NEWFOUNDLAND & LABRADOR

Report on Consultation

September, 1990

Aquaculture Development Strategy

The DPA Group Inc.
Hatfield Consultants Ltd.

Report on Consultation

Newfoundland & Labrador Aquaculture Development Strategy

n/c from

Prepared for:
Department of Fisheries
Government of Newfoundland and Labrador

Prepared by:
The DPA Group Inc.
Vancouver, B.C.

September, 1990

ACKNOWLEDGEMENTS

The consultants gratefully acknowledge the contribution of workshop participants and those groups and individuals who provided written submissions. Special thanks are also extended to the following who were spokespersons for their seminar groups: Mr. Alan Alexander, Mr. Shawn Goodyear, Mr. Arnie Sutterlin, and Mr. David Walsh; and the Department of Fisheries staff who assisted in organizing the workshop: Mr. David Coffin, Mr. Bob Hoyles, Mr. Reg Kingsley, Mr. Brian Meaney, Mr. Keith Stoodley and Mr. Ron Scaplen.

CAUTIONARY NOTE

This report has been prepared under a contract awarded to The DPA Group Inc. and its associates by the Department of Fisheries, Government of Newfoundland and Labrador. The information contained herein is believe to be accurate. Any errors or omissions are the responsibility of the authors. The conclusions reached and recommendations made constitute advice to the government by individual members of The DPA Group Inc. and associates' Study Team. Acceptance of this report by the Department of Fisheries is for contractual purposes only and should not be construed as acceptance of any of the opinions, conclusions and recommendations contained herein.

STUDY TEAM

Mr. David Egan, The DPA Group Inc., Vancouver, B.C.
Mr. Strat Canning, S. Canning Planning & Development Associates, St. John's, NF
Mr. Malcolm Winsby, Hatfield Consultants Ltd., Vancouver, B.C.

TABLE OF CONTENTS

1.0 INTRODUCTION

This report summarizes the results of an industry/government workshop whose purpose was to seek input to the Newfoundland and Labrador Aquaculture Development Strategy. The Aquaculture Development Strategy was prepared by a study team led by the DPA Group Inc. and was submitted to the Department of Fisheries, Government of Newfoundland and Labrador, and the Department of Fisheries and Oceans, in January, 1990.

The Aquaculture Development Strategy study determined the species, culturing techniques and site areas that present the most attractive commercial aquaculture opportunities for Newfoundland and Labrador. The specific objectives of the study were to:

- identify and rank aquaculture zones for at least ten species, with particular emphasis on Atlantic salmon and blue mussels;
- assess the market potential, technical constraints and financial viability of culturing species whose required conditions for rearing match those found in the province; and
- prepare a broad development strategy for aquaculture in the province.

To meet the third objective, the plan addressed development roles for both public and private sectors.

Our methods during the study included: a comprehensive literature and statistics review; policy reviews; interviews with the members of a steering committee, representatives of provincial and federal government departments in Newfoundland, representatives of producer groups, individual producers and suppliers, representatives of regional development associations, and government officials in Ottawa, other provinces and in several states in the United States; visits to aquaculture sites; and use of computerized growth forecasting models and existing cost of production models.

The study findings were contained in three volumes and were summarized in a separately bound Executive Summary document. In Volume II site criteria for culturing each species were developed. In Volume Ii aquaculture zones, technical viability and market conditions were described for salmon and mussels, the two species with which the most commercial development has occurred, and for the eight other species under consideration. In Volume III a comprehensive strategy for all species was proposed.

1.1 Summary of Development Potential

A summary of the development potential of the species examined in the study is reproduced from Volume III (p 8.1) below:

> *"The potential for Atlantic salmon culture in the province in severely limited by the widespread occurrence of lethal seawater temperatures in winter. Newfoundland, however, has the potential to become a major producer of cultured shellfish because of its considerable coastline and unpolluted waters. Of the ten species under consideration, blue mussel culture has the best potential for wide-scale commercial development in the immediate term. The prospects for an economically viable giant scallop culture industry before the end of the century are also very promising. Finfish species with the best economic potential for culturing are Atlantic cod and Arctic char.*
>
> *The total production potential for blue mussel culture as early as the mid-1990's is estimated to be between 3,000 and 5,000 tonnes. Production at these levels could result in sales of $8-12 million and direct and indirect employment of 200-300 jobs.*
>
> *Biophysical conditions and market conditions also favour giant scallop production in the province. Several production constraints have yet to be resolved, but could be substantially reduced during the next decade with increased research.*
>
> *Technically, Atlantic cod culture shows promise for development on a wide scale, but is believed to be impeded mostly by market conditions. Arctic char culture shows similar promise, but is constrained by several factors, including limited sources of suitable water available on a year-round basis".*

1.2 Purpose and Scope of Workshop

Following submission of the study reports, a workshop was held on March 31, 1990 in Grand Falls, Newfoundland. A total of 75 people attended the workshop; a list of attendees is provided in Appendix A. The participants were from approximately 40 invited groups representing a cross section of "stakeholders" in the aquaculture industry: commercial aquaculturalists; commercial fishing; regional development associations; provincial and federal governments; financial institutions; educational institutions; and other interest groups.

The workshop was structured around a summary presentation of the development strategy, followed by four concurrent seminars which addressed the major specie groups under consideration:

- salmonids;
- blue mussels;
- giant scallops; and
- other species.

Participants were assigned to the seminar groups according to professional interest. Each seminar group had a moderator/discussion leader and a spokesperson appointed by the group who took notes and later presented a summary of the discussion to the entire workshop audience. Notes taken during presentations of these seminars are provided in Appendix B.

1.3 The Consultation Report

This report incorporates verbal presentations noted by session moderators at the workshop and comments made in written submissions following the workshop. A total of 16 submissions were received and are substantially reproduced in Appendix C.

The purpose of this report on the industry consultation is mainly to:

- provide further explanation on some of the key findings and recommendations;
- acknowledge and correct any significant errors or omissions; and
- provide additional recommendations and/or identify alternate development options based on the industry input.

As such the report is not a transcript of the workshop discussions. Tapes of the planning sessions, detailed notes from the individual workshop sessions and the original written submissions in their entirety were submitted to the Department of Fisheries.

In the following section, we propose a revised policy framework for aquaculture development. In Section 3.0, we describe species development plans.

2.0 PROPOSED POLICY FRAMEWORK

At the outset to the workshop, it became clear that certain points needed to be emphasized about the intent of the Aquaculture Development Strategy study:

1. It is not intended to be used as an evaluation of existing sites. Also, the aquaculture suitability rankings of sub-areas in many zones are tentative in nature.

2. It is primarily a planning study and is intended to encourage the appropriate allocation of public and private sector investment.

3. Acceptance of the report by the respective governments does not mean that its recommendations are to become public policy.

Within this latter context, the consultants recognize that many issues affecting aquaculture development e.g. assignment of water leases and water pollution, are not unique to the industry and are part of larger issues. These issues as they relate to aquaculture therefore cannot be looked at in isolation. Moreover recommendations related to these may be more difficult to act upon.

The respective roles of the federal and provincial governments are described in a Memorandum of Understanding signed in 1988. However, the federal government is only now in the process of introducing national aquaculture policies. Prior to this and in the absence of a clearer definition of the federal mandate within Newfoundland regions, it is premature to label the present study a "comprehensive" strategy. A new industrial strategy, in the process of being formulated for the province by the Economic Recovery Commission, is also likely to impact on aquaculture development. Notwithstanding the dynamic nature of these broader initiatives, with the expected introduction of a national policy framework in 1990 and the industry consultation process complete, the assessment of Newfoundland's commercial aquaculture potential discussed in this study should provide the basis for developing a long term plan for this new sector of the provincial economy.

In this section, the social policy objectives and original recommendations of the Aquaculture Development Strategy study are repeated in italics, and are followed by discussion of the issues arising from the workshop seminars and written submissions. Several new recommendations are made. Suggestions considered worthwhile in a policy context are also mentioned for consideration in future policy-making.

2.1 Social Policy Objectives

Objective 1: *The Newfoundland and Labrador aquaculture industry should be economically viable without ongoing government assistance.*

Objective 2: *Employment should be maximized subject to the constraint above.*

Objective 3: *Aquaculture should be complementary to the fishing industry and be seen as a means to supplement the income of rural communities.*

Some seminar participants argued that aquaculturists should have the same access to government programs as fishermen currently do. This is considered a worthwhile adjunct to the social policy objectives outlined above. Given the state of many of the wild stocks, aquaculture development would seem an ecological imperative for Newfoundland and Labrador. At the same time others argued that aquaculture should not be seen as a panacea for all of the ills of the fishery.

2.2 Regulation

1. *DOF should as expeditiously as possible complete the process of licensing aquaculture sites in operation.*

2. *It is recommended that eligibility for aquaculture licenses be restricted to:*

   (i) Individuals of legal age.

   (ii) Individuals and/or companies resident in the province.
   (This would not preclude foreign ownership but require that every company maintain an establishment in the province.)

3. *Following the lead of other jurisdictions that have encouraged commercial aquaculture in its initial stages of development, the current assessment-based pricing system should be maintained. The system should be reviewed periodically to ensure that pricing guidelines for Crown lands are being met.*

4. *Conflicts in the province are likely to be fewer than in other jurisdictions. An appeal system may therefore not be a necessity at this time. The need for an appeal system should, however, be periodically reviewed. The exact nature of the system would require further study. At a minimum, the inter-agency referral system may need to be expanded to include local governments.*

5. *The ongoing survey work measuring levels of concentration of PSP, domoic acid and coliforms should continue and the results should be disseminated to the industry. Efforts to increase awareness of the risks of PSP and fecal contamination in various zones should be increased. Description of the risks should be incorporated into the information packages distributed to prospective aquaculturists. Awareness should also extend to financing and marketing issues.*

6. *Unless there is strong justification on economic grounds, physical facilities for depuration are discouraged. Rather, increased site planning is recommended.*

7. *Investment in additional capacity for the processing of aquaculture production is discouraged. Rather, use of existing plants should be maximized.*

8. *The present study indicates that the potential for salmon farming is low. If farming is shown to be feasible under certain conditions, such as by use of land-based systems, DFO should reassess its policy with regard to imports of Atlantic salmon eggs and/or smolts. The technical feasibility of land-based salmon farming in the province requires further study. Specifically, the feasibility of utilizing waste heat from electrical generating stations needs assessment. Existing generating plants, apart from the Bay D'Espoir Hydroelectric Plant, do not indicate a potential for providing adequate sources of waste heat, but proposed plants at Roddickton and Holyrood do.*

9. *Another situation under which DFO should reassess its import policy is with ocean ranching. Even though the focus of this present study has been the assessment of the potential coastal and/or freshwater culturing of salmon to market size in enclosures, ranching is a production option, as described in Volume I. The feasibility of small-scale ocean ranching of Atlantic salmon should be studied. The study should include the best potential indigenous and non-indigenous stocks for ranching. With the latter, the potential disease, genetic and ecological risks to native stocks are greater if fish are released directly to natural water bodies compared to containment during farming. These risks must be weighed against production objectives when selecting donor stocks.*

10. *The current policy of allowing import of certified disease-free, sterile (triploid) trout eggs should be continued. However, assistance should also be provided to local farmers for development of a disease-free stock within Newfoundland.*

11. *As expeditiously as possible DOF should upgrade its statistical, collection, processing and storage system. Annual surveys by DOF of aquaculture inventory, production and sales are supported. In addition cost and earnings surveys should be undertaken periodically. Results of such surveys could support the design of financial assistance programs by providing information on investment*

levels. At an industry level, survey data can assist in developing pricing strategies at both the farm and processor levels.

Appeals

There was considerable commentary about the recommendations on the existing aquaculture licensing system in the province especially under the area of appeals. Under the current system, appeals can be made directly to the provincial Minister of Fisheries. The consultants argued in the main study that this approach was flawed and that in future some form of an external review process may be necessary. Many took the view that the current system was adequate or was not necessary at all. On the other hand, one person presented a strong case for an appeal system, by stating that the likelihood of future conflicts between aquaculture sites and recreational boating was high. So while there is recognition that conflicts are inevitable it is not the intent to impose an overly bureaucratic system of resolving them but rather one which reflects administrative fairness.

Depuration

The main report had recommended against depuration facilities unless they were financially viable. In other words, the government should not be obligated to subsidize the cost of depuration. Many industry people were concerned that the report did not adequately discuss the need for depuration facilities. This argument was based on the view that water pollution was a widespread problem in Newfoundland. Already, some mussel sites had been given conditional approval by the Environmental Protection Service, but coliform levels were found to be too high when harvesting was to occur. An official of the Environmental Protection Service stated that most of the water pollution problems which affect aquaculture sites in the province were in fact caused by untreated sewage.

In a separate study, funded by the Department of Fisheries, the feasibility of a depuration facility in the St. Georges River area was investigated. Preliminary findings of the study indicate that depuration of mussels is economically viable only at large-scale production levels (B. Meaney, pers. comm). Problems are likely to persist because production is typically on a small scale and is dispersed through the province. One of the written submissions (J. Caines) noted the following, which the consultants adopt as a new recommendation:

1. Untreated sewage and other wastes from municipal sources is a major problem in the identification of shellfish culture sites. Treatment of environmental concerns, particularly municipal sewage, will require coordination with aquaculture planning. There is a need for a concentrated effort on the part

of the provincial and federal Departments of Environment and municipalities to address the growing problem of water pollution in Newfoundland and Labrador.

Processing

There was widespread agreement among nearly all participants that many processors are only vaguely aware of the new processing opportunities and requirements needed by the aquaculture sector. The report argued that it would be more appropriate to promote the use of existing processing facilities rather than build new facilities specifically for aquaculture; the main reason is current overcapacity in the processing sector. However many people pointed out that most existing plants are not suited to aquaculture production. They also noted that many aquacultured species have unique processing requirements and that existing plants do not have the required specialized equipment. For example, the processing of mussels requires equipment for declumping, grading and debyssing. The processing of scallops in the half shell also requires special equipment. In addition, there is an urgent need to develop live detection tests for scallops in the half shell. Perhaps the strongest argument for specialized aquaculture plants is the fact that many processors operate close to capacity at key times of the year and therefore could not handle additional aquaculture products when required.

2. The Department of Fisheries should prepare an information package/prospectus which identifies the potential benefits, opportunities and equipment/quality requirements of processing aquaculture products. We suggest that, at least initially, the emphasis should be on mussels.

3. Another option for The Department of Fisheries is to introduce preferential rules with respect to licensing of government-owned fish plants which favour those applications with commitments to process aquaculture production.

The market potential of scallops in the half-shell, especially in Europe, was not recognized in the main report. This significant potential brings into question an important issue with respect to DFO inspection policies because the gonads and other parts of the whole scallop accumulate PSP toxins. Also, scallops eventually sold in the half-shell are transported live and are sensitive to handling.

4. DFO and DOF jointly should develop procedures for sampling for PSP and other toxins in order to reduce post-harvest handling with live scallops.

Potential markets for cod (cultured or trapped) in a head-on, gutted (HOG) form were not recognized in the report. However a condition attached to groundfish processing licenses issued by DOF prohibit the export of HOG cod from Newfoundland.

5. DOF regulations which prohibit the export of head–on, gutted cod should be re–assessed if the market potential for fresh aquacultured cod proves to be substantial.

Stock Transfers

The economic potential of salmon aquaculture in the province is related to the issue of stock transfers which is discussed in more detail in Section 3.0.

Freshwater Culture

A policy issue related to both salmon ranching and Arctic char culture not discussed in the main study is lake cage rearing. There are currently no environmental guidelines for lake cage rearing in the province. In British Columbia, where Atlantic salmon have been introduced, guidelines for lake cage rearing are currently being developed and are modelled after Scottish practices.

6. The Province of Newfoundland and Labrador should develop environmental guidelines for lake cage rearing of finfish.

Other Regulatory Issues

Some comments were made about the potential for development of aquaculture feedstuffs from Newfoundland. Newfoundland has a substantial fish meal industry from which production could be targeted at aquaculture feeds. Fisheries Products International Ltd. for example, is in the process of developing high quality fish meal and fish protein concentrate from offal which could be used in fish feeds. The merits of a reduction fishery vs better use of offal were also briefly discussed. Under current regulations, reduction fisheries are not permitted. Analysis of feedstuffs development potential was outside of the consultants' terms of reference in the main study but could be addressed in a separate study.

2.3 Financing

12. *The establishment of financial assistance programs aimed at providing working capital to aquaculturists is recommended. The scale of financial assistance need not be massive at the outset, but should reflect the levels of investments required in culturing different species with different culture techniques. Financial assistance programs should also be supportive to suppliers to the aquaculture industry. This could include, for example, the manufacture of nets for the shellfish industry.*

13. *Newfoundlanders most affected by the declining inshore fishery are most likely to participate in the aquaculture industry. Higher rates of assistance in smaller projects are recommended for these individuals because they will likely not be able to provide substantial private investment of their own.*

14. *Financial assistance should also be provided on a decreasing scale as specific sectors mature. Administratively, this could be effectively accomplished by reducing the percentage of total eligible costs available for financing from government programs over time and/or on reissues of loans.*

15. *Increased coordination between agencies providing financial support is required since several provincial programs and federal ministries are funding projects in the industry.*

There was widespread support for the recommendations on financing. The Fisheries Loan Board was often mentioned as the most preferable program for the provision of working capital loans. As such the aquaculture industry would be provided with similar levels of assistance as that received by the wild fishery (This would satisfy the suggested addition to the social policy objectives). The notion of sweat equity qualifying for equity requirements was also raised and has considerable merit.

2.4 Marketing

16. *To facilitate industry/government cooperation in a mussel marketing strategy, the formation of a province-wide mussel growers' association is recommended.*

17. *The proposed association should be provided with some initial seed money to cover its administrative costs during startup. While ongoing government support of specific projects such as generic promotion would seem appropriate, the association over the long term should strive for self-sufficiency. To facilitate this process, and to reduce potential friction amongst members, membership in the assoc-nation should be mandatory and the association should be given the <u>legal</u> right to charge member dues.*

18. *Public support of generic promotion of Newfoundland mussels, consistent with the objectives of the Inshore Fisheries Sub-agreement, is recommended.*

19. *Other types of initial government support for marketing, recommended for a province-wide association, include the following:*

- *quality control programs;*
- *trade shows and trade delegations;*
- *advertisements in trade magazines;*
- *preparation of recipes, press releases and promotional videos.*

20. *Further study of mussel markets is required. Sufficient market information exists to also proceed with development, costing and test-marketing of specific value-added products. Test marketing should be coordinated with producers and processors. DOF should facilitate the process by subsidizing the development costs. Initially, target marketing should concentrate on North America and investigate potential in both the restaurant and retail sectors.*

21. *Some of the initial mussel product development work required would seem a logical role for the Marine Institute because of their commitment to the industry and their physical facilities for food technology work. Similar initiatives have been recently undertaken at the P.E.I. Institute of Technology.*

22. *Quality control should be exercised from the outset and be a cornerstone of promotion efforts. DOF and DFO should also continue in their efforts to develop codes of practice for shellfish culture for the Atlantic region.*

23. *Further study of specialized markets for fresh farmed cod is required.*

There appears to be widespread support for the main recommendations regarding mussel marketing which emphasized value-added production. Technology transfer and identification of market opportunities might be enhanced by a demonstration project which should be linked to the proposed value-added program. In conjunction with a food technology group such as the Marine Institute or Memorial University production could be bought up, processed into value-added forms and test marketed.

The proposed mandatory membership in the producer associations was also questioned by several groups. The intent of this recommendation is twofold: to ensure that the producer association has the best chance of financial survival; and secondly, to reduce the number of non-participating producers who would have the full benefit of publicly-funded programs offering financial assistance, grading and inspection, and generic promotion, without bearing any of the costs.

The potential for scallops in the half shell was mentioned in the discussion on processing. It is believed that the market potential for live scallops in European markets is substantial. However test marketing in these markets has yet to occur.

7. The markets for scallops in the half shell require further investigation and from this study, a market access and penetration strategy for this sector needs to be developed.

Other marketing issues identified in the consultation process included the following:

- there should be generic marketing of all aquacultured species, not just mussels
- there was also a lack of information on markets for other species.

2.5 Research, Extension and Education

24. *We recommend the formation of an aquaculture research advisory council whose membership includes industry associations, post-secondary institutions and both federal and provincial research funding agencies. The role of the research council should be to periodically update research plans for aquaculture development of each major species.*

25. *Private sector participation in aquaculture research should be encouraged and scientific exchange agreements continued.*

26. *DOF should continue to cooperate with Memorial University, the Marine Institute, and training agencies, in designing and offering multi-disciplinary programs in aquaculture.*

27. *A demonstration farm for shellfish should be established with a mandate to disseminate the results of research, and to provide extension services and training for students. The structure and ownership of the demonstration farm requires further study. However, industry participation is seen to be crucial in order to provide focus to research and technology transfer projects.*

28. *DOF should continue in its efforts to organize and support regular technical workshops so that farmers are encouraged to describe site-specific problems and solutions. These should be undertaken near the key growing areas in order to encourage maximum participation.*

29. *DOF should continue to support field missions, the results of which should be publicized. Technical workshops and term contracts making use of imported specialist expertise are also supported.*

There was the sentiment expressed that the value of the aquaculture research conducted in the province was not recognized in the report and that there was a lack of appreciation of how active the research community was in aquaculture development. This was unintended. In fact the consultants see a key role for the research community and recognize clearly that it is a critical component in achieving long term economic survival of the aquaculture industry.

Participants suggested a number of excellent research topics with respect to scallops, for example, these included the need for better research data concerning seed supply, intermediate growth, on-growing, harvesting, marketing and gear manufacture. At the same time, commercial scallop culturists recognized that while the window of opportunity with scallop culture is probably short, it may not be sensible to encourage wide-scale development until a number of technical constraints are overcome.

Some suggestions point to the need for coordination and planning. Though the study strongly recommended the need for a shellfish demonstration farm, many participants felt that this was not an urgent requirement. Rather demonstration projects at existing commercial sites were suggested to be a more effective way of conducting and disseminating the results of applied research. This reflects the small size of the industry and a cooperative spirit which exists between the academic/research community and industry. However, Memorial University's capability in food technology research was expressed, in relation to the recommendation that the Marine Institute be involved in the development of value-added mussel products. Some suggestions were also put forward that the provincial television satellite network could be used for aquaculture education and training.

