AG-Ventures

Agriculture Business Profiles

Revised October 2006 **Agdex 485/830-1**

Fresh Water Aquaculture Industry

The purpose of this factsheet is to provide an overview of the marketing and production characteristics of freshwater aquaculture in Alberta. This overview is not intended to be a substitute for individuals making their own thorough assessment of all the key issues that will influence the success of an individual enterprise.

1. Industry Highlights

- The year 2005 performance of the Alberta aquaculture industry has been estimated at $10 million. A breakdown is as follows:
  - $6 million in revenue from table fish sales
  - $4 million in revenue from fingerling sales, including u-fishing opportunities, government contracts, private pond stocking and grass carp for biological vegetation control
- Forecasts for the future of the Alberta aquaculture industry have been estimated to increase approximately 10 per cent each year. However, growth has been static for the past five years. Cultured fish currently eligible for licensing include: rainbow trout, brook trout, brown trout, tilapia, goldfish, koi, Arctic char, triploid grass carp, American eel, Atlantic salmon, chinook salmon, cohoe salmon, sockeye/kokanee salmon, bigmouth buffalo fish and freshwater prawns. These fish are all being farmed in Alberta. Rainbow trout make up the majority of Alberta's production and sales.
- There are five fish enterprises in Alberta.
  - **fingerling production** – Operators raise fingerlings for sale to recreational licence holders, other commercial fish farmers, bioassay labs and wholesalers.
  - **table food market production** – Operators grow fingerlings to table market size for restaurants, food stores, farmers markets, etc.
  - **u-fish operations** – Producers stock ponds with ready-to-catch fish for the recreational fishing customer.
  - **contract growing** – Operators contract their services to raise and grow rainbow trout for stocking select ponds. The Alberta Conservation Association is responsible for the contracts and stocking. The water bodies include some of the small municipal lakes and ponds for recreational fishing. Examples are seniors' and children's ponds.
  - **biological grass control carp** – Operators raise sterile carp for weed control in water and for research purposes.
- There are two types of commercial enterprises: intensive and extensive. Intensive aquaculture utilizes controlled environments and prepared feeds to produce marketable fish on a year-round basis. Extensive operations use ponds and dugouts, often with natural sources of food, to produce fish on a seasonal basis.
  - **Intensive operations** require consistent seasonal or year-round markets, significant capital investment and high levels of production. Individuals seeking a major livelihood from aquaculture enterprises are likely to develop an intensive operation.

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- **Extensive operations** can be developed with seasonal markets, limited capital investment and less time commitment. Individuals looking to use an existing pond to generate supplemental income or pursue a hobby are likely to practice extensive aquaculture.

- Fish farmers who produce fish for market must spend time researching their markets, identifying customer needs and developing marketing strategies. New entrants must be prepared to perform a large number of marketing and advertising activities to introduce their product to consumers, retailers and processors.
- Most of the table-size rainbow trout consumed in Alberta are imported from the United States. Capturing a greater portion of the table fish market is an opportunity for Alberta producers. However, greater access to this market depends on local producers marketing a premium, fresh and readily available Alberta grown product.
- Fish farmers identified 10 factors as necessary to develop a successful fish farm business. They include:
  - hard work and a commitment to success
  - recognition that fish are live animals and need to be treated as such
  - skill in managing human resources
  - start small to reduce risk of loss while learning about aquaculture
  - grow a highly valued, high quality product and provide good service
  - business experience and knowledge are required
  - marketing fish is where the money is made
  - aquaculture is a high-risk business
  - it takes a long time to make a profit in aquaculture
  - work only with proven fish production technology

