alternate source of resources and technological development, and increased revenue from the domestic and export sale of an expanded variety of premium quality seafood products.
3. Broadened opportunities for specific target groups (i.e. tobacco farmers, northern Indians etc.) who may be located in areas of limited or declining resource opportunities.

SUMMARY OF RESEARCH RESULTS:

In the initial phase of this study, seafood managers at grocery stores and fishmarkets throughout southwestern Ontario were polled to assess the marketability and marketing aspects of 21 potential cultured species. Based upon mean species marketability scores in relation to the primary business classification of respondents, and the type and form of fish predominantly sold by respondents, the list of 21 species for commercial aquaculture development was reduced to 14. In southwestern Ontario, it appears that the greatest market demand exists for salmonid species of fish. Of 11 species of salmonids on the list, 10 display good market potential; only the Brown Trout has limited marketability. Rainbow Trout and Atlantic Salmon display excellent market potential in southwestern Ontario, while Lake Charr, Whitefish, and Coho Salmon display very good potential. Moderately good potential is offered by Chinook Salmon, Pink Salmon, Arctic Charr, Splake and Brook Charr. The same cannot be said for non-salmonid species, however. Only 4 out of 10 species demonstrate good market potential in southwestern Ontario. Walleye and Yellow Perch display the best potential, having mean likelihood to sell scores comparable to Chinook Salmon. Not surprisingly, these two species have high end-consumer awareness, being two of the top three species commercially harvested from the Great Lakes fishery. In spite of having low overall potential, Sturgeon and Hybrid Bass appear to have excellent marketing opportunities in specialized market segments.

In contrast to a behavioural basis for market segmentation, it may appear that the market for fish and seafood products is already segmented into two clearly defined groups - fishmarkets and retail grocery stores. Survey data indicate that significant differences do exist between these groups and thus, tailored marketing campaigns can be directed toward each group. Most notably, the two groups place different emphasis on the relative importance of purchase decision-making factors. As well, differences in the likelihood to sell various species of fish were also identified.

In the second phase of the study, only those species which displayed good market potential were further scrutinized. From a technological perspective, as anticipated, Rainbow Trout and Brook Charr display the largest overall rating among the candidate species. Moreover, at the present time, the salmonid species, except for Coho Salmon and Whitefish, have a greater potential for commercial scale culture in Ontario than do the coolwater species. It appears that Arctic Charr and Chinook Salmon have the most potential for development of commercial culture enterprises. Atlantic Salmon (Sebago Lake strain), and Splake also demonstrate moderately good culture potential from a technological perspective, however, attention must be focused upon the early fry rearing and grow-out phases Atlantic Salmon culture and the slower growth rate of Splake. Coho Salmon, Whitefish, Sturgeon, Walleye, Yellow Perch and Hybrid Bass were found to be poor candidates for commercial aquaculture in Ontario, based upon technological factors.

Having narrowed the list of candidate species based upon marketability and technological feasibility, the economics of each species was considered. It appears as though Chinook Salmon, Atlantic Salmon and Splake are not presently economically feasible for commercial-scale culture in Ontario using conventional fish production techniques. All three species display a negative financial return. Splake are unsuccessful largely due to the low market value for the species, its reduced production capacity and inflated mortality and egg/fingerling expenses.

Economics projections also suggest that production of 0.5-1.0 kg (1-2 lb) Chinook Salmon and Atlantic Salmon in conventional raceway/tank culture facilities will be financially unrewarding. As in Splake production, poor financial performance appears to be due largely to the low market value of the products and to increased egg and mortality costs. Due to enhanced capacity, feed expense is also proportionately higher for Atlantic Salmon culture, however, this enhanced production capacity, and the species good rate of survival, are insufficient to offset additional costs.

Arctic Charr presents the best opportunity for a financial return from a conventional Ontario fish culture operation, in spite of a high egg/fingerling cost, and only a moderate survival rate. The enhanced production capacity and high market value for the species appear to be sufficient to offset these additional production expenses. It should be cautioned, however, that certain technological constraints must be resolved if Arctic Charr production is to become economically viable on a large scale.

Source: Ontario Ministry of Agriculture, Food and Rural Affairs. Agriculture and Food Research Fund. January 1999.

Website:

<http://www.gov.on.ca/OMAFRA/english/research/researchfund/agfooddocs/ag2073.htm>

APPENDIX 6

Fish Farming Planning Checklist

FISH FARMING PLANNING CHECKLIST

(Source: Aquaculture in Ontario, Ontario Ministry of Natural Resources, 1986)

LEGAL ASPECTS:

1. Do your provincial laws and regulations permit introduction, commercial rearing and/or sale of the species of fish you are interested in?
2. What permits or licences are required?
3. Are there other federal and provincial regulations which will affect your operations:
 - a) international and interprovincial regulations governing movement of fish and eggs;
 - b) control of predators;
 - c) use of algicides;
 - d) water rights, water access and drainage;
 - e) processing; and
 - f) retailing.

ECONOMICS:

1. Develop a business prospectus detailing land or space costs, capital expenditure for fish stock, equipment, buildings, water impoundment construction, operating capital needed, labour requirements, costs of financing, production, harvesting and marketing, depreciation schedules, and a profit and loss estimate. Such a prospectus is often necessary to obtain financing but, more important, it forces the prospective investor to take a hard look at the economic factors involved.
2. Do you have, or can you obtain, adequate financing for capital outlays and operating expenses through marketing the first harvest -- perhaps for a period of a year or more?
3. Are you psychologically and financially prepared to only break even or perhaps to take a loss for the first year or two of operation?
4. Are you aware of all your production and/or processing costs in order to evaluate your ability to meet competition and make a profit?
 - a) Overhead as well as operating costs?
 - b) Percent of shrinkage or processing losses to expect from a live harvest weight to processing plant or consumer product weight?
 - c) Have you figured your fringe benefit costs in your labour expenses?