8. The Province of Newfoundland and Labrador together with the Marine Institute, Memorial University and other post secondary education and training institutions should develop an integrated approach to aquaculture education and training.

2.6 Implementation and Review

30. Governments should immediately address the critical needs for working capital and technical and marketing support. Other necessary elements of the strategy include increased field research, increased coordination between governments and industry, and some legislative changes. Support for additional infrastructure is also crucial. This includes the local manufacture of equipment to replace imports.

31. In terms of encouraging development with the species with the most potential for commercial development in the short term, high priority should be placed by governments, industry and research institutions on resolving marketing issues with mussels and technical issues with scallops. A more cautious approach is required with char and cod, because of production and market uncertainties.

32. DOF and DFO should jointly undertake a process of public consultation to obtain input to the proposed aquaculture development strategy.

33. *Existing DOF programs should continue, but increased effort should be devoted to monitoring and comprehensively evaluating the results of projects already in place. The core of technical experts should be maintained, and future staff levels should reflect both the scale of commercial development and the scale of applied research projects.*

34. *DOF and DFO should proceed with designation of a policy and planning group, as specified in the Memorandum of Understanding between Canada and Newfoundland. It should consist of senior officers and have responsibility for strategic long-range planning for aquaculture and its administration in the province.*

35. *The Minister of Fisheries should appoint an Advisory Council consisting of key aquaculture producers and suppliers. The Council should have specific responsibility for providing input on matters related to the Memorandum of Understanding between the governments of Canada and Newfoundland.*

36. *At this crucial stage of development of the fisheries in Newfoundland and Labrador, DFO needs to carefully evaluate its support for aquaculture, including defining a role which is more pro-active than its efforts to date.*

37. *The role of the regional development associations (RDAs) in aquaculture also requires clarification. It is believed that the regional development associations can play an important pre-development role in aquaculture because of their commitment to regional economic development. However, the primary role of the RDAs should not be one of direct involvement in commercial production but to assist in creating and/or enhancing a "development climate" for aquaculture. In this regard, planning, coordination, training and/or education are seen as logical roles.*

38. *Aquaculture development plans, prepared by individual associations and/or regional development corporations, should be consistent with the overall comprehensive strategy for the province. As a result, the RDAs should focus on the species identified in this study as having the best economic potential in their respective areas. Also, there has to be recognition by RDAs that not all areas have potential for aquaculture.*

39. *Industry participation in national associations is also considered important to the development of the industry and is encouraged.*

Some elaboration on the recommendation that DFO become more pro-active with aquaculture development is necessary. DFO's aquaculture development goals as set out in its newly released policy document encompasses: scientific research; cooperative management of aquatic environments; quality control of cultured products; market intelligence and commercial analysis; and promotion of sustainable development. Yet it is unlikely that significant new resources from within the department will be allocated to aquaculture development in the DFO regions in the province. At the same time, several development agencies such as the Atlantic Canada Opportunities Agency, can provide several forms of assistance to the industry. Moreover, with the formation of the new Economic Recovery Commission, aquaculture is likely to play a larger role in the overall industrial strategy for the province.

A situation somewhat analogous to that which occurred in the Western Isles in Scotland in the 1980's could develop. In 1982 a commission of the EEC charged with regional development allocated substantial funds toward aquaculture as part of a five-year integrated economic development plan for the area. Other agencies, namely the Highlands and Highlands Development Board (HIDB) and the Department of Agriculture and Fisheries of Scotland (DAFS) had important roles in directing the aquaculture development. The aquaculture component of the initiative has been highly successful, and there are currently in excess of 40 salmon farms in the area. Both DFO and DOF could play similar roles as HIDB and DAFS in this type of development scheme.

The issue was raised about the selection of wolfish as a candidate species when its market value was low and no research on its culture potential was being conducted in the province. Related to this was the notion that there was no industry involvement in the planning or direction of the study.

9. Future aquaculture development planning should involve the participation of industry at the outset.

3.0 SPECIES SPECIFIC DEVELOPMENT PLANS

Species-specific development plans are discussed below. Some required activities apply to more than one species. The establishment of a demonstration farm for shellfish was recommended. More efficient flotation systems, necessary for both mussel and scallop culture, could be designed and tested at such a facility. The diagnostic capability for finfish such as char and cod will have to be increased, the scale of which will be dependent on the rate of development. Various aspects of fish diagnostics can likely be shared between agencies and the private sector. Basic bacteriological work could be conducted by the Marine Institute until such time as sufficient demand justified a private service.

Fish Health Diagnostics

There was the suggestion that fish health diagnostics could be provided by the Agriculture Canada at their Mount Pearl Research Centre. As stated in *Cultivating the Future: An Aquaculture Strategy for the 90's* recently published by DFO, a cost recovery policy has been adopted nationally within DFO with respect to the provision of some services to industry i.e. those that are largely commercial in nature. In this context the document indicates: "The Department will ask aquaculturists to turn, whenever possible, to private, provincial or university laboratories... for routine disease diagnosis and problem solving. By freeing DFO researchers from these activities, DFO will expand its general research on disease diagnosis and the prevention and control of finfish and shellfish diseases, and will also increase its capacity for disease surveys". DOF currently funds a disease diagnostics contract with the Atlantic Veterinary College in P.E.I. The lack of diagnostic services are therefore not seen as an insurmountable barrier, although an in-province facility would be preferable. It is expected that the Marine Institute will show increased interest in providing diagnostic services. The consultants favour the use of a facility already involved in aquaculture, but the merits of offering services from the Mount Pearl facility on a short term basis should be weighed against the benefits and constraints of alternative facilities, including that of the private sector.

3.1 Salmonids

Atlantic Salmon

Continued public support for salmon culture is not encouraged except for possible further study of the potential of land-based farming and salmon ranching. As an interim measure, the ongoing support of the Bay D'Espoir hatchery should continue, but its focus should be other species such as Arctic char and rainbow trout.

Arctic Char

The short culture history with char means that a number of technical uncertainties exist. The development process should therefore occur in phases. Initially, government support should be restricted to the ongoing work at the Bay D'Espoir hatchery to determine the technical and commercial feaslbility of growing out Arctic char to pan-size or larger, and to broodstock development. A selection program to identify high growth rate stocks amongst anadromous and landlocked populations should be undertaken. Subject to the results of these projects, assistance could be provided to undertake technical and financial appraisals of proposed development sites early in the planning process. Development of proposed sites at pilot scales prior to investment in commercial-scale facilities could then occur. Throughout these steps, developments in other areas should be monitored.

It is likely possible to rear char to pan sizes in one summer in marine conditions. This would negate the requirement for overwintering. The economics of this are not well understood and require further study, as do the economics of overwintering char in seacages and growing them out to larger sizes.

Rainbow Trout

Opportunities exist to increase ponding of rainbow trout for recreational fishing along tourism corridors. Preliminary examination should be undertaken of lakes in western Newfoundland to determine whether nearshore ice-free areas on lakes are the result of groundwater intrusion or if the lakes might nonetheless be used for growout. If suitable growout locations are identified, the commercial potential should be assessed. Proponents of pond culture should be encouraged to monitor temperature conditions, particularly during summer, before stocking with fish. The water hardness and pH and other water quality factors must also be identified to determine the potential production of the proposed sites.

Some opportunities may also exist to grow out trout to larger sizes in marine cages, but their feasibility requires further study.

Many of the opinions related to salmon farming issues had already been voiced at meetings and previous correspondence between industry, regional development associations and government agencies.
Issue was taken with several of the assumptions used to assess the economic potential of salmon farming, especially seacage rearing of salmon in Roti Bay. Workshop participants argued that the report overstated the risk of superchill based on their data which shows that during recent years temperatures in Roti Bay have not gone below 0°C. This suggests that our sensitivity analysis which assumed that a stock loss occurring once every five years due to superchill conditions was unjustified. It was also argued that our feed conversions and capital costs were overstated.

The study gave a medium ranking to the potential for salmon farming in Roti Bay. Our main concerns were related to the risk of superchill conditions, fluctuating salinities and problems with shifting ice during the spring breakup. As such, given the harsh conditions, a stock loss once in every five years is not considered overly conservative.

Our capital costs assumed the use of more expensive steel cages when in fact current operations at Roti Bay use wooden cages. However, since the useful life of wooden cages is much shorter, the amortized cost may not be significantly different.

While we consider our feed conversions to be conservative, those suggested by some growers (1.2:1) for an entire production cycle seem to us overly optimistic because, to our knowledge, the best feed conversions with dry feed are 1.6: 1 and being obtained in the Shetland Isles.

From a policy standpoint, the Roti Bay potential is related to the issues of stock transfers, government funding and the role of the regional development associations. Federal regulations which came into effect in 1989 permit the import of salmon ova for experimental research purposes. Imported stocks could therefore be introduced in limited quantities under current rules. Also, a study funded under the Inshore Fisheries Development Sub-Agreement is currently examining alternative salmon breeding programs. A large component of the funding of both capital and operating costs for salmon farms in Roti Bay has been supplied by various government departments. The Bay D'Espoir Development Association has been significantly involved as a conduit for public funding to the salmon farming industry. The consultants have previously recommended against subsidies for commercial production and against direct participation of RDA's in commercial production. We also reemphasize a need to conduct more research at pilot scales before commercial development is encouraged.

10. Both governments should undertake more detailed research into the potential for salmon farming in Roti Bay. This could be organized and executed in co-operation with existing facilities e.g. the Bay D'Espoir hatchery and in conjunction with the ongoing sea cage rearing trials with Arctic char and rainbow trout.

Developing a broodstock program with Arctic char in Newfoundland was raised. No area of the world has as many strains of wild Arctic char as Canada from which to develop a breeding program. As a result Canada could become a major producer of cultured Arctic char. Currently there is a lack of information about the performance of specific strains under culture conditions including those of the many from Newfoundland and Labrador. There is also considerable uncertainty about the potential costs of production under varying culture techniques and site conditions. In addition, market niches are not well defined.

Moreover, the federal government has not developed a national development plan for char even though commercial and pilot-scale projects have been initiated in several DFO regions across the country. As a result, development of this particular species has proceeded on a more or less ad hoc basis.
Arctic char grown out in seacages have shown good growth potential under the low salinity conditions of Roti Bay and have been overwintered successfully. Outside of Roti Bay, there is likely little or no economic potential for seacage rearing of Arctic char in the province because of winter kill conditions. However lake cage rearing and land-based farming may eventually prove viable. Several freshwater sites in Newfoundland have already been identified and some development projects at these sites have been proposed. It was previously recommended that these projects proceed at pilot scale levels only until economic viability can be proven. This recommendation is reemphasized. Also an approach taken in this province-wide study, that is identifying and ranking zones, and assessing technical options, economic conditions and financial viability, may need to be conducted across the country before some decisions can and should be made, such as where publicly-funded broodstock development should take place.

11. The Department of Fisheries should continue its efforts to develop a strategic plan for Arctic char in conjunction with the Department of Fisheries and Oceans. The plan should include: an analysis of the development to date in Canada and elsewhere; and, a more thorough assessment of commercial opportunities and constraints than was permitted in the present study. Cooperation with industry is also seen as essential to the development of an effective plan and appropriate long term strategy.

Also a number of seminar participants noted that economic potential of salmon ranching and land based farming had not been investigated in sufficient depth. Land-based salmon farming and salmon ranching were discussed briefly in the main study but a detailed analysis was not within the original terms of reference. In 1989, DFO initiated a pilot study of the potential of salmon ranching in the Exploits River area. As well, a separate study of the feasibility of a pump-ashore system at Holyrood Pond was commissioned by the Department of Fisheries.

Many participants questioned the market potential for ranched salmon and the extent to which ponding of rainbow trout for recreational fishing could be expanded. It was mentioned that additional commercial trout ponding facilities might displace markets of the existing rainbow trout farm whose main source of revenue was from the recreational fishing market (you-catch-em type sales). We did not investigate the demand for recreational fishing in the province during the course of our study. However, in recent years the demand for recreational fishing has been rapidly increasing throughout North America. This trend is expected to continue with an aging population. Salmon ranching in particular poses a number of complex policy issues.

12. The Province of Newfoundland and Labrador should assess the potential market demand for recreational fishing from salmon ranching and rainbow trout ponding. The legal and administrative aspects of salmon ranching, including the potential participation of regional development associations, also require study.

The pump-ashore study found that the Holyrood Pond area did not have suitable water quality to support a commercial-size farm. Other potential sites may have potential, especially the Holyrood generating station which offers the advantage of waste heat. As suggested in the main study, detailed feasibility studies of potential sites should be conducted first before any publicly funded support is provided.

3.2 Shellfish

Blue Mussel

The process of identifying productive sites needs to be improved. Programs for site screening, data compilation and/or field studies in the high potential areas, particularly to assess possible water quality problems (including coliform contamination), should be continued. Stations in each main growout region should be established or identified, so that water quality, growth and plankton data can be collected systematically. More than one station should be identified and should involve commercial farms where possible.

At the primary production level, a more industrial approach is required. For example, portable processing techniques need to be developed. Also, methods to control ice movement during ice breakup need to be developed. Some studies have been initiated at a few locations, but, given their diversity, they should be undertaken under a variety of site conditions.

Several urgent marketing and distribution issues need to be addressed, as discussed in Section 5.0 of Volume III.

Giant Scallop

The relative costs of production between bottom culture techniques and suspended culture need comparison and should be supported in field trials. Emphasis should be placed on assistance during site selection and monitoring surveys of potential bottom culture locations in order to assess growing conditions (currents, salinity, temperature, oxygen, plankton and predators). For suspended culture, ways to reduce equipment and labour costs need to be identified.

Spat supplied from hatcheries may permit a greater number of sites to be developed. As a result, research with hatchery technology within the province should continue and developments in other areas should be closely monitored. Technology transfer agreements with other producing regions are also encouraged.

An important issue raised by several participants was the validity of data used to assess the cost of production of mussel farming . Specifically the yield or conversion figures from live weight to meat weight were felt to be lower than that reported in the study. The effect of lower yields would be to increase the unit cost of production and reduce the overall financial viability of producing fresh mussels. This result however does not change the overall thrust of the consultants' arguments, that is to initiate a value-added program from the outset.

The consultants agree that the economic potential of suspension culture, especially by ear hanging techniques, was possibly misrepresented in the main report. Also, because some areas have been highly successful with wild spat collection they may become important seed supply centres. The Japanese industry has a number of such centres. Policy considerations relate to access rights to the spat collection areas. Conflicts with the wild fishery could potentially arise. Also, allocation of wild spat among individuals and/or organizations involved in culturing scallops may become an issue. It may be that the scallop producers can be organized into a producers association for this purpose. Alternatively, if both the demand and supply were confined to small areas, the regional development associations may be able to play a role in the distributions of wild spat.

3.3 Other Species

Specialized markets for fresh cod require further study before government support of cod culture should proceed. If markets can support wide-scale development, efforts to reduce costs of production should be accelerated and pilot scale projects encouraged. Feed optimization and nutrition trials with wet and dry feeds should be conducted. Research should also be directed at identifying better methods of transport and sorting and of improved inventory control. Developments in other regions should be monitored, including developments with rearing cod in hatcheries.

Investigations of indigenous cold-water marine finfish species, Atlantic halibut, lumpfish and wolfish, have been undertaken by scientists at the Marine Sciences Research laboratory and by private interests. The long-term prospects for successful marine culture of these and other species in Newfoundland are encouraging. Public funding of these research efforts should continue and be subject to on-going review by the proposed aquaculture research advisory council.

The council should also establish criteria with which to evaluate research goals with new species. These should include: market potential; species that are indigenous to Newfoundland, or for which disease, genetic and ecological effects can be controlled; and, existence elsewhere of a commercial culture technology for the same or similar species.

Studies required for marine finfish species include design and operating requirements of commercial units. The advantages of developing a cold-water marine finfish research facility should be investigated. Ideally, such a facility would have: a heat source for controlling water temperature; pump ashore capability with a suitable land area for a hatchery and experimental tanks; and areas nearby for shallow water impoundments and cage culture. Possible sites that might be considered for a central research facility include: Holyrood Pond (at least for the land-based facilities); Roddickton thermal generating plant; and Holyrood generating plant. An alternative would be to support investigations at private growout locations on an ad hoc basis. The relative merits of this approach should be compared to the advantages of a central research facility.

As previously indicated, the potential markets for cod (cultured or trapped) in a head-on, gutted (HOG) form were not recognized in the report. The potential for these could be investigated as part of the proposed study of markets for fresh cod. At the same time, the related policy issue ie the export of HOG fish from Newfoundland which DFO regulations currently do not permit, could be re-assessed.

APPENDIX A

LIST OF PARTICIPANTS

APPENDIX A

LIST OF PARTICIPANTS

Mr. Allan Alexander
Port au Port Development Assoc.
Port au Port, NF

Mr. David Bailey
National Research Council
Viking Building
St. John's, NF

Mr. Frank Baird
Atlantic Canada Opportunities Agency
St. John's, NF

Mr. Gerry Beresford
Business Development
Fishery Products International Ltd.
St. John's, NF

Mr. John Boland
Fishermen, Food and Allied Workers Union
St. John's, NF

Dr. Joe Brown
Ocean Sciences Centre
Memorial University of Newfoundland
St. John's, NF

Ron Burton & Keith Croucher
Eastern Mussel Growers Assoc.
Seal Cove, NF

Ms. Jennifer and Mr. Doug Caines
President
Rainbow Trout Farms Ltd.
South Dildo Mount Pearl, NF

Dr. Chris Campbell
Marine Institute
St. John's, NF

Mr. Strat Canning
S. Canning Planning & Development Consultants
St. John's, NF

Ms. Linda Clarke & Mr. Bob Robinson
Department of Development
St. Johns, NF

Mr. David Coffin
Department of Fisheries
St. Johns, NF

Mr. Clyde Collier
SCB Fisheries Co. Ltd.
St. Alban's, NF

Dr. Patrick Dabinett
President
Newfoundland Aquaculture Association
c/o Ocean Sciences Centre
Memorial University of Newfoundland
St. John's, NF

Mr. Jim Davis
Department of Fisheries and Oceans
Northwest Atlantic Fisheris Centre
St. John's, NF

Mr. Lloyd Diamond
President
Bay D'Espoir Salmon Growers

Mr. Mike Doyle
Economic Recovery Commission
St. John's, NF

Mr. David Egan
DPA Group Inc.
Vancouver, B.C. V6B 1G1

Mr. Robert Freeman
Trinity Blue Aquafarms Ltd
Port Rexton, NF

Mr. Lloyd Fudge
Vice President
Eastern Mussel Growers Association
Springdale, NF

Mr. Abe Gibbons
Executive Director
Great Northern Peninsula Corp.
P.O. Box 69
Plum Point, NF

Dr. Gregory Goff
Fisheries Research Dev. Ltd
c/o Ocean Science Centre
Memorial University of NF
St. John's, NF

Mr. Shawn Goodyear
President
Seaforest Plantation Co. Ltd

Mr. Lester Green
President
Newfoundland Shellfish Ltd.
Gambo, NF,

Mr. John Hodder
Newfoundland Aquaculture Association
c/o Ocean Sciences Centre
Memorial University of Newfoundland
St. John's, NF

Mr. Bob Hoyles
Department of Fisheries
St. John's, NF

Mr. Alex Ivany
Buchans Development Assoc.
Buchans, NF

New World Island Development
Assoc.
Newville, NF,

Dr. Paul Ke
Food Science Dept.
Memorial University
St. John's , NF

Mr. Clarence Kelly
Bay D'espoir Salmon Hatchery Ltd.
St. Alban's, NF

Mr. Reg Kingsley
Department of Fisheries
St. John's, NF

Mr. Leonard Lahey
Shellfish Farms Ltd.
St. John's, NF

Mr. David Lewis
Dept. of Fisheries
St. John's, NF

Dr. Henry Manson
President
Atlantic Aquaculture Ltd.
St. John's, NF

Mr. Brian Meaney
Aquaculturist
Department of Fisheries
St. John's, NF

Mr. Terry Mills
President
Thimble Bay Farms Ltd.
Botwood, NF

Mr. Johnathan Moir
Centre for Fisheries Innovation
St. John's, NF

Mr. Knut Nygaard
Carino Co. Ltd
St. John's, NF

Mr. Randy Penney
Department of Fisheries and Oceans
Newfoundland Region

Mr. Vern Pepper
Dept. of Fisheries and Oceans
St. John's, NF

Ms. Helen Peters
Oceans 2000 Directorate
Memorial University of NF

Mr. Jim Roberts
Environmental Protection Services
Environment Canada
St. John's, NF

Mr. Shawn Robinson
Aquaculture Consultant
North Shore Development Association
Pasadena, NF

Mr. Maurice St. Croix
Representative
St. Mary's Bay Centre
Development Association
St. Mary's, NF

Mr. Ron Scaplen
Department of Fisheries
St. John's, NF

Mr. Boyd Smith
Marine Institute
St. John's, NF

Mr. Keith Stoodley
Department of Fisheries
St. John's, NF

Dr. A. Sutterlin
Manager
Bay D'Espoir Salmon Hatchery Co. Ltd
Cooperative
St. Alban's, Bay d'Espoir

Mr. Todd Turner
President
Valley Char Ltd.
Deer Lake, NF

Mr. David Walsh
President
Atlantic Ocean Farms Ltd.
St. John's, NF

Mr. Sam Walters
Canadian Bankers Association
226 Water Street
St. John's, NF,

Mr. John Watkins
Coordinator
Cape Freels Development Assoc.
Badger's Quay, NF

Mr. Maurice Wiffen
President
North Atlantic Packaging Ltd.
St. John's, NF

Mr. Dennis Williams & Mr. Al Pitcher
Department of Fisheries & Oceans
Corner Brook, NF

Mr. Sylvester Yetman
Coordinator
St. Mary's Bay Centre Development Assocation
St. Mary's, NF

Mr. Larry Yetman
DFO Development Branch
St. John's, NF

APPENDIX B

SUMMARY OF SEMINAR DISCUSSIONS

1. Session: Salmonids Reported by: Dr. Arnie Sutterlin

Points Raised

General

- There was some uncertainty about the purpose and scope of the study among the group
- Questioned how the document will be used, for example, is it to be a blueprint for the Economic Recovery Commission?