2. Regulatory Basics

- The production and marketing of fresh-water fish in Alberta must comply with both federal and provincial regulations. These regulations are designed to protect native species of fish, provincial fish hatcheries and public water bodies.
- Alberta regulates possession of live cultured fish in the province through legislation maintained by the Fisheries Management Division at Alberta Sustainable Resource Development. Only certain species of fish are eligible for fish farming activities.
- Alberta Agriculture, Food and Rural Development's Inspection/Investigation Branch issues three types of fish licences. Under the *Alberta Fisheries Act*, these licenses are required to acquire, grow, breed, keep and sell live cultured fish. The licence can be recreational, or Class A or B commercial, depending on purpose and species being raised.
- A Recreational Fish Culture Licence is intended for the recreational, non-commercial, personal use of the applicant.
- A Class A Commercial or Recreational Licence is for a business that sells and keeps cultured fish (rainbow trout, brook trout, brown trout, Arctic char or triploid grass carp).
- A Class B Commercial Licence allows you to sell and keep fish in contained waters. These can be indoors or isolated from other water sources. The fish can include Atlantic, chinook, coho and sockeye salmon, freshwater prawn, goldfish, koi, tilapia, bigmouth buffalo fish or American eel.
- Each application for a Commercial Fish Culture Licence is evaluated to ensure the proposed site and species do not interfere with or threaten the native fish species. The licence holder is required to complete an annual report. All licences issued are for specific species at the designated culture site. Commercial hatcheries can only sell fingerlings to individuals holding a valid recreational or commercial licence. Commercial fish farmers can only acquire their fish stocks from licenced suppliers.
- A diversion or use of water licence may be required from Alberta Environment to use large volumes of surface or groundwater. For more information contact Alberta Environment. Nutrient limits have also been set to manage effluent. Any commercial operation discharging effluent must conform to those limits.
- Fisheries and Oceans Canada regulates interprovincial trade of live salmonids. Alberta producers require disease certification in order to move live salmonids out of the province. This federal responsibility requires annual fish testing and is currently without cost to the producer.

- Alberta producers require an import permit from Alberta Sustainable Resource Development's Fisheries Management Division to import salmonid eggs. Importation of salmonid fish into Alberta is restricted to the egg stage only. Fingerling to adult sized fish cannot presently be imported. Eggs must be obtained from an approved and certified disease-free fish farm. Permits are for specific periods of time, species and number.

3. Marketing Basics

- Fish farmers must be prepared to be active in the marketing of their products. Before developing an aquaculture enterprise, producers must research their potential markets to determine customer needs, which fish to produce, which market to target and how to best market their product.
- The two primary markets for the Alberta aquaculture industry are the fingerling (for stocking ponds/dugouts/lakes) and table food markets. Several other fish markets have also been developed in Alberta. They include the u-fish market, the market for bioassay research fish, the grass carp biological weed control market and the ornamental/feeder fish market.
- The fingerling market involves the sale of fish to recreational licence holders. These include u-fish operators and other commercial fish cultured growers for stocking their ponds, dugouts or facilities, and the Alberta Conservation Association for stocking of public water bodies.
- Fingerling producers import double disinfected eggs. They hatch and raise them to small fingerlings (less than four inches). This enables them to supply of six to 12-inch fingerlings for stocking the following year (usually in late spring or early summer). For u-fish operators, the ideal size is likely to be in the eight to 12-inch ranges. This reduces predator losses and allows for immediate fishing opportunities. Smaller fingerlings are purchased at a lower price per fish.
- The price of trout fingerlings for stocking is $0.25 per inch for fingerlings reaching up to five inches in length and $0.30 per inch for the larger fingerlings. The most successful marketing activities used to build up the sales of six to eight-inch fingerlings for pond include: industry advertising, word-of-mouth promotion and the ability to provide (production and technical) support to clients. Marketing is affected by localized fluctuations in spring run-off. This affects pond depths and the overwintering of stocked fish. Areas with recent winterkill have greater customer requests for restocking, while drought areas have less stocking requests.
- The average number of fingerlings purchased by a recreational fish farmer is estimated to be 200. This is the approximate number needed for a 30 by 60-metre pond. Alberta producers currently supply 100 per cent of the province's trout fingerlings. This is due to a border closure, resulting from fear of importing Whirling Disease. Egg stocks originate from private and government suppliers in Idaho, Washington, British Columbia or Alberta.
- The Alberta Conservation Association annually awards a limited number of rainbow trout contracts to Alberta commercial fish grow-out operations. Contracts are for stocking select public water bodies for recreational angling.
- The table market for trout focuses on producing a table-size fish for human consumption. Generally, this market requires the fish to be gutted, with the head left attached. To access this market, producers must provide a price-competitive product with a consistently high quality taste and texture. The market for table-size trout is accessed through a network of brokers, processors, wholesalers, retailers, food service agencies and local markets, where producers sell directly to the consumer.
- The commercial market has specific requirements in terms of size, quality and consistent supply. Retailers prefer a 454 gram (one pound) trout. Restaurants desire a 227 gram (eight ounce) size, or a one to two kilogram (two to four pound) trout for fillets. Trout producers, growing for table markets, must have an approved in-house processing facility or use the services of a licenced wholesaler/processor.
- The wholesale price for fresh table-market rainbow trout varies with the outlet, but it averages from $6 to $8 per kilogram for fresh, dressed and delivered trout. Frozen products sells for 10 to 15 per cent less.
- Fish farmers who plan to sell outside of the province (or importing food fish) require a certificate of registration from the federal Canadian Food Inspection Agency.