MANAGEMENT:

1. Personnel

- a) Are you or your production manager technically trained or have the experience to manage your operation at optimum efficiency? If not, have you arranged for management counselling and periodic checks on you operation by expert consultants?
- b) Are you, or do you have available, a biologist or pathologist competent to make immediate diagnosis and proceed with proper chemical treatment of diseases, parasites, etc. for fish stocks and to deal with biological problems of hatching and rearing?
- c) Do you have adequate skilled help to efficiently carry out all phases of your operation to maintain schedules and to meet emergencies?

2. Production Plant Facilities and Layout

- a) Are your ponds, tanks, hatcheries, processing and shipping areas, etc. laid out for optimum efficiency of labour and time?
- b) Are your facilities accessible during prolonged adverse weather conditions?
- c) Have you accounted for expansion in your production plant layout?
- d) Are adequate utilities -- three phase electrical power, potable water, sewage disposal - available?
- e) What alternate production facilities should be considered -static ponds, earthen or concrete raceways?

3. Equipment

- a) What apparatus and laboratory equipment will you require for testing of oxygen levels, disease and other diagnostic evaluation of your operation?
- b) What emergency power unit is available in the event of failure?

4. Biological and Chemical Controls

- a) What is a safe margin of oxygen level that must be maintained? Do you have provisions for emergency oxygenation of water?
- b) Do you have special permits and the cooperation of provincial and federal wildlife agencies for control of predators?

MARKETING

1. Have you studied your market outlets?

- a) Do you have reasonably firm market commitments as to quantity, price, product form?
- b) Do you have alternate market outlets?
- c) Can you adjust your harvest time to take advantage of high points in seasonal demand and price fluctuations, if they exist?
- d) Can you provide maximum product quality, type, form, and weight of products and other services your market outlet requires?
- e) Do you have or can you arrange for adequate distribution facilities and dependable supply sources to meet the time, quality and quantity demands of your market?

2. Have you planned for market promotion and education activities?

- a) Scheduled an advertising budget to stimulate sales?
- b) Cooperated with news media staffs to develop stories and programs to increase public awareness of the industry?

PHYSICAL FEATURES OF PRODUCTION SITE:

1. Site Location

- a) Does your site possess natural elevations so that proper engineering will allow each pond to be drained independently and completely?
- b) Does the land elevation permit biological supervision and general physical maintenance without excessive travel?
- c) Has analysis of the soils been made to determine physical qualities for water retainment and fish culture?
- d) Have core drillings been made to determine impervious qualities of subterranean soils?
- e) Are your production facilities protected from crop spraying on adjacent lands?
- f) Are adjacent lands subject to spraying for insects and weeds?
- g) Is the site free of all possible overflow by flooding?
- h) Is drainage available to natural waterways without crossing other private lands?
- i) Can you economically secure your production facilities from poaching?

2. Water Supply

- a) What is the source of your water supply -- reservoir, well (ground) water or running stream? Is it adequate for present and future needs? Is there an alternate source available in case of emergency?
- b) Is it possible to secure the necessary water permits for the needed volume of water for your present and future needs?
- c) What are the temperature variations of your water supply?
- d) Has the water been tested for chemical adaptability to fish production? Have provisions been made for aerating well water? Are surface waters free from harmful chemicals?
- e) Can you control predators and unwanted fish species if surface water is used?

FEEDING:

1. Feed Source

- a) Is feed readily available in quantities needed and constant supply?

2. Feeding Procedure

- a) What special equipment will be needed for an efficient feeding system?
- b) How will you determine daily feeding rates? What factors will determine the rate of increasing feed to maintain maximum consumption and growth?
- c) What feeding schedule will you follow?
- d) What physical apparatus or observation procedure will you use to check feed consumption?
- e) If feed consumption stops, what biological analysis must be made immediately?
- f) How many areas in a given pond and over how large an area will you feed for the best results?
- g) When pelleted feeds are used:
 - What percentage of fines in your pelleted feed is permissible without creating water contamination?
 - What size feed pellets are best suited for fry, fingerlings and feeder fish?
 - Should you use a floating or sinking feed?

HARVESTING:

1. What is the most economical type of harvesting method for your present and future facilities?
2. How will you construct your ponds or other production facilities for the most efficient harvesting techniques?
3. Will you need special holding tanks or ponds to keep quantities of fish ready for immediate delivery?
4. Do you have sufficient and reliable manpower available for harvest period?

PROCESSING/TRANSPORT:

1. If you plan to dress and/or package fish for resale, will your facilities conform with provincial food processing and sanitation codes? Do you need processing and retail sales licences?
2. How quickly can you take your harvest to processing area?
3. Do you have adequate chilling and/or freezing facilities to maintain high flesh quality?
4. Is it to your advantage to contract with a processor for your annual production?
5. Good service and good quality are major keys to sales expansion. Are you equipped to give both?
6. What will you use for water cooling purposes in transporting live fish -- ice, refrigerated vans, refrigerated water tank?
7. What will you use for oxygenation purposes in transporting live fish?

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