Salmon Farming

- Opportunities in salmon farming were dismissed too easily by the consultants
- Several points were then made disputing the viability analysis with salmon farming in Roti Bay (these are addressed in the written submission by the Bay D'Espoir Salmon Growers Association)

Ranching and Enhancement

- Insufficient analysis in the study to justify conclusions regarding demand for recreational fishing from salmon ranching and rainbow trout ponding
- Also, the legal and legislative aspects of salmon ranching are very complex; its potential should not be promoted to RDA's without more thorough technical, administrative and economic analysis

Arctic Char Development

- A series of comments were then made about the uncertainty with arctic char development in the province and across the country

Fish Health Diagnostics

- Fish health services are in transition phase - what is the next phase before a private service is viable. Possibilities include developing services at existing facilities such as the Marine Institute

Finfish Demonstration Farm

- Re a finfish demonstration farm. It is probably impossible to have one site serve all needs with so many species under consideration and a wide diversity in marine rearing conditions

Planning and Coordination

- Development strategy needs to be continually updated

Financing

- Even when aquaculture companies are insured, banks are reluctant to make loans; government needs to be involved in financing at the early stages

Questions From the Floor

Unidentified Person	Have attempts at ocean ranching been successful elsewhere
A. Sutterlin	Some success in Japan with chum, in Iceland with Atlantics and with Pinks in Alaska with pinks
H. Manson	Noted that in most other countries with established aquaculture industries there was substantial government assistance at the outset
Doyle	The Economic Recovery Commission was only one of many groups providing financial assistance to aquaculture; believed the industry consultation process was important in coordinating efforts
J. Beresford	Emphasized that aquaculture is not a panacea for all of the ills of the fishery i.e. it won't replace the 15 w jobs lost with the permanent closure of an FPI plant - aquaculture should supplement rather than replace the fishery

2. Session: Mussels Reported by: Mr. David Walsh

Points Raised:

- We did not have time to get through all the recommendations.

Financing/Economics

- A mechanism is needed immediately to provide working capital
- We had difficulty with the "heart of the matter", i.e. the report's economic analysis. We asked for clarification on some aspects, e.g. the economics of mussel production in this province.

Processing

- We agreed that the emphasis should be on secondary (added value) processing.

Demo Farm

- We felt there was no real need for this; there are enough existing private farms and enough research agencies. Demo farm should use those of existing operators.
- Instead, we need better co-ordination and communications of agency research efforts. Research is needed on all aspects; basic, research, marketing, etc.

Depuration

- May be a myth about Newfoundland pristine water, therefore may be a need for such facilities especially as industry grows.
- Report did not look in detail at economics of depuration.

Labrador

- Not considered in the report; has any research been done on mussels in Labrador.

Industry Association

- We agreed on need for seed money for this Association
- But did not feel membership a requirement for funding

Marketing

- Too much emphasis on North America markets.

Closed Areas

- Vol. 1 has inconsistencies or mistaken impression re which areas of province are closed.

Questions from Floor on Mussels

J. Moir Did your group have any suggestions about how research should be coordinated

Dave Walsh No.

G. Beresford Thinks it would be very advisable not to speak out too much about whether or not Newfoundland has pristine water.

D. Egan Raised point of clarification on existing appeal system

3. Session: Scallop Reported by: Mr. Allan Alexander

Points Raised

- We found several errors re scallop industry; we will address these in our written brief
- We agreed in principle with many of the report's findings, and thus our comments are diverted towards only what we disagreed with/or found erroneous.

Development

- We are agreed that scallop production should be increased, but advise caution about expanding too quickly. Funding should be concentrated on existing operations (and not spread too thinly). Evaluations (of current projects) needed before going too far.

Technology

- Re bottom versus suspended: we need more R&D in this area; we should also evaluate technology in light of market conditions.

Regulations

- We are concerned about any increase in license fees - this point should be struck from report.
- Pollution control needed: Dept. of Health should be involved here (in an education program)
- Re depuration: we did not believe that need for such facilities should be overlooked/not necessary. May be needed in future, e.g. for specific areas/sites.

Processing

- We did not agree best to use existing plants. Many current operations are very unaware of our needs; most plants cannot be easily adapted; and in most cases, special equipment is needed for each species

Financing/Marketing

- We agree that working capital urgently needed
- But we felt that European markets should be strongly targeted (these markets have very high product prices) and scallops considered a delicacy.
- Other institutions should be involved, e.g. MUN,
- Demo farm: more than one is needed.
- Report did not adequately address market for scallops

Questions from Floor

Dr. Lee Fresh scallops prices in Paris up to $30/lb and in Tokyo local mussels sell for 1/2 the price of cold ocean products.

Newfoundland has (comparative advantage) cold ocean, plus pristine water.

DFO also needs to establish criteria for assessing what is a "dead" shellfish. Can it still be processed? Needs an objective scientific procedure. This is a key to marketing.

We also need to develop/evaluate high tech procedures for handling and transporting shellfish species.

P. Dabinet Commented on D. Egan's response to license fees per hectare. Noted the scallop (bottom production) needs an extensive area.

4. Session: Other Species Reported by: Mr. Shawn Goodyear

Points Raised

General

- There is a good potential market for HOG cod: market conditions for cod are not a constraint; efforts should not be restricted to North America
- Quality is most important item; if existing plants used to process, they must be aware of (new) quality requirement/need.
- Study lacked market information on "other species. This information is a pre-requisite for developing any new species.
- Sites should also be identified for cod and "other species".
- Market/technical research need to go hand in hand

- We did not think a cod hatchery is viable at this point.
- Re industry regulations: there is a need to simplify the application process
- Disease: We should pursue use of the Federal Department of Agriculture at Mount Pearl Farm. They have expressed an interest and have expertise.

  There is a need for a full-time technician for disease monitoring, etc.

Financing

- Funding agencies should give consideration to or take into account sweat equity inputs
- Formal membership in an association should not be a criteria for funding
- Use a mail-out program to co-ordinate information form funding agencies

Marketing/Promotion

- Quality control should be the cornerstone of all marketing efforts, regardless of species
- Don't restrict target markets for Newfoundland species
- Workshop supports idea of generic marketing of all aquaculture species

Research/Extension

- A demonstration farm also needed for finfish: this should research all aspects - feeding, handling, etc.
- The Newfoundland aquaculture industry needs to be better informed about existing (DOF/DFO) extension programs/information available, etc.

Questions from the Floor on 'Other' Species

N. Robbins You said market information and other species was skimmed over, is this because no information exists?

S. Goodyear We know the study was (expected) to focus on salmon/mussels; but "others" need to be looked at. There seems to be no logical reason why some other species were not emphasized.

D. Walsh Did your group feel they had been consulted enough.

S. Goodyear We were visited

J. Brown Report looked at wolfish, but said little information was not available. Also we are working on ocean pout, but this species was not discussed.

F. Baird Were people in your group consulted about the T. of R. for this study?

S. Goodyear No.

APPENDIX C

WRITTEN SUBMISSIONS

APPENDIX C

WRITTEN SUBMISSIONS

H.J. Manson
Atlantic Aquaculture Ltd.

Bay D'Espoir Salmon Growers

A. Ivany,
Buchans Development Corporations

K. Nygaard,
Carino Company Limited

L. Fudge,
Eastern Mussel Growers
Association

J. Roberts,
Environment Canada, Conservation
and Protection Branch

D.U. Williams,
Fisheries and Oceans Canada,
Inspection Services Branch,
Gulf Region

A. Gibbons,
Great Northern Peninsula
Development Corporation

K.M.W. Keough,
Memorial University of Newfoundland,
Department of Biochemistry

H. Peters,
Memorial University of Newfoundland,
Oceans 2000 Secretariat

P. Dabinett,
Memorial University of Newfoundland,
Marine Sciences Research Laboratory

L. Green,
Newfoundland Shellfish Ltd.

L. Lahey
Rainbow Trout Farms Ltd.

Robert Freeman
Trinity Blue Aqua Farms Ltd.

J. Caines
Shell Fresh Farms

S. Robinson
The Venture Centre

RESPONSE TO
THE DPA GROUP'S REPORT

NEWFOUNDLAND AND LABRADOR
AQUACULTURE DEVELOPMENT STRATEGY.

by

Atlantic Aquaculture Ltd.

Atlantic Aquaculture Ltd.
P.O. Box 9338, St John's, Nfld. A1A 2Y3.
Tel. (709) 753-9325.

Mr S. Canning,
36 Monkstown Road,
St John's, Nfld.
A1C 3T3.

90-04-12.

Dear Mr Canning,

Re: The DPA Group's Report "Newfoundland and Labrador Aquaculture Development Strategy".

This report was presented to the aquaculture industry at a recent meeting (March 31) at Grand Falls, at which our company was represented. Atlantic Aquaculture Ltd finds itself in strong disagreement with some major points in the report.

At that meeting, written submissions commenting on the report were invited by the Provincial Department of Fisheries. We are principally concerned with the section on salmonids and wish to reply to it in this document.

We would like to point out that our company has spent approximately $500,000 on researching the questions addressed in the DPA Report but was not contacted by the DPA Group or its representatives at any stage.

Unfortunately, two weeks is not enough time to produce a detailed response to a document of this size. There is more that could be said but time prevents us from doing so.

Thank you for your attention in this matter; we hope that the following will be helpful.

Yours sincerely,

HJ Manson

Dr H.J. Manson,
Secretary/Treasurer.

RESPONSE TO THE DPA GROUP'S REPORT "NEWFOUNDLAND AND LABRADOR AQUACULTURE DEVELOPMENT STRATEGY"

AN OVERVIEW OF THE SALMONID FARMING INDUSTRY.

Aquaculture resembles the agriculture industry (of which it forms a part) to a greater degree than it resembles the traditional fishing industry. There still seems to be a good deal of confusion on this point.

All farming falls into one of three categories; ranching, extensive (or traditional) farming and intensive farming. Salmonid aquaculture falls into all three categories and will be discussed under these headings.

Ranching.

Salmon appear at first sight to be highly suitable for ranching, because they return to the river of their origin to spawn. This suggests that, in theory, all one would have to do to realise a profit would be to have a large, well run hatchery and release the fish into the wild environment. These would then go away to eat and grow, returning as large adults to be netted and sold at very little expense to the rancher. In fact, there have been many attempts at salmon ranching. With the exceptions of Japan (and perhaps Iceland if one includes what is really a major enhancement program) these attempts have not been very successful, because the ratio of recaptured fish to fish released has been rather low.

Actually, there are two entirely seperate problems in salmon ranching; intensive hatchery management and the entirely different problems associated with ranching proper.

The poor rate of returning fish is due to problems common to all ranching. In such systems, there are always four sources of loss:

1/ When the young animals are released, many fail to make the adaptation to the natural environment. This is a more serious problem in fish than in mammals, because the young are not accompanied by adults. The young fish must adapt to find their own food, avoid predation and face new disease challenges.

2/ Ranched salmon are subject to all the diseases of wild fish. Essentially nothing can be done about this, because after release it is impossible to supervise or to treat them. It is possible that better fish vaccine technology might make inroads into this category of loss but it is very doubtful that disease prevention alone could change the picture enough to make ranching a viable private sector industry.

3/ Predation obviously takes a toll of salmon, both wild and cultured. It causes great financial loss among cultured and released stocks. The majority of the loss is among parr and smolt, on which considerable amounts of money have already been spent. It seems likely that juvenile cultured fish may be less adept at avoiding predation than wild juveniles of similar size.

4/ "Rustling" is probably the main reason that salmon ranching has problems as a commercial venture. Even if legislation were put in place so that a salmon ranch had the sole rights to a river the problem would not be close to solution. A single purse seine could intercept the ranch's school of salmon in international waters and wipe out a year's production. For this reason, while salmon ranching could be used to increase the world supply of salmon, it is extremly hard to see how a private commercial venture could be founded on it.

Fish ranching is essentially an unbankable proposition. It is also hard to attract investment to it from the private sector. It is difficult to persuade individuals to put their life savings into becoming salmon ranchers for the same reasons. The investor, whether corporate or individual, is being asked to invest or lend money on security and to run all the risks mentioned above, while owning nothing but a few nets (the hatchery is a liability, not an asset - a factory whose sole product automatically becomes government or community property).

He has no other real property in his business and so has nothing to mortgage. He does not have, nor will he have till the instant of recapture, any rights of ownership to the fish stock. We cannot envisage a scenario where DFO would grant any meaningfull or bankable kind of ownership of a river's fish stock to a private individual or group and, indeed, doubt that they have the power to do so.

Yet fish ranching is a time consuming and expensive business at the hatchery stage, not entirely easy to combine with other regular employment. The risk must be conceeded to be very high and it might be expected that the profit would have to be very large to offset the risk. Unfortunately, this is not so.

Conflicts would inevitably arise with the capture fishing industry and legislation to solve the problem would be extremely complex, as well as facing the difficulty that much of the loss may occur in international waters. We understand that there is already some friction locally between the inshore fishermen and the sport fistermen over resource management.

It is probably important that both Japan and Iceland (the two

countries often referred to by the advocates of ranching) are much more highly disciplined societies than Canada, i.e. their citizens are much more accustomed to accepting regulatory interference.

For all of the above reasons, it does not seem at this time that salmon ranching will become an economic private sector venture in the foreseeable future.

Enhancement programs.

Enhancement programs are a special case of ranching. Atlantic Aquaculture is strongly in favour of programs to enhance, conserve and protect Newfoundland's fish stocks but has become alarmed at aspects of development planning which seem to be gaining favour in some quarters and are connected to a salmon enhancement program.

If enhancement programs are primarily directed towards the capture fishing industry or some segment thereof, such as the inshore fishery, we would see them as a form of ranching. The only difference from conventional salmon ranching would be that the program was public sector, not private sector.

All the problems identified in the previous section would apply to such a program, except that no question of bankability would arise since the program would be be funded completely and perpetually from public monies. The only element of privatisation that might become possible in such a program would be a levy on commercial salmon catches. It seems unlikely that this could be imposed before considerable success had been demonstrated. It is noteworthy that the Exploits river enhancement program has taken approximately twenty years to reach its present level of success.

There seems to be confusion between enhancement and aquaculture, and a perception that enhancement is a major solution for the tourist industry. It has been calculated that a salmon caught on rod and line in the island of Newfoundland brings a total of $200 tourist dollars to the island ecomomy, while in the Labrador, the comparable figure is $1,000. These figures are seen as a very attractive way to sell fish and undoubtedly represent the best possible dollar harvest of the wild resource.

Unfortunately, there are two points to bear in mind. There is a considerable hidden cost in policing and protecting this resource. Consideration of the numbers involved also reveals problems. Let us assume that the desired target for revenue from sport fishing is $10,000,000 and neglect any hidden costs. Let us further assume that this revenue will come from the island of Newfoundland. That means 50,000 salmon caught on rod and line or 10,000 limit days. Does this seem likely? It would require 50,000 salmon taken on tourist rods to approximately equal the dollar

return on a farmed harvest of 1,000 tonnes. Can we ever hope for enough tourism?

While it is not within Atlantic Aquaculture's technical ability to answer questions on tourism we cannot but question whether funding for such a program should come from the same source as that for aquaculture. It would probably be better to see enhancement as long term support for the tourist industry, funded as such, rather than as part of agriculture, aquaculture or fisheries.

Relevance to the DPA Report:

1/ Atlantic Aquaculture Ltd sees salmon enhancement programs as most desirable, but feels that it will be difficult to point to a comparable environment where ranching has been a commercial success.

2/ Considerable long term assistance from Government will likely be necessary to fund such programs as well as the assumption of a major part of the risk in a type of venture having such a history.

3/ The policies of the Federal Department of Fisheries, which prevent the importation and release of superior stocks, are likely to prove a barrier to this type of endeavour. In particular, sport fishermen are not attracted by low weight grilse stocks.

4/ Enhancement programs are long term public works programs, whether they be directed at tourism or the inshore fishery.

<u>Extensive farming</u>.

Most salmon ongrowers fall into this category although the stocking densities now used place sea pens at the borderline with intensive farming. However, if we define extensive or traditional farming as a system in which the stock is kept confined (by fences or nets) but can interact freely with the natural environment and where the successive crops of the stock are allowed to interact with each other, we can see that ongrower pens in the sea fit this description.

There have been problems associated with attempts to carry on traditional farming on an industrial scale. As stocking density is increased disease tends to spread within the group more readily, for various reasons. The amount of disease organisms which are shed to the environment increases drastically, becoming a serious problem to succeeding groups, because the natural environment cannot usually be adequately cleaned.

Traditional farming has never really overcome these problems of scale, which have generally limited the number of animals that can be kept in this way.

One strategy which has been useful has been to use some system of rotation so that the animals could be moved to fresh clean sites, at least after each crop. This, of course, has the effect that fewer animals can be kept, the number of sites becoming the limiting factor. This is, in fact, a special case of reducing the population density.

Where there are natural hosts to disease in the environment, the mobility of these natural hosts may be a problem, offsetting man's attempts to create disease breaks, by cross infecting sites.

Wild fish are a problem in this respect. Unless the sites are seperated by a distance greater than the territorial range of the wild fish species in question, the contaminated wild fish will move to the new site, as it represents a food supply. Little is known about the territorial habits of most fish species.

The time required for a site to lose its load of disease organisms has also proved to be a limiting factor in the application of this strategy.

The length of time that needs to elapse before a site is "clean" depends chiefly on two things; how long the disease organisms we are interested in can persist free in the environment and how long they can persist in any other host species that they use and that remains on site.

Relevance to the DPA Report:

1/ The quoted density of sea sites in Roti Bay seems very high relative to its area for sustained production, but the remainder of the Bay D'Espoir system is ignored in the report. This is a major oversight since the system is claimed to be capable of sustained production of several thousand tonnes per annum.

We concede that there may be problems with overwintering salmonids under ice cover in large quantities in sea cages. We do not regard this as a fully proven methodology under Newfoundland conditions. From a business point of view the risks of this technology are substantial, with sums of millions of dollars at risk from a single adverse event and having exposure for two or three winters. It seems, however, that the workers at Bay D'Espoir are confident that these problems can be lived with, in their particular environment. It is worth remembering that this type of risk is insurable, which the DPA Group seems to have largely ignored.

2/ Low growth rates are not necessarily a serious problem in themselves. They can result in better marketing strategies under some circumstances (due to the longer period between reaching marketable size and grilsing) and do not necessarily imply substantially increased feeding costs or worse feed conversion ratios. Labour and other running costs are of course increased, but these costs are relatively smaller. Obviously, rate of return on investment is decreased; the most serious consequence of low temperatures is increased interest costs where borrowing is necessary.

3/ The limitations of site and stocking density are now becoming a factor affecting the growth of the industry in Scotland and Norway. These limiting factors and their effect on marketing are ignored in the DPA report.

4/ We are quite surprised that the DPA Group cannot seem to accept the feed conversion ratio of 1.25:1 reported from Bay D'Espoir. We have studied sea cage farms in Scotland and have found that in that environment 1.2:1 is regarded as an excellent result, 1.7:1 is taken as serious cause for concern and 2:1 is becoming seen as a signal to rest the site.

Intensive farming.

As man's demands on his food supply have grown, there has been an increasing need to develop food production systems on an industrial scale. The simultaneous pressure to cut costs has resulted in the development of what is known in the livestock industry as intensive farming.

All salmon hatcheries fall into this category. Pump-ashore or land based systems for ongrowing are also within this class of farms.

Intensive farming is generally capital intensive and relies on a high degree of efficiency to realise a large financial return.

Disease management is vital in these "highly geared" systems. The governing principle which makes intensive farming possible is the "all in all out" system of management, where strict separation between groups and isolation of each farm unit is combined with rigourous "clean up" or sanitation programs to limit the introduction and spread of disease.

We have pointed out in our proposal to develop an aquaculture facility at Newfoundland and Labrador Hydro's thermal generating plant at Holyrood that water temperatures in Newfoundland are substantially lower than in most other salmon farming areas. Lower mean temperatures lead to slower growth rates and winter

temperatures are dangerously low. Of course, areas affected by pack ice are virtually impossible to farm using floating sea cage technology.

The considerations outlined above have led us to the view that, in Newfoundland, a land based pump-ashore farm will be safer and that heated water confers a great financial and safety advantage. A heated water supply helps to ensure a sufficiently high rate of return on investment so that a pump-ashore facility can be attractive in its start-up years; once established, with its capital costs amortised, a land based farm would be viable without this advantage.

Cold water land based farms.

A land based farm without a major supply of heated water would be operated to advantage in a mode in which several year classes of fish would be present in the farm's ongrowing tanks at any one time. These year classes must be isolated from each other to prevent disease spread. This system of management is illustrated in the accompanying figure "3 Year growout management system". Operating in this manner would have obvious cash flow advantages.

1/ Growth rates:

It is known from practical experience in Newfoundland and in Norway that it takes about three years to grow out salmon to market size at the sea temperatures encountered in this area.

Growth rates would be maximal in summer and fall to near zero in winter. This temperature based variation in growth rate is superimposed on the basic non linear growth rate of the species. However, for projection purposes, an adequate approximation of growth can be made by taking a linear growth rate in terms of weight from the time of introduction as smolt to time of slaughter.

Feed conversion ratios would be essentially unchanged (we are assuming a modest overall feed conversion ratio of 1.7:1 in our projections).

2/ Biomass:

Under a cold water regimen, total maximum biomass for a 18852m3 facility (the example we have calculated) would be approximately as follows:

Each year class would have a final maximum biomass of about 235,000 kg. Then at maximum biomass (occurring toward the end of March) the three year classes would weigh about 235,000 kg, 157,000 kg and 78,000 kg respectively. Annual

total biomass would follow a sawtooth waveform from 242,750 kg to 470,000 kg with a mean of 356,375 kg. This is illustrated in the figure "3 Year growout management system".