- Most of the table-food trout sold in Alberta is imported from the United States. Fresh, imported trout has a reduced shelf life, due to long distance transportation. Thus, a direct opportunity exists for Albertans to supply fresh table-size fish. However, the product must be quality tasting, consistently available and competitively priced.
- Creating other products from table fish adds value and increases market potential. Value-added can include: fillets, steaks, smoked, kippered, pickled, patè, deboned, butterflied or battered. There are only a few fish processing facilities in Alberta.
- Licenced recreational fish culturists cannot sell fish or angling opportunities. This licence only allows the rearing of fish for personal consumption (or for giveaway to friends and relatives).
- Commercial fish farmers can sell table fish:
  - to retailers or wholesalers who have a meat processing license, but this market usually requires a year-round supply in order to meet the needs of the market
  - at Farmers' Markets or directly to customers, provided the fish are not live and are kept in a manner accepted under the *Public Health Act*
- The u-fish market provides an opportunity to fish for recreation. Some consumers are seeking family-oriented recreation, aesthetics and relaxation. Others want to be part of a group social event or are ardent fishing enthusiasts. Accessing the u-fish market requires a good location close to large populations or a tourist site, highway access, visibility, signs and parking.
- Operating a u-fish venture requires the management of stocking densities and predators to insure acceptable catch rates and sizes. It also requires an ability to deal with the public, having additional facilities such as washrooms and carrying liability coverage. The prices charged by u-fish operators vary greatly. Some charge according to the size of fish caught. A minimum guideline is $0.50 per inch, or $5 to $7 per pound. Others charge a daily, monthly or annual user fee. Another option is group bookings.
- Markets for bioassay rainbow trout are small, involving live trout sales to laboratories for water quality analysis. This market requires a weekly supply of trout that weigh between 0.2 and 0.6 of a gram each. Labs usually request fish reared from certified disease-free facilities.
- The price for rainbow trout delivered to a laboratory for bioassay use is $0.25 per trout.
- The goldfish market involves supplying wholesalers, pet stores and aquarium owners with either feeder or fancy goldfish. To access this market, producers must be able to accomodate year-round production. Wholesalers pay $0.15 each for feeder goldfish and up to $1 each for fancy varieties. Goldfish sold directly to small ponds sell for $2 to $5, depending on size and colour. The koi market can be very selective, selling only quality ornamental fish to backyard or indoor pond owners.
- Other potential commercial markets for new aquatic species require feasibility analysis, risk assessment and final approvals.
- The critical marketing issues for managers of aquaculture enterprises are to:
  - recognize that fish are highly perishable and require stringent quality control during production and in processing
  - research the various markets for Alberta-produced fish and determine customer requirements
  - identify a target market for their fish and determine how to access that target market
  - produce the specific product required by that market and maintain it faithfully
  - have access to an approved processing facility

4. Production Basics

- Freshwater aquaculture requires a significant level of production management. Producers must be prepared to learn as much as they can about aquaculture, visit fish farms, join aquaculture associations, attend training sessions and read extensively about fish production.
- Each potential market for Alberta fish has specific production requirements. Producers need to identify the species of fish to be produced, the average size and number of fish to be harvested and the dates of harvest.
- Production requirements vary for each fish species. This information is widely available through publications and from established producers. Some of the key production considerations are:
  - **trout fingerling market** – Hatching and growing is commonly done indoors. Fertilized trout eggs require a continual flow of water to supply the necessary oxygen and an environment that is free of pollution. The optimum water temperature is 15°C. The customers often expect delivery.