3/ Water flows required:

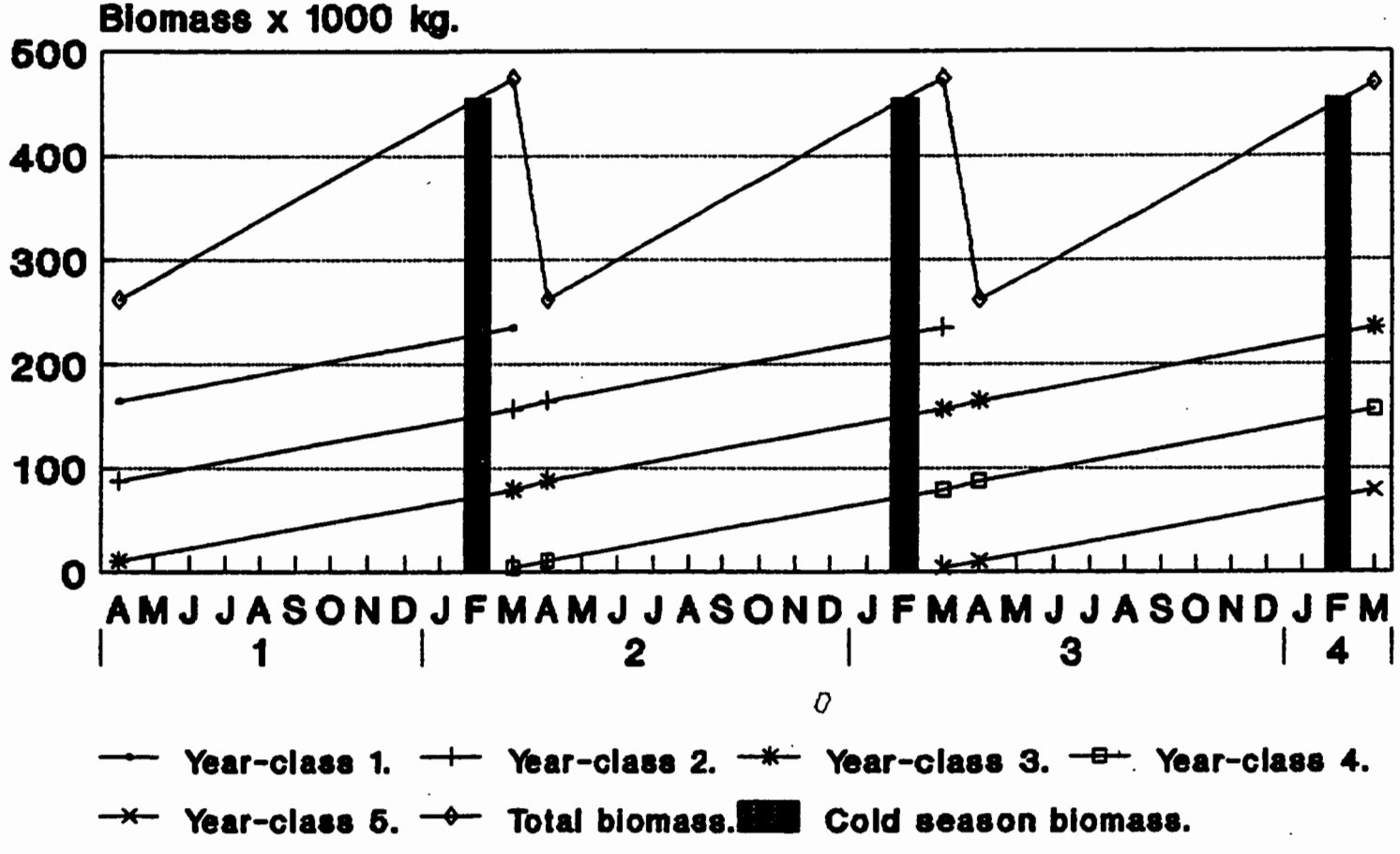
Flows required depend on biomass directly and are also a function of temperature. Smaller fish need higher flows because of their higher metabolic rate, however a reasonable approximation can be obtained by taking the total biomass on the farm at any one time and hence determining the average individual fish weight (knowing that each of the three year classes has 77,500 fish). From this and the monthly sea water temperatures (except that sub-zero temperatures will be prevented - see below), the flow required in litres per minute per kilogram of fish can be found by reference to curves produced by Skjervold (1974). The flow required can then be calculated from this figure and the total biomass. This calculation has been done on a monthly basis and the mean annual flow rate required determined (Table: "Water flow requirements - 3 Year growout management system").

At these lower temperatures there is less need for concern regarding water flows required to prevent the build up of ammonia excreted by the fish, since the mole fraction of unionized ammonia (which is much the more toxic form) declines with temperature, approaching the level for fresh water at 0oC. This is shown in the figure "Mole fraction unionized NH3". Also, we have data from a pump ashore farm in the Shetland Islands which operates over a somewhat higher temperature range (5 - 12oC), with maximum biomass of 25 kg/m3 at 10oC. This farm therefore has a less favourable environment from the point of view of ammonia toxicity, yet it successfully uses a flow of 0.158 l/min/kg fish at 10oC, which is considerably lower than would be predicted by Skjervold and lower than any flow we would consider using.

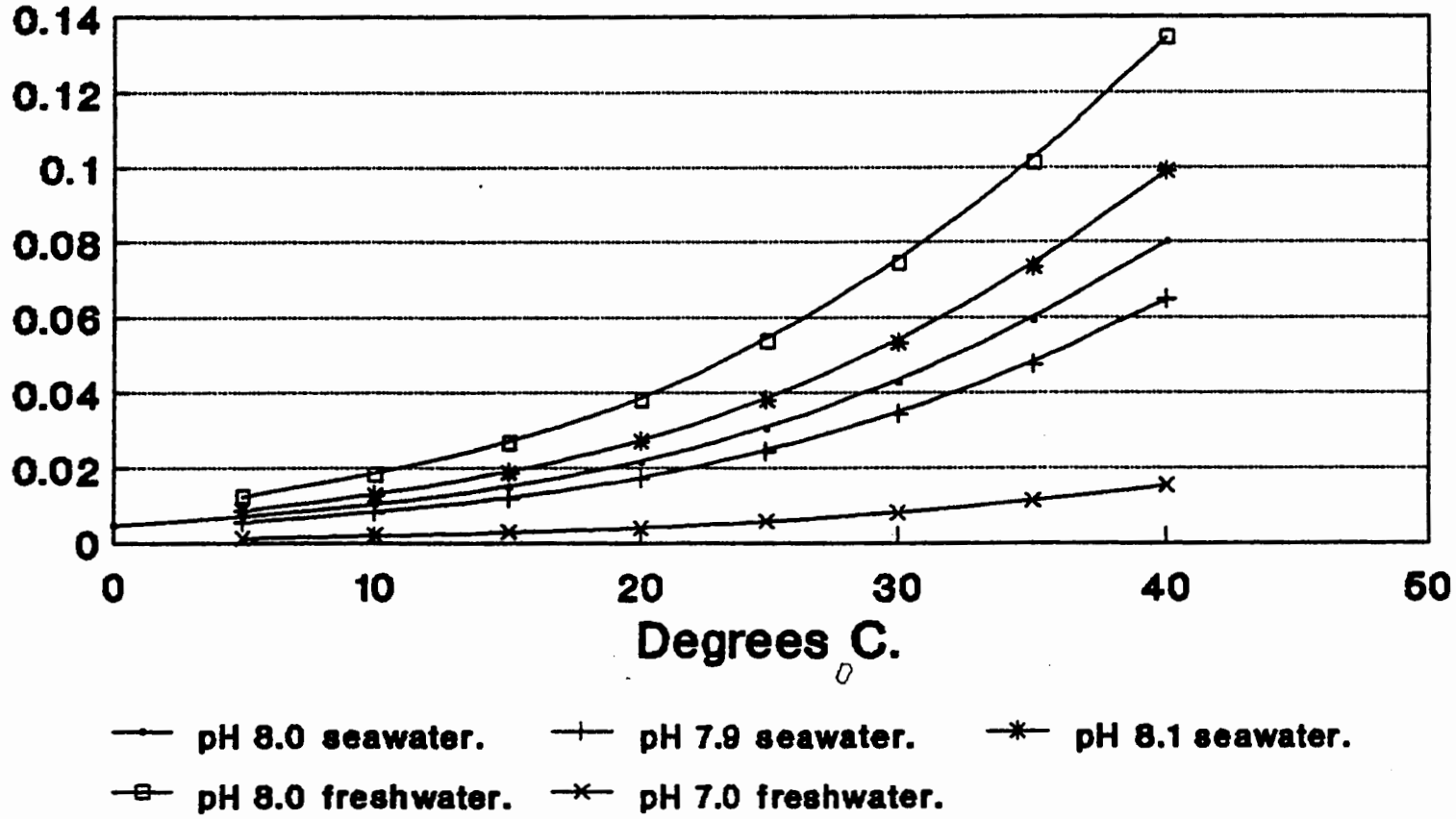
Using the method described above, based on Skjervold's work, the mean flow which would be required is estimated at approximately 50,815 l/min. ShawMont Newfoundland Ltd in their report for Atlantic Aquaculture estimated the cost of pumping 103,682 l/min at their site to be $225,000 per annum. Hence the cost of pumping water for the 3 year growout management system would be about $110,273 per annum.

It is apparent that this represents a considerable reduction from the 204,000 l/min maximum (and approximately 102,000 l/min mean) design flow given by ShawMont Newfoundland Ltd for a 470,000 kg, 18852m3 facility operating at around 14oC on a 1 year growout basis.

3 Year growout management system
without process heat.



Mole fraction unionized NH3
in freshwater and seawater.



Water Flow Requirements - 3 Year growout management system.

Month	Temp (oC)	Total biomass (Kg)	Mean individual fish wt(g)	Flow (l/min/kg fish)	Total flow required (l/min)
Apr	1	261688	1125	0.03	7850
May	4	280625	1206	0.06	16837
June	8	299563	1288	0.14	41938
July	12	318500	1370	0.24	76440
Aug	16	337437	1451	0.36	121477
Sept	16	356375	1533	0.35	126513
Oct	13	375312	1614	0.26	97581
Nov	8	394250	1696	0.13	51252
Dec	3	413188	1777	0.05	20659
Jan	3	432125	1859	0.05	21606
Feb	0	451063	1940	0.03	13531
Mar	0	470000	2022	0.03	14100
				Total:	609784
				Mean flow:	50815

4/ Protection From Ice:

The coldest temperatures are encountered in February-March, at which time there would be three year classes present in the tanks. Simple graphical methods using linear growth rates have been used to estimate the total biomass which would be present at that season, for smolt introduced in April (Table: "Water flow requirements - 3 Year growout management system").

The flow required during the late winter period of minimum temperature is critical to considerations of heating cost. It has been calculated above to be 13,531 l/min in February and 14,100 l/min in March for a mean cold season flow of 13,816 l/min.

Salmon become supercooled below -0.7oC and will then die if exposed to ice. Minimum intake water temperature will be approximately -1.5oC so it would be necessary to heat intake water about 1oC.

For 60 days the mean cold season flow of 13,816 l/min would be raised by 1oC. The power which would be required may be calculated as follows:

Flow = 13,816 l/min.
= 230.3 l/s.

Energy required to raise 1 l of water 1oC = 4184 J.

Power required to raise 230.3 l/s of water by 1oC
= 230.3 x 4184 J/s (watts).
= 963.6 kw.

This is required constantly for 60 days per annum. Power consumption is therefore
= 963.6 x 24 x 60 kw-hr per annum.
= 1,387,584 kw-hr per annum.

Assuming a cost for power of 5 cents per kilowatt-hour this would represent a cost of $69,379 per annum, say $99,000 for a 70% efficient system.

5/ Financial implications:

Production and Sales.

Annual production would be 235 MT live weight. At a yield of 85% for head-on gutted salmon, this would give 199.75 MT of saleable product, at a projected price of $11/kg. Annual gross sales would thus be ---------- $2,197,250

Selling cost:

Sales commissions @ 5% of gross selling price --	$ 109,863
Freight-out @ 45.83 cents/kg net ----------	$ 87,590
Total selling cost	$ 197,453

Net sales ---------- $1,999,797

Cost of sales.

1) Eggs: hatchery costs are included with general costs, below.

2) Direct labour. This would be proportional to production since the mechanical operation of the farm is not labour intensive; most labour cost is in feeding and handling the fish, as on Scottish farms. For an annual production of 235 MT direct labour would be 4 full time employees (@ $8.98/hr inclusive of fringe benefits) for a cost of $73,240 per annum. Management positions for the ongrowing facility would be only the general manager at $45,800 per annum.

3) Energy costs. Calculated above as pumping at $110,273 plus heating at $ 99,000 for a total of $209,273 per annum.

4) Feed cost. Feed is calculated at $1,035 per tonne. At an average feed conversion rate of 1.7:1.0 a total of approximately 399.5 tonnes would be needed annually at a cost of $413,482.

5) Production supplies. $14,400 per annum.

6) Maintenance. $75,000 per annum.

7) Packaging costs. Calculated at $0.26/kg for a total of $61,100 per annum.

Total cost of sales	$ 846,495
Gross margin	$1,153,302
General and administrative expenses	$ 350,800

Profit.

Gross margin	$1,153,302
General and administrative expenses	350,800
Profit before Income Taxes	$ 802,502

Before tax profit after all expenses in such a system works out to 36.5% of gross sales. However, this figure is before any principal or interest payments on capital. Thus such a system would probably not be viable with conventional financing. Conversely, if conventional financing were used, a capital cost of $5,000,000 would leave little profit ($5,100,000 at 14% interest, 15yr. term costs approx. $798,984 p.a.).

Relevance to the DPA Report:

1/ We agree with the opinion expressed in the report that land based (pump-ashore) facilities may be the most promising technology for Newfoundland.

2/ We are surprised that the DPA Group did not explore this avenue in more depth. We note that they discuss the use of heated water but again they have not considered this in depth. Our company would have been willing to supply data to the DPA Group on this subject, but was not consulted.

3/ While Atlantic Aquaculture Ltd's views on the difficulty of culture in ice areas are given above, we have carried out an in-house analysis which indicates that with proper management and government assistance at startup, land based facilities may well be a viable option for Newfoundland even in the absence of a large supply of heated water such as is available at the Holyrood site. We note that the DPA Report does not totally discount the possibility of heating water to avoid lethal winter temperatures.

It would be neccessary, however, to find a means of avoiding heavy borrowing at startup. This would perhaps be possible for a cash rich company, or for a successful company in an expansion phase; in the context of Newfoundland aquaculture at present it would in practice require Government support in one form or another.

REGULATORY DIFFICULTIES.

It is generally better to see regulations as a source of precautions rather than difficulties.

It is true, however, that some aspects of the DFO regulations seem excessive. The fear of genetic pollution of the native stocks could be made completely unrealistic in a land based facility, for example. It cannot be dismissed if sea cages are used - indeed accidental releases are inevitable in sea cages. It is likely that permission to import stocks that would not be allowed in a sea cage facility would be given to a land based facility with adequate containment.

It is very likely that DFO will allow the importation of non-native stock, provided an agreement is signed guaranteeing that these will never be put into sea cages and that there is adequate containment. If the intention is to develop a broodstock from these non-Newfoundland salmon, the effect would be to eliminate the option to expand production by using sea cages for part of the year or to sell eggs or smolt to any other than land based facilities.

It is very hard to see logical justification for policies that permit Atlantic salmon in sea cages in British Columbia but not St John River stock in sea cages in Newfoundland. Indeed, there is precedent for the importation of Scottish Atlantic salmon into Canada.

Many people find the arguments regarding genetic pollution unconvincing with regard to stock transfers of Atlantic salmon within the Atlantic provinces, saying that Atlantic salmon are but a single species and that the advantage in protecting low weight grilse subpopulations is not clear.

There is a sense of injustice in this area, with a feeling that the industry in Atlantic Canada and Newfoundland in particular is being asked to accept limitations on theoretical grounds which do not seem to apply to other areas of the country. It is all very well for the DPA Group to talk of missing windows of opportunity, but it should be recognised that the major reason for the delay in developing Newfoundland's salmon industry has been the restrictions on availability of stock.

Geographical boundaries are a vexed point also. Presently, the basic unit is being taken as the watershed. Importing eggs or smolt from anywhere in Newfoundland outside one's watershed requires a permit. DFO would become involved on the grounds of protecting native stocks.

It should be borne in mind that the level of strictness in granting permits will vary with time, under the influence of two

opposing factors. On the one hand, outbreaks of disease will lead to a tightening of the rules.

On the other hand, as time goes on, it is more or less inevitable that each specific watershed will be found to have more naturally occurring disease in its wild fish population than is presently recognised. This will simply be a function of better testing methods and more study, which will reveal what has been there all along. Provided that aquaculture units are not mistakenly blamed for naturally occurring disease, this will lead to some slackening of the regulations, especially as regards the specific diseases that are discovered in each watershed.

It is clearly impossible to predict these events in detail, especially their time scale, but we must be aware of the possibilities, particularly of the negative ones.

The importation of eggs or smolt into Newfoundland from outside the Province from elsewhere in Canada or from abroad requires permits from both the Federal and Provincial governments.

Broadly speaking, the Provincial Government has become responsible for regulating aquaculture, while the Federal Government will be directing its regulatory activities toward the preservation of wild fish stocks.

It appears that no permits to transport fish or eggs are likely to be issued by the Federal authority contrary to the wishes of the Provincial authority, but that permits which might be desired by the Provincial authority may not be forthcoming at the Federal level. This is likely to impart a conservative bias to the decision making process.

In particular, it seems possible that permits for the transport of smolt or eggs from Bay D'Espoir into another watershed cannot be assumed to be auotmatically forthcoming. This might prove just as much of a regulatory problem as importation from out of Province.

Attempts to import uncertified smolt from the other Maritime Provinces into Newfoundland have been disallowed. It is clear that the Federal authority will resist such attempts, unless the smolt come from a Federally certified hatchery or the eggs are imported into a Federally controlled quarantine facility as part of a certification process.

<u>It has to be said that there is a problem in getting clear, unequivocal answers from DFO, which are consistent from time to time and place to place. This is a serious problem for industry; bankers and investors cannot be expected to play their part if availability of stock is uncertain</u>.

Everyone understands that fish cannot be imported without quarantine conditions and that these preclude importation from diseased stocks.

Clear guidelines on what is permitted, on quarantine proceedures and on containment requirements are essential. It is of no use to industry to make statements about what may be permitted, or which reserve undefined discretionary powers or which take the form of stating that something may be permitted on an individual basis depending on some condition. Industry cannot commit funding without clear guidelines.

There is some perception within industry that DFO, having withdrawn from direct control of aquaculture within the Province, has adopted a purely defensive posture. That is to say, their interest in developing the industry has evaporated and is replaced by a view of aquaculture solely in terms of downside risk. Such a negative attitude ignores the social responsibilities of government and threatens to kill a fledgeling industry.

MARKETING.

Salmonid aquaculture, indeed all aquaculture, is a branch of agriculture, specifically livestock farming. As such, it is a business engaged in the primary production of a commodity in an uncontrolled market. There is thus no reason to expect that the market for (say) Atlantic salmon will differ in kind from any other livestock market, for example, the hog or fat cattle markets. Commodity prices in these markets have been intensively studied for decades and although variations cannot be predicted in detail as to timing and amplitude, the cyclical processes underlying them are rather well understood.

Agriculture is a universal industry and in the global environment of modern trade it is quite unrealistic to hope to avoid competition. Specifically for aquaculture, the seas and oceans are large and the number of possible aquaculture sites planet-wide is very great. This holds true unless some species having a remarkably restricted habitat can be found and popularised for consumption.

It is quite impossible in these circumstances for any one region, country or individual to corner the world market. This has been tried many times in other agricultural commodities and has always failed. There are simply too many possible alternatives and competitors.

Type of market.

In an unregulated market in which there is a pre-existing demand, for example the initial market for cultured Atlantic salmon, when a "new" product, such as cultured salmon, is introduced, it at first commands a very high price. The reasons are twofold; there is scarcity value or pent-up demand for the heretofore scarce and desired product and, secondly, the price reflects the risk of the new technology. Typically in this phase fortunes are made at the same time as there are spectacular bankruptcies.

As the technology matures the price of the commodity "stabilises" at a lower level. Since farming is one of the resource-based industries which obey the classic laws of economics, we expect, and indeed find, that this "stabilised" price is in fact rather unstable and rises and falls in a quasi-periodic manner, roughly under the laws of supply and demand.

The exact manner of this fluctuation of price with time is extremely complex, too complex to be accurately forecast by current methods. So-called "fundamental analyses", while widely used in attempts to predict such markets as hog, cattle and grain futures are only capable, at best, of supplying the broadest outlines. All the expensive market surveys done fall into this category. "Charting" is the other widely used technique in this

field, but has no scientific foundation. It is difficult to show that one technique is better than the other.

Nevertheless, we can say that livestock market systems are cyclical in nature, even though we cannot predict either the length or the amplitude of the cycles with accuracy. Typically, periods of oversupply lead to low prices which cause a reduction in production and a consequent increase in price. This grossly oversimplified picture is much modified.

Even those modifiers which are known are too numerous to list but the following four obvious examples illustrate the complexity of the market cycle. Fluctuations in the supply and cost of essential inputs (e.g. feed ingredients) modify production costs. The economic cycle as a whole modifies demand while natural events of sufficient magnitude (e.g. disease epidemics, severe storms in vital areas or slower climatic variations) may modify supply. The machinations of politics can cause large distortions of the entire market.

Such systems, where small changes early in complex interactive causal chains produce major changes in output, are sometimes described as chaotic systems. Fortunately the type of market we are talking about does have constraints; salmon are not likely to be produced to any major extent below the cost of production (unlike some commodities) since there is no longer a source of subsidy large enough to sustain such production. Similarly, consumer resistance limits the upside of the price.

It is axiomatic that any cyclical system shows high and low points. It is further clear that the market for cultured salmon is settling down to the normal cyclical pattern for an agricultural commodity and it seems that it is approaching the price range in which it could be expected to trade in the longer term. In the spring of 1990 we seem to be emerging from a low and starting to form an uptrend.

Since there is as yet no futures market for salmon, the stabilising effect that these markets are claimed to have, is not seen in the prices paid for salmon.

There are some further aspects of aquaculture which will tend to make market prices more unstable compared to, say, hogs or cattle. First among these are considerations of aquacultural financing. Since one cannot mortgage the sea the most stable form of borrowing is denied to the aquaculture industry.

These factors will tend to result in shorter market cycles as long as aquaculture is debt-financed, since low prices will have drastic effects on those who rely on short term borrowing from conventional lenders.

The cyclical nature of the market is illustrated in the two figures, "Salmon Price Bands Billingsgate Market London, 1980-1988" and "Farm Raised Salmon - New York Greensheet Market Prices".

Species.

By far the most widely researched market in salmonid aquaculture is the salmon market, although there is also a considerable body of knowledge regarding Rainbow trout.

Pan-sized Rainbows are farmed and sold in very large quantities but at a low price. Our own research has convinced us that they are unprofitable for land based (tanks with a pumped water supply) facilities in Newfoundland; according to Mr Lahey of Hopeall there is not a large market for these fish locally and he relies largely on the tourist/sport fishing industry.

There is a market for large Rainbows but it is currently considered limited in size. This is dealt with in the report "A Market Study for Newfoundland Farmed Salmon" by Wolfgang Uebel and Asssociates Ltd. Prices have generally been lower than salmon prices, as have production costs. Sea cage production in Newfoundland should be profitable but the market is limited.

Artic char could be produced in large quantities in Newfoundland in either salt or fresh water environments. Currently available salt water char strains have less than optimal characteristics. Unfortunately the market for char is still very limited and char are virtually unknown as a consumer product in many areas, including areas of the U.S.A. which would be target markets for Newfoundland. There seems to have been some overoptimism about char prices, which may run below the price for large Rainbows even in areas where char is known as a product. This may in part be due to consumer experience with frozen char in these areas.

Product.

Our research suggests that at present the best market for Newfoundland salmonid products is, first, local and then Eastern Canada and the Northeastern United States. There seems to be a large relatively underdeveloped market in the Eastern central United States.

Within this area the best product at present appears to be fresh (unfrozen) head-on, gutted fish. This product is less vulnerable to European and Chilean competition, as to compete requires these producers to undertake costly air freight.

Frozen salmon is not a favourable product at present, as Norwegian overproduction is readily dumped on this market. The same is true for smoked salmon to a somewhat lesser extent.

We agree that there is a need to develop and market other value added products from salmonids. There is also a need for more research into market interaction between species, size ranges and value added products in the marketplace (see the DFO report "Market Intraction of Canadian Farmed and Wild Arctic Char", Economic and Commercial Analysis Report No.22 for an example of this type of work).

Newfoundland's market share.

Cultured production of Atlantic salmon in Newfoundland will be limited in quantity and the Province will not command a major position in production or become a world leader in this respect. We fail to see that this matters.

Our company is projecting production of 470 metric tonnes in the short term and hoping to expand this production to 1 - 2,000 metric tonnes or more in the longer term. This represents an average annual dollar value of $5m-19m as compared to approximately $6m-7m for the traditional Newfoundland salmon fishery. We do not feel that this is an insignificant figure compared with the figure of 3500 metric tonnes annual production from B.C. and the Maritimes in 1989 recently quoted by the Centre For Fisheries Innovation.

Total potential salt water salmonid production for Newfoundland has been estimated at approximately 7,000 metric tonnes. This represents an approximate market value of $50m.

By way of comparison, tiny Shetland, population 23,000, has managed to become a significant salmon producer (approximately 8000 tonnes per annum) and, by imposing a strict quality control standard, commands premium prices in the market to such an extent that the Shetland Salmon Farmers Association felt able to withdraw from the Scottish Salmon Board as of January 1, 1990, in order to obtain a better return on their marketing investment.

It is surely not wise to dismiss an industry of such a potential dollar volume just because Newfoundland cannot expect to assume a leading position in it, on the world stage. It is likely that economic recovery in the province, if it is to occur at all, will be the result of many modest- to mid-sized diversified industries, not of a few giant world class industries.

Competitive position.

According to the "Long Term Production Outlook for the Canadian Aquaculture Industry - Economic and Commercial Analysis Report No. 13" prepared for DFO by Price Waterhouse Management Consultants, Vancouver, BC, January 1989, Eastern Canada is competitive with BC (pages 44-45, Production costs). They

estimate NB production costs in 1988 at $6.40 per kg before interest and taxes and attribute some of this cost to the high cost of Atlantic salmon smolt. Atlantic Aquaculture Ltd can probably improve on this cost of production, or be very competitive with it, not least because we intend to supply our own smolt.

Price Waterhouse further state that proximity to the major markets in Montreal, Toronto and the Eastern United States confers an advantage. We have investigated trucking costs and times for fresh salmon to these markets in some detail and find that they do not, in fact, place Newfoundland at a significant disadvantage. They certainly compare favourably to air freight from Europe or Chile.

Price Waterhouse found that labour costs for aquaculture in Eastern Canada are also competitive. They quote an income for fish farm employees of $19,200 per annum, including benefits, and state that this is lower than BC and Norway but higher than Scotland or Chile. However, Wolfgang Uebel and Associates Ltd point out in their report (page 11) that labour productivity in Chile is very low compared to Europe and North America, perhaps 8-10 times lower than in North American operations, thus negating much of that country's apparent advantage.

Wolfgang Uebel and Associates Ltd note that fish meal is a world commodity and that Chilean feed manufacturers must compete for fish meal on the world market in the same way as everyone else. Price Waterhouse states that the cost of feed in Chile is competitive with that in other countries and quote Canada as having a lower feed cost than Norway or Scotland, which agrees with our own findings. Price Waterhouse also state that Chilean inflation is pushing up their cost of production and offsetting the competitive advantage that might be thought to accrue from the falling Chilean peso.

The table "Comparative Cost Components for Norway, Scotland and Canada" sets out some of these cost factors. It is clear that our situation is not unfavourable.

Atlantic Aquaculture Ltd finds it surprising that a predictable market down cycle could provoke such a negative report from supposedly mature decision makers. No experienced businessman expects to trade in a non-competitive climate. To do so is naive. The DPA report would have been of more use had it addressed competitive strategy rather than producing a knee jerk response to a temporary market downturn.

Cost of production.

Atlantic Aquaculture's costings reveal a break-even cost of producing Atlantic salmon in a heated water land based facility,

including the amortisation of capital, short term borrowing costs, salaries, labour costs and all other costs of the operation, to be $3.01 per pound at a production level of 470 metric tonnes per annum, in 1990 Canadian dollars. This is in excellent agreement with the $3.00 cost of production given in a recent report by the Centre for Fisheries Innovation, provided that that report refers to the total cost of production and not the variable cost only.

If the bottom of a record low in the market price coincides with one's cost of production (both being approximately $3.00) one may be considered extremely fortunate. This would mean that one is never expected to be in a loss situation. In fact, the price of fresh Canadian farmed salmon of 6 - 9lb. weight (the market of interest to us) fell to $3 - 3.10 U.S./lb. (from data collected by the Provincial Department of Fisheries marketing section) which , allowing for the exchange rate, leaves a slim margin of profit. Currently prices are recovering and have reached $3.60-3.75 U.S./lb.

Other agricultural enterprises do not enjoy such good fortune. For example, a common cost of production in hog farming is around 70 cents Canadian per pound, while the market price, which varies cyclically in a comparable manner to the salmon market price, often reaches lows around 50 cents. It is expected, in all other livestock enterprises, that both losses and profits will be made. In spite of this, Canada is a major producer of hogs and cattle and farmers expect to make a sufficient rate of return to make the investment attractive over the long haul.

<u>In short, aquaculture has a better record of profitability than many sectors of the livestock industry</u>.

It is by maintaining technological superiority that Canadian aquaculturalists and other livestock producers hope to remain competitive in the global marketplace. Since Canada increased its share of the total U.S. imports of fresh and frozen salmon from 38% to 45% from 1985 to 1988, (according to Egan, D. and G. Gislason., 1989 U.S. Salmon Consumer Survey, Econ. Commer. Anal. Rep. No. 23: 71p.) we must accept that we have been in some measure successful in this. The growing U.S. market and Canada's increasing share in it are shown in the figures "Fresh/frozen salmon imports to the U.S. 1985-1988" and "Imports of fresh whole salmon to the U.S. 1985-1988". We need not expect this success to continue if we do not maintain momentum in R & D.

<u>Competitive strategy</u>.

Canadian agriculture has always been among our biggest national industries and we must maintain this position or face the future as a nation of paupers. Since Canada is a net exporter of agricultural products we cannot expect that adopting a

protectionist strategy will work for us as a nation.

All forms of farming enterprises face similar competitive scenarios - for Chilean salmon, substitute Argentinian beef or Brazilian soyabeans. The only strategy possible for a David such as Newfoundland to use, facing the Goliaths of the international marketplace, is to be more nimble than the giants. Unless Newfoundland aquaculture is more flexible, adaptive and innovative than its competitors its restricted size and harsh environment will eventually tell against it in the marketplace, no matter which of the species listed in this document we consider. This is true, in fact, for all of Canadian agriculture.

At the risk of belabouring the point, most agricultural markets cannot be cornered; farm a "new" species of fish today and others will farm it tomorrow, if it has any commercial merit. Success will depend on high productivity, cost control and marketing ability in the usual way.

Industry forecast for Scotland.

In 1987 a report prepared for Atlantic Aquaculture Ltd by Dr A.G. Manson predicted a shakeout in the salmon farming industry in Scotland, for several reasons:

1/ There were signs that the technical limits of efficient production for the region were being exceeded.

Many sites were reporting poor results as regards growth and feed conversion, as compared with the early years. The current thinking in Scotland was that greater demand had forced operators to be less selective in their smolt acquisition. While smolt of inferior health status and poorer genetic makeup as regards growth and feed conversion were probably being purchased, our report concluded that this was not the main problem.

Poor quality smolt were clearly a scapegoat. Poor feed and disease build up emerged as the most significant factors. There was evidence of significant disease build up at the sea sites; performance can be regained by resting sites.

A confounding factor was that least one large feed company was found to be marketing a ration with a carbohydrate content over 30 %, which is unacceptable.

The main conclusion reached was that the limits of deployment of sea sites were being exceeded.

2/ Another factor making a significant contribution to the decreased gains was that the limits of efficient management were being exceeded. Due to the expansion of the industry in

Scotland the units had grown in size, so that the owner/ manager/ worker (normally the same person) came under great pressure of work. One area where this was clearly shown was in the number of damaged fish. Another factor identified was that as the industry expanded, "quick buck" operators were drawn into it.

3/ The most pressing problems identified were financial. With the high capital cost of sea cages in Scotland added to the other start-up costs aquaculture has become a capital intensive industry. Since almost all the individuals involved started out with very little capital and had to borrow heavily, they were (and are) very "highly geared" indeed.

Several factors made relative success possible initially: very highly motivated individuals, help (in the form of grants and low interest or interest free loans) from the Highlands and Islands Development Board and the Shetland Islands Council (which was affluent with the proceeds of offshore oil development revenues during the startup period in question) and the formation of a consortium of Scottish businessmen, organised by the Scottish banks, which functioned as a venture capital source, specific to aquaculture (note that this only became possible AFTER success had been demonstrated).

Nevertheless, tradition in Scottish business was maintained. There was never enough grant and no-interest money. Consequently, many of the operations were so highly geared and operated on such a shoe string that the report stated that "the first draught must blow them away, unless it is to be some considerable distance away in time". This extreme conservatism and lack of real far-sightedness, typical of Scottish industrial development in our lifetime, has left a thriving industry in a perilous position.

Other factors identified as contributing to the financial squeeze were:

a) The high cost of insurance, especially for wreck and tempest insurance on sea cages.

b) The unpredictability of Norwegian dumping. (Studying the price fluctuation in North America suggests that our prices are more governed by seasonal factors- Scottish farmers share their major European markets directly with the Norwegians and hence are more vulnerable).

c) Relatively high bank interest, over the period in which we are interested.

d) Higher feed costs as compared with ours.

The predictions of this report have now been realised and the salmon industry in Scotland is experiencing hard times with consequent decreases in production.

Market study by Wolfgang Uebel and Associates Ltd.

In 1989 Atlantic Aquaculture Ltd commisioned a report entitled "A Market Study for Newfoundland Farmed Salmon" which was carried out by Wolfgang Uebel and Asssociates Ltd. A copy of this report is included with this document.

The executive summary of this document states, on page iv.; "While temporary setbacks in the markets for farmed salmon can be expected to occur in future years, the long term market outlook calls for a stabilisation of the market at price levels below those experienced in recent years but above those now prevalent".

In fact the study, on page 21, says; "At present, the market for farmed salmon is chaotic, supply exceeds demand and prices are at an all time low. This situation is expected to continue into late 1990 and, possibly, early 1991, thereafter supply and demand are expected to be more balanced and prices to stabilise likely at an average level of $5.00-$5.50/lb (Canadian)."

Atlantic Aquaculture Ltd expects that the market will stabilise at about this level and anticipates a trading range from approximately $3.75-$6.75/lb (Canadian) to become established and to operate for much of the time in the forseeable future. This is not to say that a cyclical salmon market will not continue, or that we will never again see $3.00/lb prices.

Recent developments.

There have been a number of recent developments which affect the market for farmed salmonids.

As noted above, growth in Scotland has slowed and appears to be about to become negative.

With regard to the Norwegian industry,there has been a failure to reach predicted levels of expansion and, recently, a definite downsizing of the industry. The predicted production for this year was of the order of 212,000 tonnes; it is actually running around 140,000 tonnes of which about 120,000 tonnes will be marketed and the rest frozen (thus removing them from our market of interest). Projected production for 1992 is 130,000 tonnes.

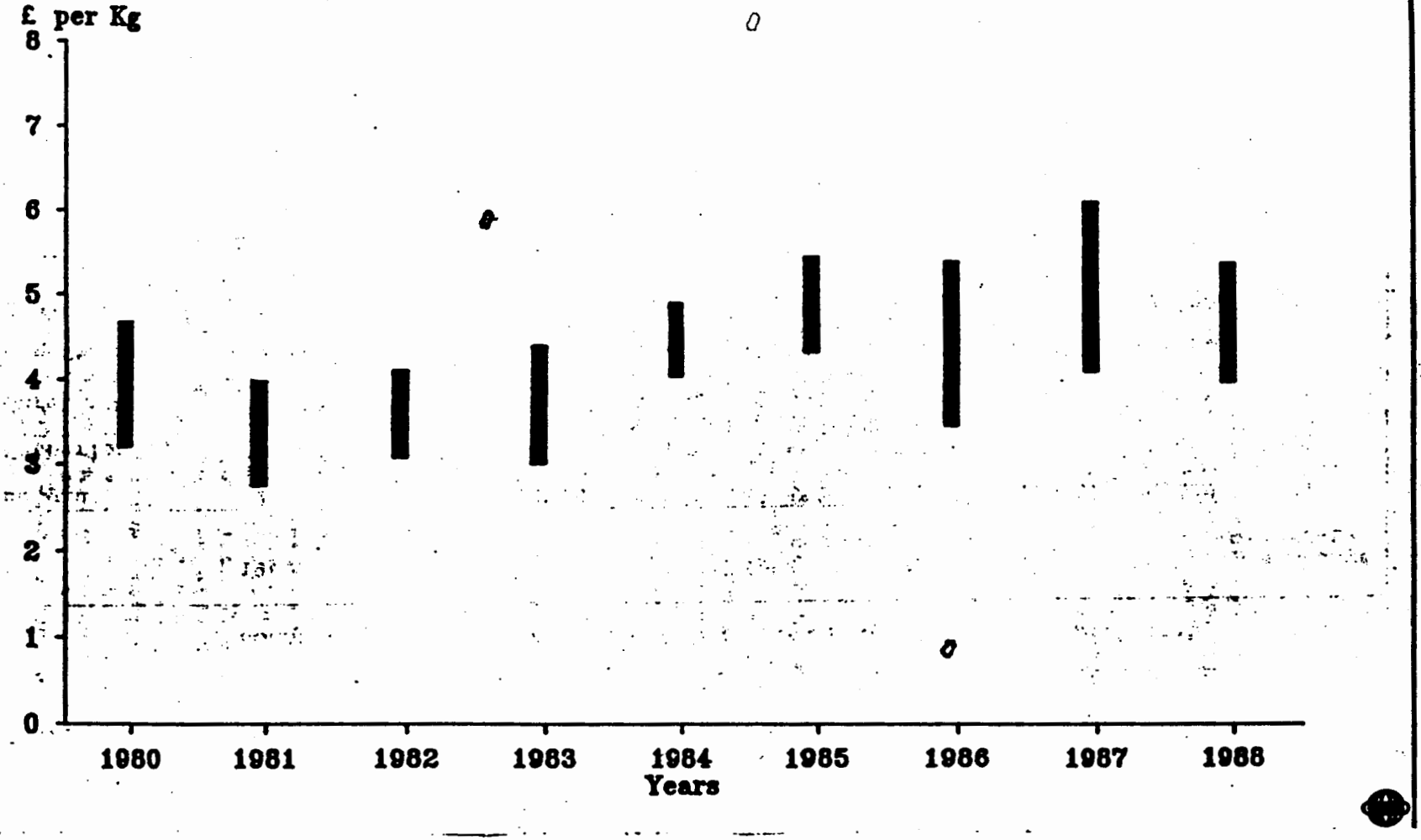
This downsizing move appears to be the result of several factors. The Norwegian government and the salmon producers themselves have

recognised that they are overproducing and have started to enforce their licencing quotas. The very substantial but largely hidden subsidies to the industry are being withdrawn, notably interest support. The Norwegians, like the Scots, are finding that there is a limit to the use of sea sites and in fact have serious disease problems. These include a possibly new viral disease of sufficient severity that the United Kingdom has recently banned the importation of ungutted Norwegian fish.

The Norwegians intended to start regular year round shipments of frozen salmon to the United States and have initiated a very costly and agressive promotion campaign for this product. They failed to fully understand the attitudes, policies and legislative environment of the U.S.A. and recently an anti-dumping action was raised against them by interests in Maine and is likely to be successful.

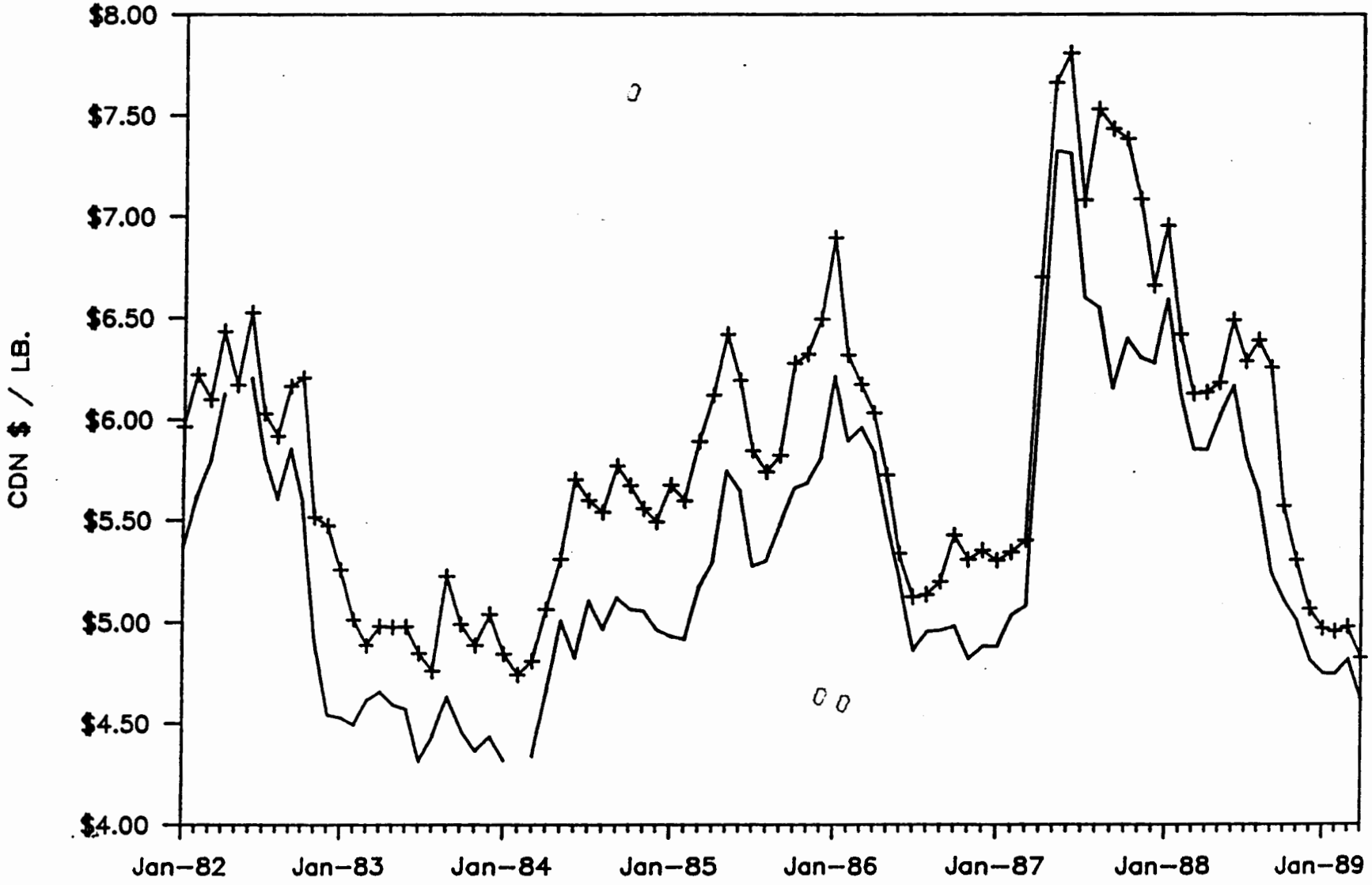
It now seems inevitable that Norwegian salmon will face countervailing duties on importation into the United States sooner rather than later. Provided that Newfoundland can avoid the same problem this will be greatly to our advantage.