- **trout table market** – These fish can be grown out in tanks, raceways or ponds. The ideal water temperature is 15°C. A processing or smoking facility might be added to increase the value of the fish.
- **u-fish market** – The focus is on the control of fish stocking numbers and their size in order to achieve acceptable catches of good-size fish. Taste is also important.
- **arctic char** – The production cycle is one year to achieve good size. Arctic char thrive in colder waters better than trout species, but they cannot tolerate warmer water.
- **goldfish** – The production process requires two to three months for feeder fish and up to a year for ornamental pond stocking size, using room temperature water. The market requires a year-round supply.
- **tilapia** – The production process requires warm water (25 to 30°C), usually in tanks. It takes a production cycle of up to 12 months to produce a one-pound fish.

■ The target market and production process helps determine whether to develop and operate an intensive or extensive system.

■ **Extensive production practices** utilize outdoor facilities such as ponds or dugouts. Extensive practices generally are used by u-fish operators, hobbyists and by grow-out operators who produce and market fish on a seasonal basis. These operations generally have low investment costs and are able to utilize natural food sources and natural water sources. Extensive operations reduce the opportunity to control factors affecting fish survival and fish growth, as compared to intensive practices.

■ **Intensive production practices** require more sophisticated management techniques to maximize fish production. Intensive facilities generally have higher investment and operating costs. However, they are able to produce fish on a year-round basis.

■ Commercial aquaculture can unclude the following:

- **pond culture** – Several important management considerations are required when establishing an extensive aquaculture enterprise. Please refer to the Alberta Agriculture, Food and Rural Development's factsheets in the Agdex 485 Series. They provide general criteria about constructing dugouts, pond screens, licences, water quality, algae control, predator control and weed control.
- **hatcheries** – Producers must strictly manage the fertilization and incubation process, as well as the grading and feeding of the young fish. Rearing trout requires a facility that provides rapid water circulation and a moderate to cool water temperature. The ability to provide a year-round supply of fish stock is beneficial.
- **recirculation culture** – The modern, environmentally accepted method of aquaculture production is recirculation. Most of the water source is circulated back into the system for reuse. Any effluent waste can easily be managed. These systems require considerable capital investment and have high operating costs. Rearing fish can be done year-round.
- **raceway culture** – Raceways are artificial water channels in which fish are raised. In this environment the water flows or is continuously pumped through the channels. The capital costs associated with these artificial channels can be significant. Additional operating costs are required for supplemental feed, water pumping and waste removal costs. The critical management concerns for raceway culture are effluent management and the reduction of nutrient discharge.
- **cage culture** – Fish are raised in large cages floating in outdoor water bodies. Currently, cage culture is not allowed in Alberta's public waters, unless it is approved through a research permit from Alberta Sustainable Resource Development's Fisheries Management Division. The benefit of cage culture is that a high harvest level can be attained without the addition of facility costs. Some pond owners practice cage culture using net pens. The pens provide easy access to the fish.

■ ***The critical production issues*** in freshwater aquaculture are:

- determining the appropriate fish species to produce
- choosing the method of production to use
- identifying the target market
- continuously adjusting the production process in order to deal with production issues, such as predators, disease, water quality, harvest and feeding

- Other production considerations include:
  - **stocking** – Stocking densities are a major production issue for both intensive and extensive fish culture.
    - Fingerlings less than 10 cm (four inches) are more susceptible to disease and predation.
    - Alberta Agriculture, Food and Rural Development generally suggest stocking 15 to 20 cm (six to eight inch) fish at a rate of 250 to 300 per 0.4 hectare (one acre) of pond surface. Producers need to recognize that, over time, growing fish can outstrip the pond's ability to support them. These recommendations do not consider the depth of the pond.
    - Large fingerlings and frequent stocking are necessary to meet demands of u-fish clients and community ponds.
    - Intensive aquaculture tends to work with higher fish densities, requiring greater management to maintain water quality and healthy fish.
  - **feeding** – Feeds and feeding are important determinants in fish performance for both intensive and extensive enterprises.
    - Producers need to be familiar with both the natural food supply in a pond and with supplemental feeding that may be necessary to support their growing fish.
    - Fish raised on feed for the table market may acquire an unacceptable taste. These fish need to be purged in clean cold water, without feed. In ponds, continuous aeration might help reduce flavour problems.
    - Supplemental feeding is a management tool that allows the producer control in achieving optimal growth and product quality. Supplemental feeding is also the main production cost of a fish enterprise.
    - Proper supplemental feeding requires the producer to know feed qualities, pellet size and pellet type for all age classes of their fish. The feed must be distributed to the fish in a manner that ensures all fish eat their share.
    - Do not overfeed.
  - **harvesting** – Harvesting techniques vary according to the product and the production process.
    - Pond harvesting techniques include angling, fixed nets (proper sized), net pens and draining the pond. Generally, plan to recover around 50 per cent of your stocked fish. The recovery percentage increases with water quality, aeration, predator control and the use of proper harvesting techniques.
    - Intensive aquaculture uses specialized harvesting techniques in controlled environments to achieve optimal recovery and maximize product quality.