Salmon Price Bands Billingsgate Market London, 1980–1988



FARMED RAISED SALMON

New York Greensheet Market Prices



Source: FIAB.

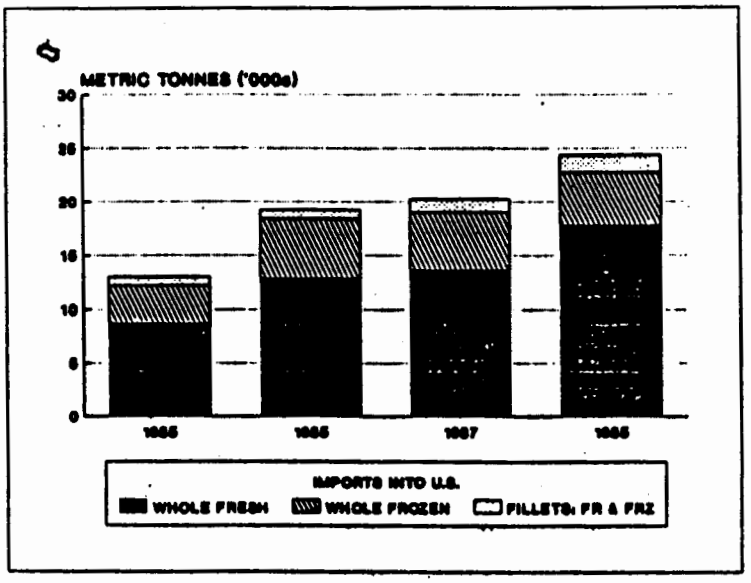
	Norway	Scotland	Canada
Feed (C$ per kg of feed)	$1.33	$1.14	$1.11
Wages and salaries			
. Farm staff - per annum	$25,000	$13,000	$20,000
. Packers - per hour	$11/hr	$4/hr	$6/hr
Interest	15%	10%	10%

Note:

Based on October 1988 exchange rates.

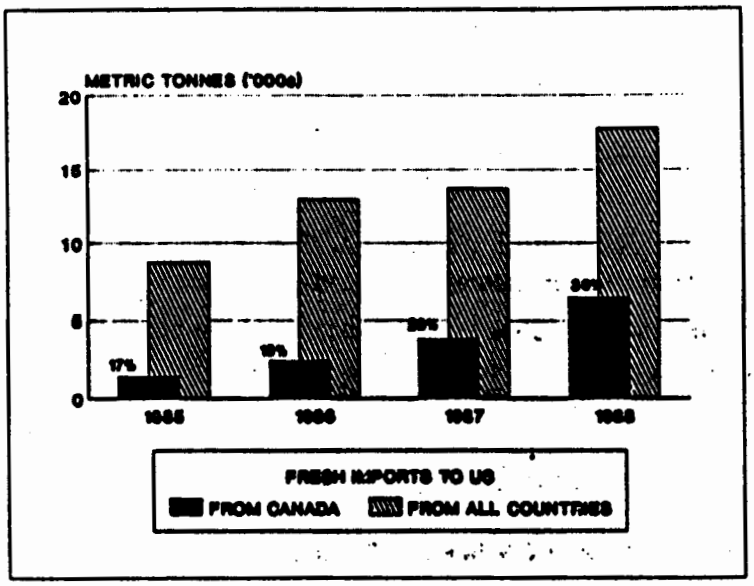
Source: Norwegian Farming Abroad, A Special edition of Norskfiskeoppdrett, September 1988, page 43.

EXHIBIT 1.1: FRESH/FROZEN SALMON IMPORTS TO THE U.S.
1985-1988



Source: U.S. Dept. of Commerce

EXHIBIT 1.2: IMPORTS OF FRESH WHOLE SALMON TO THE U.S. 1985-1988



Source: U.S. Dept. of Commerce

RESEARCH AND DEVELOPMENT.

The foundation of an adaptive industry strategy is research. It is imperative that small enterprises have full access to the knowledge base available and the ability to build upon it for their specific needs.

It is in part by the adoption of better technology that any company attempts to reduce its overhead and increase its production. While some benefits can be a result of technology transfer in its crudest form, other technological imports must be adapted and fine tuned to suit local conditions and specific company needs. It is just this "industry driven" type of research that was hoped for from the Canadian Centre for Fisheries Innovation.

Let us examine a few examples of the research needs of one company. Atlantic Aquaculture Ltd has identified a need for further R & D in these areas:

1/ Nutrition, where our company has a specific need to develop efficient feeding tables for Atlantic salmon held at water temperatures ranging between 10 and 16oC.

2/ We intend to devlop a system which will allow Atlantic Aquaculture to market salmon year round. To make this a practical proposition, methods of manipulating fish development will have to be developed.

3/ Better means of fish handling, sorting and grading are needed, since we know that disturbance and injury from handling are significant profit killers.

4/ There would be a great deal to be gained by developing superior Newfoundland and Labrador broodstocks. The benefits of such a project would extend beyond aquaculture, and might likely justify the considerable cost in time and money involved. Obviously, this is not a field where we can hope to directly benefit from work done in other localities.

5/ There is also a need for work in the marketing area. There would be benefit in developing cooperative marketing projects, including perhaps the development of a Newfoundland brand of high quality fish products which could be associated with Newfoundland's clean unpolluted waters. It is generally agreed that value added products from salmon should be developed.

Unfortunately, it is in the area of research that we can see the first of the negative results of this report. It would seem that the Canadian Centre for Fisheries Innovation has already decided

not to activly pursue research into salmon related topics. We regard this decision as premature, at best.

Loss of research funds from Newfoundland institutions.

Even supposing that private sector salmonid aquaculture survives the DPA group report, the loss of private sector and federal research funding to Newfoundland institutions which will follow the negative effect that the report seems to have had on the Canadian Centre for Fisheries Innovation, may be considerable. There is abundant R&D expertise available from the Atlantic Veterinary College's Aquaculture Department (who appear keen to sell their wares in this area) as well as from Huntsman Marine in New Brunswick and the University of Guelph in Ontario.

Demonstration farm.

We are not convinced of the general value of a salmonid demonstration farm (as opposed to more narrowly directed research facilities) because of the difficulties of site and species specificity.

There is also the concern that the time has passed for such projects; what is needed now is the means for action to make possible a start for a significant aquaculture industry. Further delay will result in Newfoundland slipping behind the competition.

FINANCING.

Bankability.

All forms of aquaculture suffer from six quite major disadvantages when looked at through the eyes of a lender.

1/ Risk. Rightly or wrongly aquaculture is perceived as a risky business.

In the past there were too many instances of failure for technical reasons. Many of these design problems have now been overcome, but the perception of risk remains.

Similarly, there have been too many disease problems in the past. Again, a number of these problems now have some form of technological countermeasure available and our general understanding of disease has improved to a degree where many diseases can be avoided for most of the time, but again, the perception of risk remains.

While considerable success has been had against the technical forms of risk the financial risk factors set out below have not changed significantly.

2/ Lack of equity. Aquaculture is a "new" field of endeavour to our society. As such, it has chiefly been developed in a highly entrepreneurial manner. This is not a bad thing in itself but it is fair to say that few large holdings of established capital have so far been attracted to aquaculture.

Another factor which has led to the highly geared nature of the aquaculture business is that it is usually found in less developed areas (for reasons of geography and the nature of the neccessary environment). Such areas are usually less well off financially and the individual aquaculturists are typically hard working and highly motivated persons who are not initially wealthy because of lack of opportunity.

3/ Lack of collateral for long term debt. Most forms of aquaculture have little if any real property. Sea sites are not a mortgageable proposition, unlike farms. Even if there is real property, as in the case of hatcheries and land based units, it is single use property, of no possible use for anything other than aquaculture and hence will enjoy a limited valuation for mortgage purposes. There may also be additional disadvantages from the loan collateral point of view,

such as remote or inaccessible siting.

The necessity of building the unit on property belonging to some other body such as a utility or conservation authority may result in a site which can only be leased and hence is of no use for mortgage security.

4/ Lack of collateral security for operating loan. Operating loans in agriculture are usually largely secured by a lein against moveable assets and receivables. In fact, this means crops or livestock.

At first sight, aquaculture would seem to be in a strictly comparable position to other forms of agriculture but further consideration reveals that in the undeveloped state of the industry there is a serious question as to the marketability of partially grown stock. This is a problem to all forms of farming but is less acutely felt in other livestock operations where there are recognised markets for partly grown animals.

Banks do lend to aquaculture, but tend to do so up to a lower proportion of the current valuation of the livestock than is usual in other forms of farming. This allows a margin for carrying the stock to maturity, should there be a financial failure.

A further, little considered, disadvantage to this form of borrowing is that it is quite possible to find that a downturn in market price has left an operation in a position where its borrowings exceed its bankers' guidelines. Note that no physical loss is needed to bring about this condition.

5/ Newness. There is still a lack of understanding of aquaculture's needs on the part of most bankers. This will remedy in time but until this happens it should not come as a surprise if a degree of overconservatism is seen.

6/ Market risk. The inevitable fluctuations in the market price of salmonid fish are an obvious source of financial risk to any lender. While there is reason to believe that the salmon market may be entering a period of greater stability, any realistic appraisal of this market must conclude that there will be periods where losses will be made. This does not preclude lending to salmon farmers; it merely puts them in the same class as other farmers. The record of profitability in aquaculture compares favourably to that in the rest of

the livestock industry.

7/ Reduced returns in the future. We believe that the honeymoon period is over for aquaculture and that the industry must grow up, forget its get-rich-quick dreams and settle down to earn money the hard way like every other form of farming. Those who were serious aquaculturists to start with will welcome the change, the rest will get out of the industry.

However, there is a problem. Even staid Canadian bankers can be lured into taking risks if the rate of return seems very large. Now that the rate of return on investment is lower it will be more difficult to attract loans (as well as other forms of investment) even though the return, while more modest, may be more stable.

Equity financing.

Although it is often more expensive than borrowing, equity financing has many attractions for aquaculture. Most importantly, it is a more stable form of financing. In hard times shareholders may become difficult to deal with but they do not usually force their own enterprises into bankruptcy. Anyone familiar with Canadian agriculture will know that this is often not true of lenders.

The problem of perception of risk remains. The lack of real property and concrete assets is still a problem as is the low rate of return on investment during the start up years.

In Newfoundland, a lack of local private sector investment interest is a problem.

Government investment schemes often have the attractive feature that it is possible for an industrious owner to redeem shareholding out of profits. This is also true for some foreign investors.

Immigrant investors were origionally expected to invest in the higher risk sectors but up to the present this has not really taken place in practice, much of the investment having been in real estate. It is hoped that this will change.

The cost of such investment, in the form of "finder's fees" etc is quite high, sometimes very high. Another disadvantage of this kind of investment is that many foreign investors are not thought likely to wish to remain as shareholders for longer than the minimum period required by law. The problem of replacing them so soon after the project's start up must then be considered.

Insurability.

There is no real difficulty in insuring a fish crop against catastrophic loss. Almost all of this type of insurance is underwritten by Lloyds of London, who by now have extensive experience in aquacultural insurance. In their financial analysis the DPA Group does not seem to give sufficient weight to insurance against catastrophic loss.

It is fair to say that while good insurance coverage is available it is expensive. It is hard to quantify the exact cost as each unit is assessed for risk on its own particulars in a detailed manner.

Foreign subsidisation.

Almost all other jurisdictions which have an aquaculture industry have developed their industry by subsidising it in some way in the early stages. The industry in both Scotland and Norway has been highly subsidised. Not all the subsidies have been obvious Government grant situations, although there is a great deal of grant money in foreign aquaculture. Both artificially low interest rates and various tax incentives are examples of indirect subsidies. Investment in the industry infastructure has been another form of subsidy commonly used.

Although these subsidies have largely been discontinued as a response to the recent European salmon glut, this does not mean that aquacultural enterprises will now be competing on a level field. As well as the ongoing remnants of these subsidies one must remember that the overseas competition is using facilities that have essentially been acquired at a reduced capital cost. If Newfoundland wants a competitive aquaculture industry Government assistance will be neccessary during the startup phase.

U.S. Tariffs/Countervailing duties.

Whether or not the current anti-dumping suit in Maine against the Norwegians is successful it is inevitable that the U.S. will introduce countervailing duties against some salmon imports in the near future. This weapon is being increasingly resorted to and has already done major damage to other sectors of Canadian agriculture. There was far less justification for this penalty in most of these cases than there is against the Norwegian or Scottish salmon industries.

Any assistance to the aquaculture industry from Government should be planned with this in mind. It should be quite possible to avoid a situation where these penalties are incurred on Newfoundland salmon.

Need for start-up assistance.

The unique features of aquaculture as a business, discussed above, coupled with the very long lead times which are a feature of the industry, mean that it is quite unlikely that there will be any successful initiatives in salmonid aquaculture in Newfoundland without initial Government assistance. Indeed this is true for aquaculture in general.

Form of assistance needed.

Obviously the greatest need for aquaculture is for capital, both long term capital financing and operating money. As noted above, since a major target market is the United States it is necessary to avoid provoking countervailing duties.

Newfoundland aquaculture is sufficiently small that, if it is possible to avoid identifying too closely with Canadian aquaculture in other regions, or, worse, Canadian fish sales in general, this may not be a very severe problem. Assistance should not be species specific and thought should be given to making at least some assistance less direct.

A banker of last resort is needed and here the Federal Industry Development Bank may have a part to play.

Schemes such as interest buy downs or interest deferment are well suited to aquaculture, particularly if coupled to loan guarantees so that the risk is made more acceptable to lenders.

Unfortunately the ACOA program has recently only dealt with very small scale projects, too small in general for aquaculture. This may have come at a critically adverse time for the industry.

As mentined above, equity financing is very attractive to aquaculturists and the form in which ownership is reedeemable out of profits is especially so.

The Provincial government could perhaps ensure that some foreign investment money be earmarked for aquaculture, thus achieving the origional objective of targeting a higher risk sector.

A government assisted insurance program would be of value in promoting confidence in the industry. Other forms of investment in infrastructure would also be of value and a start has already been made here, for example in investment in fish diagnostic services through the the Atlantic Veterinary College in PEI.

As noted above, it is vital that research money be available on a continuing basis for aquaculture, including salmonid and indeed salmon aquaculture. Only by continuing research can the industry become and remain competitive. Fortunately Newfoundland already

has the necessary excellent institutions and considerable relevant scientific expertise.

Employment assistance, in one form or another, is another area where government could provide support, while achieving useful social goals. Two specific areas with which we are impressed are assistance for trainees serving an "apprenticeship" and assistance with research salaries.

Timing.

There is a tendency for capital to become unavailable during the down segment of the commodity price cycle. This is unfortunate and has demonstrably had serious negative effects on all Canadian industries which operate in market areas governed by commodity cycles. By far the best time to start a new business is towards the end of a market downturn so that the heaviest debt burden can be dealt with in the following market upswing. In recent times this has seldom been possible because of the negative attitudes taken by both Government and the banking community.

The converse is also true - the worst time to start a business is towards the end of its commodity's market up-segment. Farmers say that "you should try to walk when others are running and run when others are walking." Because of the long lead time in aquaculture it is preferable to try to take advantage of these cycles. If this is not possible, it is better to ignore the market ups and downs, rather than be stampeded by the downturns, which latter course of action will ensure that the timing is phased contrariwise to the market cycles.

CONSULTANTS.

There is always a tendency to be impressed by distant experts - a prophet is not without honour, save in his own country. In many industries, especially the salmon industry, competition is savage; this is well exemplified by the Norwegian versus Scottish industries, where delegates to trade shows have been seen publicly slandering each others' wares on television.

There is sometimes the problem that even the most honest and ethical of experts become biased by the mindset of their region. They sincerely come to believe that the region in which they live is the best for their industry, and they fall victim to their region's propaganda. This is complicated by the danger that a visiting expert can easily make facile judgements, wishing to impress and satisfy the client but not having to live with the consequences and not usually having a deep grasp of the social, political and detailed geographical aspects of the region visited.

It is a matter of some concern that major government policy decisions could come to be based on a single report.

CONCLUSIONS.

1/ There appears to be strong reason to believe that the DPA Report would have been improved by more extensive consultation and field work.

2/ We find it disturbing to see Atlantic salmon dismissed as a crop in what seems a casual and ill-considered manner. Indeed, salmonids as a group fare little better. It is surely rash to abort a potential $50 million industry on the basis of a report such as this.

3/ There are more disturbing aspects to this report than its immediate effect on salmonids. Should it be taken as authoritative the consequences for aquaculture in Newfoundland could be serious. Since the conceptual errors on marketing on which part of the report is based will ultimately be seen to apply to any of the species named in the report, the uncritical adoption of the report's arguments would in fact be a severe setback for Newfoundland aquaculture in general.

4/ There is a problem in getting clear, unequivocal answers from DFO, which are consistent from time to time and place to place. This is a serious problem for industry; bankers and investors cannot be expected to play their part if availability of stock is uncertain. Industry cannot commit funding without clear guidelines.

5/ The policies of the Federal Department of Fisheries, which prevent the importation and release of superior stocks, are likely to prove a barrier to salmon ranching and even enhancement as well as tourism based ventures. Sport fishermen are not attracted by low weight grilse stocks.

6/ Atlantic Aquaculture Ltd sees salmon enhancement programs as desirable, but feels that it will be difficult to point to a comparable environment where ranching has been a commercial success.

7/ Fish ranching may be an unbankable proposition, nor will it readily attract investment from the private sector.

8/ We do not believe that DFO would grant any meaningful or bankable kind of ownership of a river's fish stock to a private individual or group and doubt that they have the power to do so.

9/ The financial risk of fish ranching must be conceded to be very high and large profits would be needed to

offset this. Unfortunately, such profits do not seem likely.

10/ Considerable long term assistance from Government would be necessary to fund ranching programs, including the assumption of the major part of the risk, since this type of venture has an unfavourable history. It is questionable whether this is a worthwhile use of money.

11/ Enhancement is best seen as a long term public works project supporting the tourist industry or the inshore fishery, and should be funded as such, rather than as part of agriculture, aquaculture or fisheries.

12/ The density of sea sites in Roti Bay quoted by DPA seems high, relative to its area, for sustained production, but the remainder of the Bay D'Espoir system is ignored in the report. This is a major oversight since the system is claimed to be capable of sustained production of 5,000 tonnes per annum.

13/ We do not regard overwintering salmonids under ice cover in large quantities as a fully proven technology but it seems that the workers at Bay D'Espoir are confident that these problems can be overcome in their particular environment. The DPA Group seems to have largely ignored the feasibility of insurance in dealing with this type of risk.

14/ Low growth rates due to temperature are not necessarily a serious problem and can result in better marketing strategies under some circumstances. They do not imply substantially increased costs or worse feed conversion ratios. Rate of return on investment is decreased; the most serious consequence of low temperatures is increased interest costs where borrowing is necessary.

15/ The limitations of site and stocking density are now becoming a factor affecting the growth of the industry in Scotland and Norway. These limiting factors and their effect on marketing are ignored in the DPA report.

16/ We agree with the DPA Report that land based (pump-ashore) facilities may be the most promising technology for Newfoundland. We are surprised that they did not explore this in more depth and that although they discussed the use of heated water they did not consider this in depth.

17/ We have carried out an in-house analysis which indicates that with proper management and financing, land based facilities may be a viable option for Newfoundland with minimal winter heating, provided that heavy borrowing at startup could be avoided.

18/ Atlantic Aquaculture Ltd expects to see little further growth in the Scottish salmon industry for some time and some downsizing in the Norwegian industry in the short to middle term.

19/ The Norwegian salmon industry will likely shortly be subject to countervailing duties in the United States. The Newfoundland industry must make every effort not to incur countervailing duties.

20/ Atlantic Aquaculture Ltd expects to see fresh Atlantic salmon prices in the American market stabilize in a trading range from approximately $3.75-$6.75/lb (Canadian), likely at an average level around $5.00-$5.50/lb (Canadian).

21/ The government of Newfoundland should not withdraw support for the salmon farming industry. Support should be selective; for most of the island of Newfoundland this will mean land based facilities. Sea cage technology should only be pursued in the Bay D'Espoir system, where development should be at such a pace as to ensure that the available sites are not overloaded.

22/ There is a continuing need for government support for R&D for salmon farming as well as for other salmonids.

The foundation of an adaptive industry strategy is research. It is imperative that small enterprises have full access to the knowledge base available.

We can already see the first negative results of the DPA Report in the Canadian Centre for Fisheries Innovation's decision not to activly pursue research into salmon related topics. We regard this decision as premature and inappropriate.

23/ There is a significant body of opinion which says that the "window of opportunity" in agricultural projects is at the low point of the market cycle.

24/ The aquaculture industry has difficulty in borrowing because of an excessively high perception of risk, newness, lack of equity and of real property as collateral for long term loans, lack of easily valued collateral for operating loans, perceived market risk and the possibility of reduced returns in future.

25/ Similar problems arise with equity financing, which may be a desirable form of financing for the industry.

25/ Foreign aquaculture competitors have been heavily subsidised

during their startup years.

27/ Because of the long lead times in aquaculture, the difficulties in financing and the need to compete with subsidised foreign producers, there is a need for government assistance during the startup phase of aquaculture.

28/ Government should examine ways of simplifying the financing process and of encouraging private investment, including foreign and immigrant investment, in aquaculture.

29/ We are concerned that policy decisions may be founded on a single report, which clearly could have benefitted from more in depth research.

30/ The time for exclusive concentration on research projects in salmonid aquaculture in Newfoundland has passed; what is needed now is the means for action to make possible a start for a significant aquaculture industry. Further delay will result in Newfoundland slipping behind the competition.

April 8, 1990

DPA Group's Aquaculture Strategy

a response brief

Submitted to:
Mr. Brian Meaney
Dept. of Fisheries
Govt. of Nfld. & Lab.
P. O. Box 4750
St. John's, Nfld.
A1C 5T7

Prepared by:
Bay D'Espoir Salmon Growers
P. O. Box 486
St. Alban's
Bay D'Espoir
A0H 2E0

TABLE OF CONTENTS

INTRODUCTION:

There are approximately 60 people directly involved with the aquaculture industry in Bay D'Espoir as investors, and approximately 20 people derive their livelihood from the industry. Although the present industry is in a developmental stage, as various technical hurdles are surmounted we anticipate considerable future employment opportunities in the economically depressed Bay D'Espoir region. The various farming companies have formed the Bay D'Espoir Salmon Growers Cooperative which has acquired the necessary infrastructure to process and market aquaculture products. The farmers have also formed an operating company, SCB Fisheries Ltd. to consolidate efforts during the early Research and Development phase.

Atlantic Salmon have been cage cultured in Bay D'Espoir in experimental quantities for five years. Commercial quantities have been cultured for one year. Local grilse stocks of salmon were used initially at the insistence of the Department of Fisheries and Oceans. These fish proved to be highly susceptible to disease problems likely precipitated by early sexual maturity. These stocks, although entirely unsuitable for farming, were able to grow and convert feed to flesh in a very efficient manner. Surface temperatures (20°C) for grow out at Bay D'Espoir tend to be higher than optimum but at 7 meters the temperature seldom exceeds 15°C.

In any event the grilse certainly did not succumb to cold water temperatures or supercooling during the winter. However, Atlantic Salmon that were held under the ice did not respond to the feed boxes at the surface and experienced problems in replenishing their air bladders; consequently 30% of the stock was lost during winter ice cover. The release of a bubble curtain at the ambient depth of the fish is one method of overwintering that is being evaluated. Another constraint facing the culture of Atlantic Salmon in Bay D'ESpoir is the tendency of the fish to pick up the colouring of the reflected light from the surface freshwater lens. A means of manipulating the colour background of the fish might be required if we are to effectively market the fish as a gutted, whole product.

Steelhead rainbow trout that are presently being raised have exhibited excellent growth and survival from July 10, 1989 (the stocking date) to December 10, 1989 (freeze up). They grew from 35 grams to 600 grams in five months with a feed conversion of 1.19:1.00. These same fish are presently being overwintered with no requirement for energy input to maintain ice open conditions. The steelheads tend to remain in the relatively warm saline water (0.7°C at the end of March). They will, however, periodically venture up into the cold freshwater layer (0.0°C all winter) to feed and replenish their air bladder. The fish grew by 100 grams over the winter and are now 700 grams. The prospects for cage culture of these fish appear to be excellent.

Arctic Charr that were stocked last fall have also shown considerable promise. We have lost a total of 14 fish to date out of the original 3,300 that were stocked. These fish are also presently being overwintered with no requirement for an energy input. The prospects of this species for cage culture in our environment appears excellent. However, as an aquaculture product, Charr require considerable promotion to develop consumer awareness in the US marketplace.

Further to our oral presentation at the DPA briefing meeting in Gander on March 31, the Bay D'Espoir Salmon Growers were requested to submit our comments to the study committee. This brief therefore reflects our concerns as they relate to both the technical and financial aspects of the DPA study.

TECHNICAL CONCERNS:

We have never recorded negative water temperatures at Roti Bay during the three year period that we have been there. Contrary to the -1°C temperature reported at the surface in DPA table 3.0; the minimum temperature can only be 0.0°C for freshwater.

We have never lost fish to lethal winter water temperatures in three winters and suggest that a wipe out frequency of once every five years is, to say the least, unreasonably pessimistic.

It is our understanding from discussions with various ice scientists and engineers that the energy requirements to cause vertical water mixing resulting in supercool conditions are likely prohibitive for stratified systems. It is virtually impossible to get supercooling with the presence of a relatively pure freshwater lens over a deep warm saline water body as occurs in Roti Bay. Evidence of supercooling has never been recorded in Roti Bay and given the oceanographic conditions of the area probably never will.

Most statements about temperatures in Bay D'Espoir run contradictory to the statement at the bottom of page 2-9 (volume 2) where it describes winter water temperatures as remaining adequate to overwinter fish.

It should also be noted that this paragraph errs when it states that only Roti Bay on the coast of Newfoundland has adequate winter temperatures. In fact the whole Bay D'Espoir system has basically the same temperature regime as Roti Bay. The Bay D'Espoir system is estimated to have approximately five times the potential grow out area as does an area occupied by the entire New Brunswick salmon farming industry. Reference to the map attached (1), will indicate the relative size of one of the more productive salmon farming areas in New Brunswick compared to Bay D'Espoir.

In reference to the general growing conditions on page 2-13 of volume 2, we have found that the general summer grow out temperatures are about four degrees higher than the optimum that is quoted, and repeated references to cool summer conditions seem at best inconsistent. Temperatures as cool as those quoted would, if anything, be welcome as our surface temperatures tend to get somewhat high (around 20°C). Reference to the graph attached (ii) indicates that temperatures obtained at 5 meters depth from routine sampling in Roti Bay compares favourably with the optimum presented in the DPA report.

In volume 1, page A31, paragraph A.2.2.2 it is stated that under normal seawater conditions, Scandinavia rainbow trout are grown to 3kg after 4 years. We expect to harvest this very fall 200 metric tonnes of 3+kg fish. These fish are now only 15 months old from hatching and are approximately 700 grams. Based on growth experienced to date and the projected growth over the following summer months, we refute the DPA assumption that we will experience poor summer growth due to low ambient temperatures. Growing conditions in Roti Bay are ideal for many salmonids. Reference to the graph attached (iv) compares actual growth in Roti Bay to that projected from the Ewos Chart.

The optimum salinities quoted in the report must refer to some other situations because they seem to have absolutely no bearing on the stratified brackish conditions in Bay D'Espoir. Salinities

much lower than 15% have been found to be ideal for maximizing growth efficiency in both Atlantic Salmon and rainbow trout. We generally get feed conversions between 1.1:1 and 1.3:1 for both species. We have yet to raise Arctic Charr over a summer and therefore can not comment on their potential feed conversions. Our observations to date indicate that they feed well in the water column, seldom waste feed and are certainly not bottom feeders as some literature has suggested.

We have found that the ideal salinities for the grow out of salmonids to be approximately 12%. At that salinity we believe that fish do not have to expend as much energy osmoregulating as in full strength salinity.

Arctic Charr are presently being overwintered in Roti Bay. The charr have remained in the upper 0°C freshwater layer. We have only lost a total of 14 fish to date from the 3,300 originally stocked. The energy requirements to overwinter charr have been found to be nil, as the charr appear to be very tolerant of ice cover. Capital costs are expected to be less than that required to raise salmon (the stocking density of salmon is 10 kg per meter^3 whereas the stocking density of charr is purported to be several fold greater). Statements in the DPA study to the effect that charr could only be raised in onshore facilities or lake cages severely limits the potential of this species in Newfoundland. The brackish water grow out in cages of charr appears feasible and

warrants full evaluation. Also the employment of cages in large lakes in Newfoundland is questionable because of environmental concerns and the present utilization of such lakes as municipal water supplies.

73,000 rainbow trout are also being overwintered successfully. They remain in the relatively warmer saline water but do venture up into the freshwater layer to feed and to adjust their swim bladder volume. Energy requirements for overwintering steelhead rainbow trout have been found to be minimal.

Sea lice, which present so many problems to farmers in full strength salinities, has of yet presented no concern to us possibly because of our unique growing environment. This is not to say that we might not encounter problems with more euryhaline species such as Caligus and Argilus.

The reference to the negative effects of salinity fluctuations due to high influxes of freshwater are speculative. Most periods of rainfall in spring and summer result in forcing the halocline deeper for short periods and do not result in appreciable dilution of the salinities at lower depths. However in the fall, there are periods of vertical mixing , but there is no evidence that this is stressful to the rainbow trout or Arctic charr. A negative effect on salmon is also somewhat speculative.

FINANCIAL CONCERNS:

The assumption that 50,000 fish per year can yield 200 tonnes with a mortality rate and an end weight as stated seems impossible. Given a mortality rate as stated, 36,501 fish will remain from the original 50,000; at a harvest size of 3.508 kg, the yield would be 128 tonnes. Refer to the growth chart provided.

The stated rates of feed utilization are far higher than that ever recorded for dry feed conversions. These rates, however, correspond very closely with the rates for wet feed while the prices quoted are for that of dry feed. When realistic dry feed conversion rates (1.3:1) are matched with local feed prices ($1.28/kg), the unit cost of feed per kilo of fish produced becomes $1.83 rather than $3.60 which DPA quotes as the average condition.

Using a more realistic unit cost of feed, the total unit cost of production becomes $6.90 per kilo, well within the range experienced by Norway and New Brunswick. Refer to the cost calculation attached (iv).

The total unit cost of production of $6.69 was derived without adjusting for the exceedingly high capital costs factored in by DPA which are several times greater than we have historically experienced.

CONCLUSION:

This report could have been more representative and served a much more useful purpose had the investigators approached those directly involved in the industry. Data from external sources used in this report should have been compared more accurately with present levels realized by the local industry. The few hours of discussions with the growers does not appear to have been sufficient.

This report speculates that variables applicable to sites in full strength seawater are applicable to estuarine sites. Unqualified and unsubstantiated statements about oceanographic conditions should have come from verifiable sources (and they are available) rather than stated as an opinion and then rationalized as being a serious constraint to cage culture in Bay D'Espoir.

In evaluating the financial viability of salmonid cage culture in Bay D'Espoir, the assumptions used in the model might have been verified against the existing data base at Bay D'Espoir. This would have also avoided the unfortunate use of inaccurate feed conversion ratios and capital cost requirements.

By focusing so intently on discrediting the potential for marine grow out of salmon and assuming that the grow out of trout and charr are the same, the report totally disregards the different requirements between species. The different species have quite

different overwintering requirements, and the constraints of low salinity repeatedly described for salmon have been shown to be quite beneficial to trout and charr. Many production costs are much less for trout and charr held in marine cages than for salmon. The marketing needs of the three species are quite different. Large steelhead trout and Arctic Charr are relatively new market entries and considerable promotion work is required. Salmon while being very well known are facing perhaps only a short term oversupply problem. A thorough investigation would have resulted in identification of the tremendous advantages of the Roti Bay environment over typical marine farm sites for culturing trout and charr. Unfortunately the report's many unsubstantiated assumptions tend to preclude further evaluation of the potential for these species in Bay D'Espoir.

Considering the consequences of using unproven salmon stocks, and the continued difficulties with DFO policy(local strains vs imports), we consider this issue more than a "moot point" and do not appreciate DPA's regarding it as such. Yes DFO should be more "Pro-active"

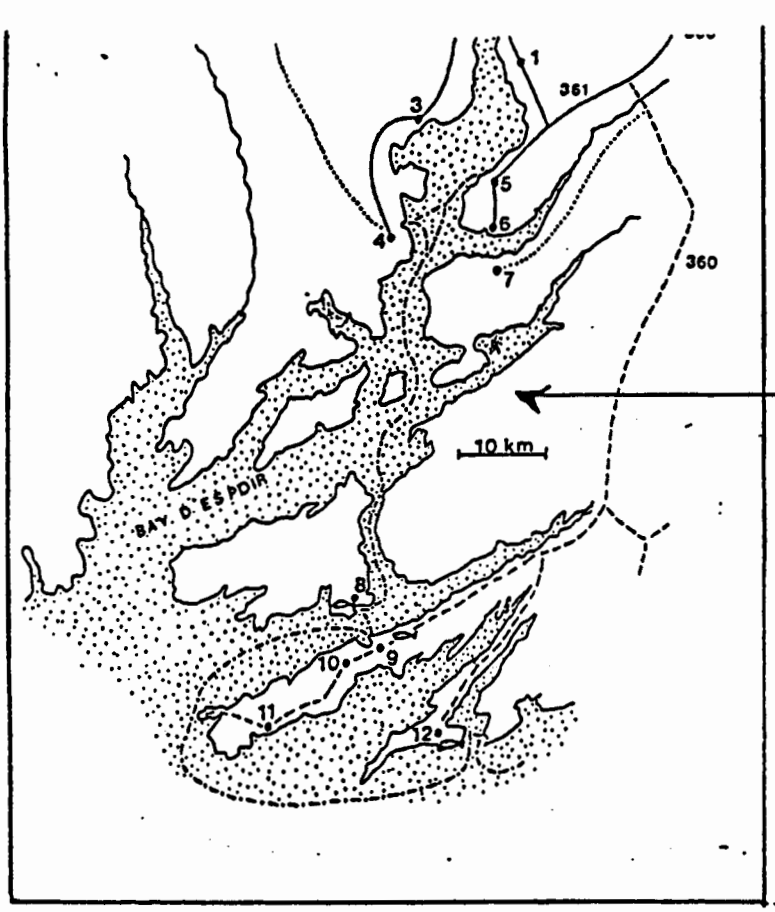
After the intensive planning and the sizeable expenditures to date by the Province in Bay D'Espoir , we find DPA's assumption that salmonids are likely to periodically freeze to death somewhat of slight to the technical integrity of our scientists.

While we concede that there are a number of uncertainties that remain to be resolved with respect to salmon culture at Bay D'Espoir, (buoyancy regulations, skin coloration and perhaps excessive temperatures) none of which incidently were apparently recognized by DPA, we suggest that our unique environment may offer certain other advantages for culturing salmon and other salmonid species.

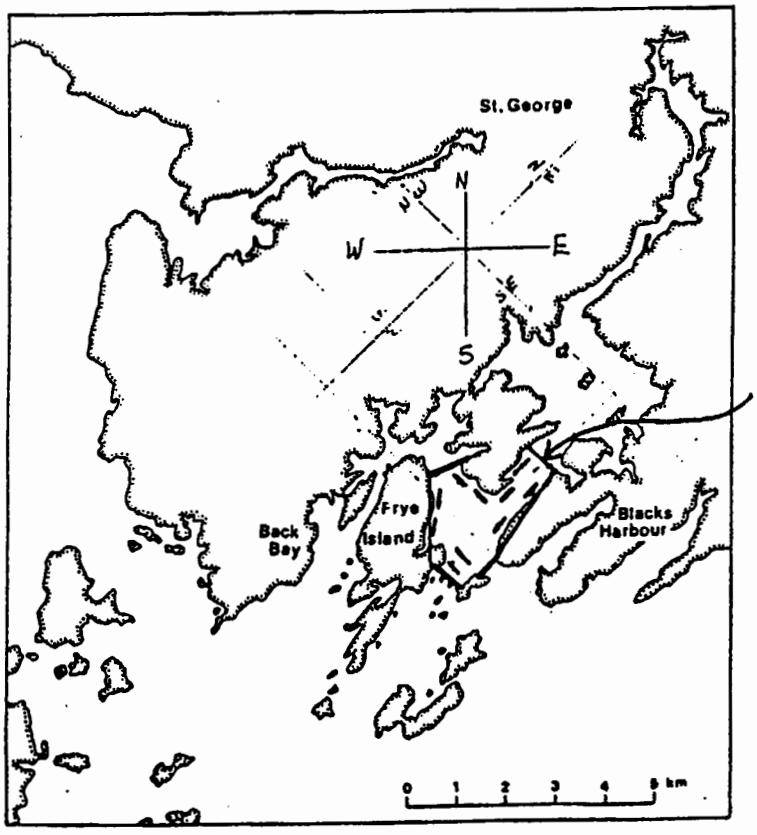
The casual dismissal of opportunities for salmon culture, in favour of salmon ranching and trout fish out ponds without even a cursory thought to economics, political and legal ramifications is in our view somewhat irresponsible.

The conclusion that charr are not "aggressive" salmonids and will not unfavourable impact salmon requires some clarification along with more references.

Despite a very intensive assortment of data projecting future salmon markets and prices, the situation with salmon is not properly put into perspective with the normal (and most often unpredictable) fluctuations experienced in most agro food commodities. With proximity to a sizeable Eastern U.S. and Canadian market, and with our somewhat lower wages and production costs, we don't feel the situation with salmon is as desperate as that depicted by DPA. With the diversity of simultaneously culturing two other species, we in fact believe the prospects of developing a modest industry in Bay D'Espoir is quite favourable.



insert



usable Area = 6.5 Km²

10 farms @ 200 t/yr

Total Production = 2000 mt

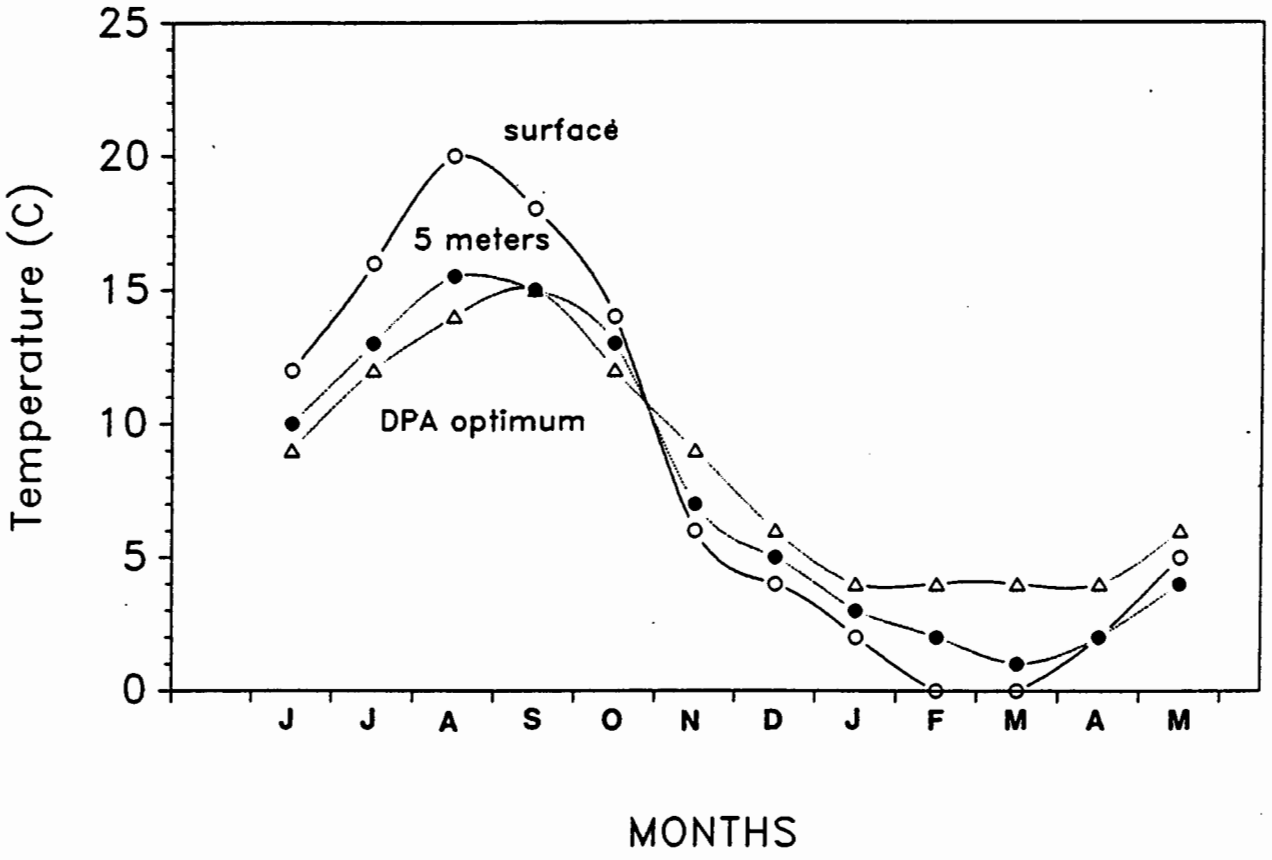
@ $4.00/lb = $17,600,000

at farm gate

10 – Cage Sites

DPA and Roti Bay Temperature –a comparison

(Attachment ii)



Attachment iii

SUMMARY OF PROJECTED FEED COSTS AND GROWTH
PER 50,000 ATLANTIC SALMON

MONTH	TEMP	FEED RATE	MEAN WT.(KG)	MORTALITY	FISH NUMBER	TOTAL WT.(KG)	GAIN WT.(KG)	FEED C.F.=1.3	FEED $1.28/KG
May	5.0	0.70%	0.100	2500	50000	5000	808	1050	$1,344
June	8.0	1.80%	0.117	2375	47500	5558	2309	3001	$3,841
July	16.0	2.10%	0.168	2256	45125	7588	3677	4781	$6,119
August	16.0	2.10%	0.254	429	42869	10886	5276	6858	$8,779
September	15.0	2.10%	0.378	424	42440	16053	7780	10114	$12,945
October	10.0	1.60%	0.563	420	42016	23672	8741	11363	$14,544
November	6.0	1.00%	0.774	416	41596	32176	7425	9653	$12,356
December	4.0	0.30%	0.954	412	41180	39280	2719	3535	$4,525
January	3.5	0.00%	1.021	408	40768	41606	0	0	$0
February	2.5	0.00%	1.021	404	40360	41190	0	0	$0
March	1.0	0.00%	1.021	400	39956	40778	0	0	$0
April	2.0	0.20%	1.021	396	39557	40371	1863	2422	$3,100
May	5.0	0.60%	1.068	392	39161	41830	5792	7529	$9,638
June	8.0	0.80%	1.218	388	38770	47204	8715	11329	$14,501
July	16.0	1.10%	1.445	384	38382	55446	14075	18297	$23,420
August	18.0	1.10%	1.815	380	37998	68967	17507	22759	$29,131
September	15.0	0.90%	2.280	376	37618	85784	17817	23162	$29,647
October	10.0	0.70%	2.759	372	37242	102743	16597	21576	$27,617
November	6.0	0.40%	3.209	369	36870	118312	10921	14197	$18,173
December	4.0	0.30%	3.508	365	36501	128050	8865	11525	$13,945
								TOTAL	$233,627

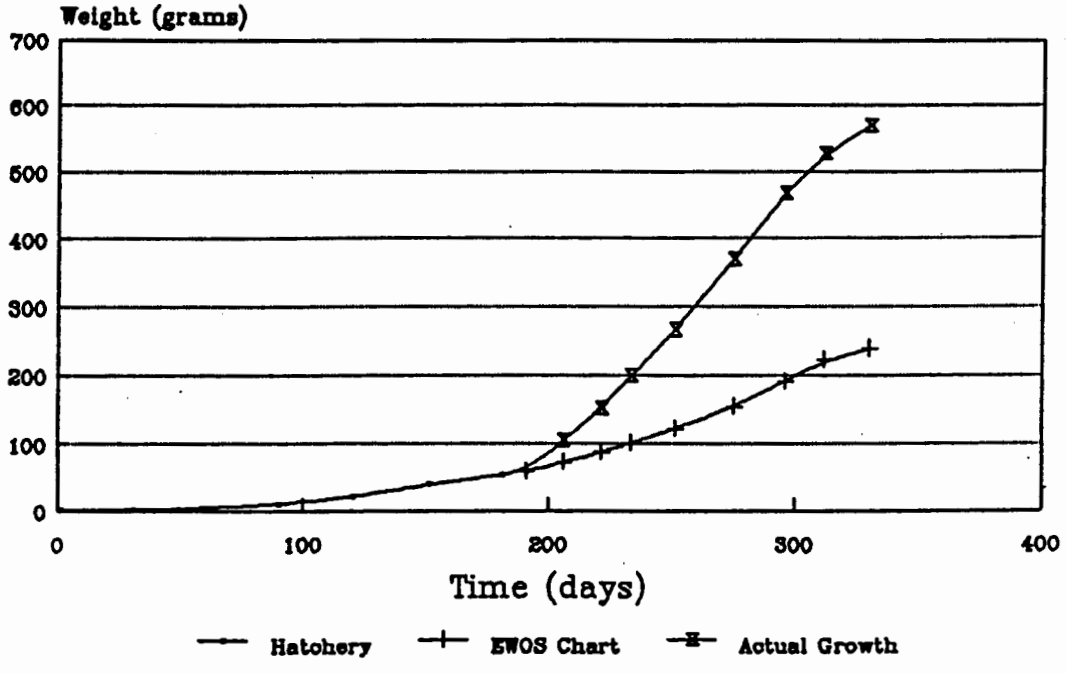
Attachment iv

UNIT COSTS PER KG.
(Using realistic unit cost of feed and all other costs remaining the same.)