5. Economic/Finance Basics

- Fish farmers generally incur high cost levels in order to meet the demand of their particular markets. Commercial producers need to closely examine the costs and returns for their specific operation. This determines whether the profit (or expected profit) meets minimum requirements established for their business activity.
- Cost of production is also a significant industry concern as it relates to the ability of Alberta producers to supply a greater portion of the table-size fish market. Presently, producers in the state of Idaho have significant advantages that allow them to dominate the Alberta table fish market. These advantages include free-flowing groundwater, a longer growing season, large-scale production and marketing expertise.
- Fish farmers must accurately measure their economic performance in order to determine the contribution the fish enterprise is making to their personal situation or to their farm business.
- If you are considering an extensive pond culture venture in u-fish or direct table sales, remember that these ventures are best suited for supplementing income and personal enjoyment. Financial profit can be gained using an existing pond, where low maintenance is needed (such as feeding fish) and low fish mortality occurs (through constant aeration and predator management).
- Extensive fish pond culture can complement other ventures, such as campgrounds, u-pick fruit operations, meat processing facilities, etc.
- For more detailed information on planning u-fish or direct table sales using extensive fishponds, contact the Aquaculture Development Officer at Alberta Agriculture, Food and Rural Development or the Alberta Aquaculture Association.

- ***The critical economic issue*** for a fish farmer is to effectively control the operating and capital costs of their fish enterprises. Low margins (high operating costs relative to revenues) and high capital costs can severely squeeze the returns an individual fish operation might produce. However, operators able to control operating costs and limit capital costs can generate acceptable levels of returns.
- The following budgets have been prepared to illustrate the capital investment required, together with estimated expenditures and returns for an intensive rainbow trout fingerling enterprise. It contains information on a modern facility incorporating current technology to minimize mortality rates. The business is located in the Edmonton region and is designed to achieve target revenues of $100,000 per year from fingerling sales. This is not a start up enterprise. The operator must have production experience, knowledge and capital. This information is intended as a business-planning tool. Managers need to make their own assessments of all the production and financial variables that would influence the success of the enterprise.

Table 1. Rainbow Trout Fingerling Enterprise

	Acres	Price	Purchase Price	Useful Life	Depreciation $/Year	Interest Cost $/Year
Capital Investment Requirements						
Land	20	$1,000	$20,000			$1,600
Pole shed (30 x 260')			$99,840	30	$3,328	$3,993.60
Developments						
Well			$6,000	30	$200	$240
Power			$2,000	30	$67	$80
Natural gas			$2,000	30	$67	$80
Telephone			$500	30	$17	$20
Dugout/effluent settling system			$14,000	30	$467	$560
Cistern (holding tank)			$4,000	30	$133	$160
Total Developments			**$28,500**		**$950**	**$1,140**
System Equipment						
Culture area (30 - 12' diam.rearing tanks)			$45,000	30	$1,500	$1,800
Backup generator			$30,000	30	$1,000	$1,200
Protein skimming unit			$2,000	30	$67	$80
Rotating drum filter			$15,000	30	$500	$600
CO2 stripping unit			$1,500	30	$50	$60
Biological filters			$10,000	30	$333	$400
Ozone generator			$15,000	30	$500	$600
Low head oxygenator			$3,000	30	$100	$120
Oxygen concentrators			$6,000	30	$200	$240
Plumbing			$20,000	30	$667	$800
Pumps			$1,500	30	$50	$60
Hatchery equipment			$5,000	30	$167	$200
UV destructor			$4,000	30	$133	$160
Furnace			$2,500	30	$83	$100
Lighting & electrical			$3,000	30	$100	$120
Emergency alarm system			$4,000	30	$133	$160
Hand tools			$8,000	30	$267	$320
Total System Equipment			**$175,500**		**$5,850**	**$7,020**
Delivery Equipment						
3/4 ton delivery truck			$20,000	5	$4,000	$800
350 gallon slip tank			$350	30	$12	$14
Delivery equipment			$500	30	$17	$20
Total Delivery Equipment			**$20,850**		**$4,028**	**$834**
Total Fixed Costs			**$344,690**		**$14,156**	**$14,588**

Table 2. Rainbow Trout Fingerling Enterprise Revenue and Expense Estimates

	Number	Estimated Price	Revenues
Projected Revenues			
4 inch fingerlings	30,000	$0.50	$15,000
6 - 8 inch fingerlings	60,000	$1.25	$75,000
10 - 12 inch fingerlings	10,000	$2.00	$20,000
Total Projected Revenues			**$110,000**
Projected Direct Costs			
Eggs			$4,000
Feeds			$15,000
Veterinary expenses			$250
Marketing costs			$200
Telephone expenses			$6,000
Power expenses			$2,000
Natural gas expense			$700
Building repairs & maintenance			$800
Production system repairs & maintenance			$2,500
Fuel & oil expenses (vehicle)			$10,000
Vehicle repairs & tires			$600
Vehicle licence and insurance (share on truck)			$1,000
General insurance including liability			$2,500
Memberships			$100
Travel expense			$250
Small tools			$100
Professional fees			$1,500
Office expenses			$500
Custom charges			$500
Interest on operating			$1,500
Total Projected Direct Costs			**$50,000**
Projected Indirect Costs			
Land taxes			$1,000
Operator labour (1,970 hrs at $15/hour)			$29,550
Depreciation of developments			$950
Depreciation on buildings			$3,328
Depreciation on production system			$5,850
Depreciation of delivery equipment			$4,028
Total Projected Indirect Costs			**$44,706**
Total Projected Direct & Indirect Costs			**$94,706**
Gross Operating Profit			**$15,294**

Table 2. (Cont'd)

Interest on Investment			
Land			$1,600
Developments			$1,140
Buildings			$3,994
Production system			$7,020
Delivery equipment			$834
Total Interest on Investment			**$14,588**
Total Projected Economic Costs			**$109,294**
Return to Management			**$706**
	Hours/Day	**Days/Year**	**Total Hours**
Labour Estimates			
Delivery	12	40	480
Feeding	3	365	1095
Cleaning	1	365	365
Industry involvement			30
Total Hours			**1970**
Value ($/hour)			15
Total Operator Labour Cost			**$29,550**

6. Resources

Industry Associations

Alberta Aquaculture Association
RR 2 Camrose, AB
T4V 2N1
Phone: (780) 878-3839
Fax: (780) 878-3769
E-mail: ackenberry1@aol.com
Website: http://www.affa.ab.ca/

Aquaculture Association of Canada
16 Lobster Lane
St. Andrews, New Brunswick
E5B 3T6
Phone: (506) 529-4766
Fax: (506) 529-4609
E-mail: aac@mar.dfo-mpo.gc.ca
Website: http://www.aquacultureassociation.ca/

Publications and Internet links

Northern Aquaculture
Subscription Services
RR4, Site 465 C-37
Courtenay, British Columbia
V9N 7J3
Toll-free Phone: 1-800-661-0368
Fax: (250) 338-2466
E-mail: naquasub@mars.ark.com
Website: http://www.northernaquaculture.com/

Getting Started in Freshwater Aquaculture
Workbook with interactive CD Rom – L.Swann,
Purdue University, Aquaculture
West Lafayette, Indiana
Phone: (765) 494-6264
E-mail: lswann@purdue.edu
Website: http://aquanic.org/images/interact/
getstart.htm

A Manual for Rainbow Trout
Production on the Family-Owned Farm
George W. Klontz
Department of Fish/Wildlife Resources
University of Idaho
Moscow, Idaho 83843

Pond Raising Rainbow Trout
Bruno Wiskel
Box 194 Colinton, Alberta T0G 0R0
Phone: (403) 675-4762

Aquaculture Network Information Centre (AquaNIC)
http://aquanic.org/

AquaNet, a network of centres of excellence for aquaculture http://www.aquanet.mun.ca/

World Aquaculture Magazine http://www.was.org/

A selection of aquaculture publications and videos is available on a short-term loan. Contact Judy Chow, with Alberta Agriculture, Food and Rural Development's Agriculture Research Division in Lethbridge at (403) 381-5170.

Request *Procedures for Conducting Risk Assessments for the Introduction or Transplant of Fish or Aquatic Invertebrates*, if you are considering other aquatic species not listed in this publication.

Alberta Agriculture, Food and Rural Development's Aquaculture website on Ropin' the Web is found at: *www.agric.gov.ab.ca/*, click on Livestock, then Aquaculture. This site contains information on aquaculture in Alberta, including newsletters, factsheets, courses, fingerling supplier's lists and links to other aquaculture sites.

The following are some of the aquaculture factsheets available on-line. They are available from Alberta Agriculture, Food and Rural Development's Publication Office at 1-800-292-5697, or from the Lethbridge AAFRD office at (403) 381-5170.

Aeration of Dugouts or Ponds with Compressed Air. Agdex 716 (B36)

Algae Control in Ponds. Agdex 485/716-2

Biological Weed Control in Alberta using Triploid Grass Carp. Agdex 485/641-1

Constructing Dugouts for Fish. Agdex 485/716-1

Fish Culture Licences. Agdex 485/84-1

Predator Damage Control in Cultured Fish. Agdex 485/685-1

Screening Your Fish Pond. Agdex 485/87-1

Government Resources

Aquaculture Licencing/Inspection

Alberta Agriculture, Food and Rural Development
Inspection/Investigation Branch
Second Floor, Agronomy Centre
6903 - 116 Street
Edmonton, AB T6H 5Z2
Phone: (780) 427-5083

Production and Research

Alberta Agriculture, Food and Rural Development
Dan Watson – Aquaculture Biologist
Agriculture Centre
5401 - 1 Avenue S
Lethbridge, AB T1J 4V6
Phone: (403) 381-5850

Alberta Agriculture, Food and Rural Development
Planning and Development
Eric Hutchings – Development Officer
Agriculture Centre
5401 - 1 Avenue S
Lethbridge, AB T1J 4V6
Phone: (403) 381-5574

For More Information

Visit Alberta Agriculture, Food and Rural Development's website or contact Alberta Agriculture, Food and Rural Development's Ag-Info Centre (toll-free) at 1-866-882-7677.

7. Key Management Issues

- If you continue to investigate this agricultural business opportunity, it is essential that you are able to answer the following questions concerning production and management requirements of freshwater aquaculture.
  - Are you prepared to learn all you can about aquaculture through visiting fish farms, joining the Fish Farmers Association, attending workshops and reading all you can about fish production and marketing?
  - Are you aware of the intensive management required by an aquaculture enterprise?
  - Are you aware of the amount of time you will have to devote to continuously marketing your product and improving your production performance?
  - Have you objectively and thoroughly assessed the "fit" that the marketing, production, economic and management requirements of an aquaculture enterprise have with your personal situation?
  - Have you clearly defined the markets that you intend to sell your aquaculture products in? Do you know the requirements to meet the needs of these markets?
  - Have you clearly defined the type of aquaculture enterprise and the production practices you will need to implement in order to achieve an acceptable level of business performance?
  - Are you prepared to develop a complete business plan for your aquaculture venture and test this plan on a small scale that you can afford?
  - Do you know which Commercial Fish Culture License is required for your operation? Refer to the Agri-Fax on Fish Culture Licences, Agdex 485/84-1 or contact the Aquaculture Licensing Officer at (780) 427-5083.
  - Do you know the related environmental issues? Are you aware of the Water Act and how it applies to you? Refer to: http://www3.gov.ab.ca/env/WATER/Legislation/Index.cfm
  - Are you familiar with the biological and disease management issues that may affect the quality and health of your fish?

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