VARIABLE		
	Smolts	$1.17
	Feed	$1.83
	Processing	$1.25
	Insurance	$0.27
	Interest	$0.19
	Selling	$0.72
		$5.43
FIXED	Labour	$0.42
	Other Production	$0.22
	Administration	$0.19
	Depreciation	$0.34
	Financing	$0.09
		$1.26
TOTAL		$6.69

TROUT GROWTH '89

Actual and Chart



Charted Growth Rates From EWOS Tables

BDC
BUCHANS DEVELOPMENT CORPORATION
P.O. BOX 9 • BUCHANS, NEWFOUNDLAND • A0H 1G0 • PHONE (709) 672-3300

April 12, 1990

Mr. Strat Canning
36 Monkstown Road
St. John's, Newfoundland
A1C 3T3

Dear Strat:

I want to take this opportunity to thank you for involving me in the Aquaculture meeting held in Grand Falls on March 31, 1990. I found the proceedings interesting and informative. It was a real eye-opener seeing the number of people involved in the industry in Newfoundland.

I have spent some time studying the report and while I do not feel qualified to offer a critique one way or another on its contents, I would like to go on record as expressing some disappointment that the vast quantity of frest water in inland Newfoundland was virtually ignored. It would be desirable, from the point of view of the Buchans Development Corporation, if some effort could be made to identify the potential for this resource to be utilized in the farming of salmonids (eg. Artic Char, or Rainbow Trout) and shellfish (eg. Freshwater Prawns).

Once again, I thank you for your interest.

Yours truly,

Alexander Ivany,
Executive Director

AI/lcb

Cainpo Company Limited

64 Water Street
P.O. Box 6136, East Post Office
St. John's, Newfoundland
A1C 5X8
Telephone (709) 753-5369
Telex 016-4028
Telefax (709) 753-3955

Mr. Strat Canning
36 Monkstown Road
St. John's, Nfld.

Your ref Our ref KN/jn Date April 12, 1990

Dear Strat,

Re: Comments to AQUACULTURE DEVELOPMENT STRATEGY

Thank you for giving us the opportunity to add our comments to the study. As you will note - our biggest concern is how dumping of fishwaste will affect the up-coming fish farming industry.

Kind regards,

Knut Nygaard

DUMPING OF FISHWASTE.

There is as far as we can see it two unnoted problems for the aquaculture industry in connection with dumping of fish waste in our inshore areas.

1
A large number of the inshore plants not being able to sell any of their fish waste as the few mealplants that are in operation very quickly filled to capacity. Many of the smaller fishplants are then faced with the problem of either dumping their fish waste or seizing operation. Seizing operation would no doubt leave a lot of fishermen and plantworkers out of work. Therefore the plants are upon application given licenses to dump their waste in certain areas of our inshore waters.

2
A large number of fishermen do their own gutting of the fish. This is done in order for the fish to be of a higher quality when delivered to the processing plants. A few of the fishermen have now started to take care of the livers but most all of them throw all the waste including the livers into the sea very close to shore.

Both of the dumpings are causing a large number of seagulls, seals and other animals to gather in the dumping areas as there is plenty of food. These animals are then as far as we can see it leaving behind two problems for the fish farming industry; Namely # 1 A lot of coliform bacteria, and # 2 many predators to fish farms. It seemed to us that these problems were not considered in the study.

Lloyd Fudge
Vice President
Eastern Mussel Growers Association
Box 252
Springdale, NF
AOJ 1TO

Mr. Strat Canning
36 Monkstown Road
St. John's, Nfld
A1C 3T3
Fax: 739-4849 753-4471

Dear Mr. Canning,

On behalf of the Eastern Mussel Growers Association, (EMGA), I would like to make reference to the proposed Aquaculture Development Strategy, that was presented to government and industry, by the D.P.A. group at Grand Falls on March 31,1990.

From an overall perspective we feel that the study recommandations were favourable towards the Mussel Industry. However, we do have concerns about some of the proposed recommendations, these are presented below.

Recomendation 16-17 The association supports the formation of a province wide mussel growers association, but we question the necessity at this time of a mandatory membership and the legal right to charge these mandatory dues. Mussel growers are already faced with numerous fees and expenses, (PTO permits, water lease, Aquaculture license, Crown Land Survey, etc), if growers are burdened with many more constraints they will have a negative effect on the encouragement of new or continued participation within this new and developing industry.

Such mandatory participation within a group or association is certainly a possibility in the future when industry participants are more financially secure and have a better understanding of the benifits of such a group.

We strongly support the recommandation for the provision of seed money to get the association firmly established. Seed money should be initially provided to cover:

1. The cost of hiring a full time coordinator and secretary, both experienced with adminstrative work and familiar with the mussel industry in Newfoundland.

2. Government employees and other professional groups have had the opportunity to see first hand established aquaculture operations by visiting them outside the province. Funds should be provided to have the growers in Nfld educate themselves in this way.

3. The cost of promoting the mussel industry on a much larger scale then is possible by a group of unfunded volunteers.

Recommendation 13. If the Aquaculture industry is to be economically viable everyone should have equal opportunity to participate in the industry. if we show a bias in favour of certain groups because of their present economic condition then we might encourage individuals who are only interested in acquiring funding rather then them being truly interested in the industry.

Recommendation 4. It doesn't matter how few conflicts we have within the province there should always be an appeal system in place. Everyone should have the right to appeal any decision that he/she feels is unfair.

Recommendation 6. To date approximately 40% of the potential sites tested by EPS has been turned down due to pollution. Therefore we consider it necessary to investigate the needs, cost and benifits of a depuration facility within the province. Consumer demand within the market place may demand that a product be depurated before it be consumed.

Recommendation 17. There is no need to establish a demonstration farm. Due to the extreme variability within the province between different mussel farms, data collected from such a farm would not be representive of each individual mussel farm. We do recommend that DOF implement it's plan to use eleven sites around the province as monitoring sites.

Recommendation 30. As a means to finance aquaculture sites the association would like for industry personel to be able to access funding from the Fisheries Loan Board, at present there is no mechanism within the loan board to finance aquaculture. Within this recommendation we would like to see a specific portion of the Fisheries Loan Board budget allocated each year for use in the Aquaculture industry.

I trust the above propsed changes to the DPA study will be given consideration by you. Thank-you for your time.

Sincerely Yours,

Lloyd Fudge

Lloyd Fudge
Vice President
EMGA

Environment Canada | Environnement Canada
Conservation and Protection | Conservation et Protection

P.O. Box 5037
St. John's, NF
A1C 5V3

772-4297

Your file / Votre référence

Our file / Notre référence

April 10, 1990

4887-1

Mr. S. Canning
36 Monkstown Road
St. John's, NF
A1C 3T3

Dear Mr. Canning:

Re: Newfoundland and Labrador Aquaculture Development Strategy Report

The above document has been reviewed and the following comments and corrections are offered for your consideration.

I will restrict my comments to those sections of the report dealing with shellfish. Having read the entire document I found that for the most part the information supplied was already known and available, very little new information has come to light. The major effort would appear to have been the compilation of existing information which was well presented in volumes 2 and 3. However, volume 1, especially sections 3.2.3 and Appendix B, is very poorly written with many inconsistencies, numerous spelling errors and worst of all misleading and incorrect statements.

In terms of water quality/pollution, much of the emphasis is placed on industrial sources, fish plants etc. and not on the major cause of poor water quality - the discharge of untreated sewage. For example Zone 5, "at Glovertown a plant produces transportation equipment. At Eastport, there is a furniture business, which could contribute minor pollution," there is no mention of sewage from those towns. Many, if not all, of the errors could have been corrected had the draft been made available for comment prior to publication. It is unfortunate that, as the old saying goes, "one bad apple spoiles the barrel", since there is a lot of valuable information contained within these documents which will do much in allowing for an orderly development of this new and promising industry.

VOLUME 1

- P. 2/16, Table 2.7, pollution, the optimum and min. conditions expressed here are the same as those for finfish. In terms of public health protection the impact of pollution on a shellfish culture site could be far

more severe than on a finfish site. It is misleading to suggest that "nearby low level sources" are tolerable without first having identified the type of pollutant and defined "low level".

- P. 3/16, first line, Cornerbrook should read Corner Brook.

- P. 3/17, second paragraph, "a large oil-fired plant is planned at Holyrood", there is ,as is mentioned elsewhere in the report, a large plant already in operation.

- P. 3/45, first paragraph, reference is made to small bays such as Chimney Bay, Burnt Village and Main Brook. Burnt Village and Main Brook are communities, not bays , reference should have been made instead to Prince Edward Bay and Drac Bay.

- P. 3/46, 5. Water Quality/Pollution The communities of Roddickton and Main Brook also discharge raw sewage to the marine environment and significant areas adjacent these communities have been closed to shellfish harvesting. Fleur de Lys Harbour is also contaminated with fecal coliform bacteria and the area is closed.

- P. 3/49, Water Quality/Pollution, Grand Falls and Gander are refered to as cities, they are towns. Activities such as pulp and paper, a sawlog operation, mining and fish plants are identified as creating pollution loads but the many communities along the watershed and estuary of the Exploits River which discharge untreated sewage into the system are only mentioned as likely sources of coliform bacteria to local freshwater systems. Grand Falls is a definite source of <u>fecal</u> coliform bacteria. (The approval of shellfish growing areas is based on fecal coliform bacteria not coliform bacteria.) In addition any fecal coliform bacteria entering a freshwater system will, in all likelihood, impact on the marine environment as well.

- P. 3/50, first paragraph, "the following areas were contaminated with high levels of Coliform bacteria". This is a very serious misrepresentation of the facts and could have a detrimental affect on existing mussel culture sites, in particular those operated by Colin Adey and others in Burnt Arm and Upper Gut Arm. Burnt Arm was surveyed in 1987 and approved as per the criteria established by the Canadian Shellfish

Sanitation Program. The only elevated fecal coliform counts in Burnt Arm were near a small stream known to be populated by seagulls. As a precautionary measure, a 100 metre closure zone was implemented around the mouth of the stream. This closure represents a very small portion of Burnt Arm which is approximately 5 kilometres long and 0.5 kilometres wide. The area was resurveyed in 1988 with similar results being obtained. A total of 83 water samples collected over the two year period showed fecal coliform levels to be <2 MPN/100 ml. A shellfish growing area is deemed to be contaminated with fecal coliform bacteria when the median of all samples exceeds 14 MPN/100 ml.

Similarly, Upper Gut Arm was approved in 1987, two small, very localized, zones of contamination were identified and closed to shellfish harvesting. The misrepresentation of the facts on classified shellfish growing areas, as contained in the report and there are many, must be corrected. A wide distribution of such incorrect information will do little to restore the public's confidence in our ability to ensure that only "safe" shellfish reach the marketplace.

- P. 3/51, the first two paragraphs read like a kindergarden storybook. What is the author trying to say? What are the Upper and Lower harbours referred to here? Is the author implying that St. John's Harbour on Thwart Island is a port, when actually it is only a name of cove? These two paragraphs are typical examples of the poor descriptive writing style used throughout section 3.2.2 and shows the writer to be unfamilar with Newfoundland, resulting in such information being of little use in site selection.

- P. 3/53, first paragraph, Water Quality/Pollution. It is misleading to say that "... identified Indian Bay, Indian Tickle and Northwest Arm .... contaminated by coliform bacteria", when Indian Tickle is not contaminated, it is an approved growing area, and only portions of Indian Bay and Northeast (not Northwest) are contaminated and closed.

- P. 3/54, "the waterway north, west and south of Random Island", should read Nortwest Arm and Smith Sound.

- P. 3/56, only a portion of Northwest and Southwest Arms are contaminated, Cap Cove, in Northwest Arm, is an approved shellfish growing area.

- P. 3/56, the statement on the fish plant not being a pollution problem would only be true if it were serviced by a sewage treatment plant, you still have discharges of raw sewage and process water.

- P. 3/59, what about conflict with recreational boating, there are two yacht clubs in this bay and many of the sheltered bays are used heavily by recreational boaters during the summer months. The conflict with recreational boating is not very well addressed in the report but it should be since we are a seagoing people and boating is the major form of recreation in most of the coastal communities. There has been concerns expressed by boaters as to the blocking of entrances to many bays and coves used for safe anchorage without proper notification or markings.

- P. 3/63, last paragraph, phophorous should be spelled phosphorus.

- P. 3/64, "The north side of the Burin Peninsula is very exposed to the east", doesn't make any ~~since~~ sense.

- P. 3/67, "Portions of Otter Bay" should read all of Otter Bay.

- P. 3/68, second paragraph, should "Goose Bay" not read Goose Arm.

- P. 3/68,should read all of Lark Harbour, portions of York Harbour and all of Humber Arm.

- P. 3/69, Cornerbrook should read Corner Brook.

- P. B/1, 50 operations at present(1990) yet Volume 3, pg.1-1, second paragraph, quote "In 1988 there were 110 mussel sites", Has there been a 50% reduction in mussel culture sites since 1988 and if so, why?

- P. B/2, Table B1.1:, Sunnyside and Aquaforte were both closed in 1988.

- P. B/9, Charle's should read Charles.

- P. B/15, last paragraph is totally incorrect. All harvesting shellfish areas must be approved as per criteria established under the Canadian Shellfish Sanitation Program (CSSP). This approval is given only after a

thorough survey of the area by Environment Canada. These surveys are comprehensive and are not simply a test,the -15 samples are not collected over a period of 14 days, sampling must evaluate the worst environmental conditions that may occurr in the area. Shellfish growing areas cannot be approved on the basis of results obtained during consecutive sampling. The " tri-annual water quality inspections" are a requirement under the CSSP and are carried out by Environment Canada and not by Fisheries Inspection in conjunction with Environment Canada. Refer to Volume 3, p. 4-3, section 4.2 Licensing, and p. 4-10, section 4.3.

VOLUME 2

- P. 3-1, There is an Exhibit 3.1 but it shows Zones, not subareas.

- P. 3.1, all of the inner portion of of Canada Bay was closed in 1990 as the result of high fecal coliform levels and as such the area can no longer be considered suitable for shellfish harvesting for direct marketing.

- P. 3.5, it is not only the mines we are concerned with, what about the discharge of untreated domestic sewage from these towms.

- P. 3.6, this implys that all of Upper Gut Arm is contaminated, not so, only two small zones.

- P. 3.7, Indian Tickle is not contaminated and there is only a small portion of Northeast(not Northwest) Arm contaminated.

- P. 3.8, Portions of Northwest and Soutwest Arms are contaminated, all of Goose Arm, Collier's Arm and Broad Lake are contaminated and were closed in 1988. As mentioned earlier there are many inconsistances in this report, for example in detailing areas of contamination, in this report we see, "found to be contaminated with coliform bacteria", "identified as contaminated with high levels of coliform bacteria", "coliform contamination has been identified", "found to have high fecal coliform counts", " constrained by fecal contamination" and " high levels of coliforms have been reported". Under the CSSP areas are classified as either APPROVED, CONDITIONALLY APPROVED OR PROHIBITED for shellfish harvesting.

- P. 3-11, last paragraph, all of Lark Harbour and Humber Arm are closed.

- P. 4-12, first paragraph, "sites which were approved", this is incorrect, there were no sites approved in this area under the Canadian Shellfish Sanitation Program. Several operators assumed the area to be approved since they were permitted and encouraged to place gear throughout the area.

- P. 6-1, third paragraph, Atlantic Ocean Farms is located in Notre Dame Bay and is not near Bonavista Bay.

Yours truly,

J. Roberts
Environmental Quality
Officer
Environmental Protection/Nfld

JR/pb

Fisheries and Oceans / Pêches et Océans

P. O. Box 2009
Corner Brook, Nfld.
A2H 6Z6

Your file / Votre référence

Our file / Notre référence

April 03, 1990

S. Canning Planning & Development Consultants
36 Monkstown Road
St. John's, Nfld.
A1C 3T3

Att'n. Mr. S. Canning

Dear Sir:

In response to the request for input from attendees at the Newfoundland & Labrador Aquaculture Development Strategy session in Grand Falls on March 31, 1990, I would like to provide the following comments as Area Inspection Chief, Gulf Region, DFO, Corner Brook, Nfld.

Under the industry regulations section of the overview handed out at the meeting, I have two concerns:

1. KEY RECOMMENDATION 4 states that "there is no need for an appeal system at this time, etc." With any licencing procedure there is always a built in appeal system. If an applicant is rejected he or she has a right to know the reason and to appeal any decision to the Minister.

2. KEY RECOMMENDATION 6 states that "depuration should be discourgaged in favour of better pre-planning and site relocation procedures". This statement would be valid if we were starting from "point zero". However, many mussel sites were begun before the overlay waters were tested by EPS. Several of these operations are now in closed areas and depuration is an option which should be considered. In the St. George's Estuary, near Stephenville, there are seven (7) mussel farmers who are now in a conditionally approved area based on rainfall. This is an unreliable way of harvesting as they are subject to the elements, which are beyond their control. Also, there is no other suitable area to re-lay their shellstocks.

If we are to consider fresh sales and secondary processing as options, then depuration should be considered as a third option.

..2

The question of classification of growing areas will be addressed by Jim Roberts of EPS in greater detail. With 40% of sites surveyed being rejected (58% on the west coast) we cannot afford to overlook the possibility of depuration, as the so-called "pristine" areas are, in many cases, inaccessable.

I look forward to receiving a copy of the final report, or Volume 5, when it is available. If you have any questions, please call me at 637-4342 or FAX 634-1421.

Sincerely,

D. U. Williams

D. U. Williams
Area Inspection Chief

cc: J. Marsahll
S. Robinson

Great Northern Peninsula
Development Corporation

March 30, 1990

Honourable Walter Carter
Minister of Fisheries
Government of Newfoundland and
Labrador
P.O. Box 8700
St. John's, NF
A1B 4J6

Dear Mr. Carter:

Thank you for the copy of the "Aquaculture Development Strategy" recently prepared for the province and your kind invitation to participate in an industry review of this document on March 31, 1990 at Grand Falls. Unless barred by unforeseen circumstances, I will represent the Great Northern Peninsula Development Corporation at this meeting.

A cursory review of this ducument has revealed that, given the magnitude of the task at hand, the consultants have produced a well-rounded and good report. The report contains a considerable quantity of information concerning the 10 species reviewed, provides in most cases a very realistic assessment of the aquaculture potential of each, and provides a logical set of guidelines for the future development of aquaculture in Newfoundland and Labrador. Interestingly, many of the recommendations put forth are exactly in line with our Corporation's aquaculture development activities.

The Corporation has attempted to provide assistance to mussel farmers in the region and promote the industry as a whole on the Great Northern Peninsula. The Corporation has helped this budding industry evolve by accessing and providing technical advice and assistance to local residents. This has included site assessment work carried out with the help of the Marine Institute, as well as, the offering of workshops and training courses within the area, again with the help of the Marine Institute. In addition, the Corporation has retained qualified staff to lend assistnce and advice to growers in various matters from site selection and farming technology to business planning.

cont'd.../2

P. O. Box 69 Plum Point Newfoundland A0K 4A0 • 709 • 247-2354 • Fax 709 • 247-2324

Most recently the Corporation has recognized the need to provide this growing industry with marketing support. The Corporation, with assistance from the Newfoundland Inshore Fisheries Development Agreement (NIFDA), has recently had a mussel marketing study completed to identify a secondary mussel product form which can most effectively be produced and marketed from the GNP. The results of this work has been the identification of a frozen, vacuum packed whole mussel product in a special sauce (boil or microwave right in the bag), which can be directed to both the retail and foodservice industries. The Corporation has recently solicited support from the Centre for Fisheries Innovations and the Marine Institute to develop this product type. A further proposal to access partial support for the test marketing of the product has been submitted to NIFDA. Hopefully, the GNPDC will have the results of this work ready for the 1990 mussel harvesting season and yield a means by which mussels grown on the GNP can be processed locally into secondary products, thus creating additional employment in the area, and marketed effectively from the region, creating viable and stable markets for the local mussel farming industry. This secondary processing activity would be effected at Great Northern Seafoods Ltd.'s plant in Brig Bay, thereby adding to the viability of an existing fish processing facility.

The above description of the Corporation's activities in mussel aquaculture fits exactly with the present report's recommendations;

- Recommendation #7 - "use of existing plants" for aquaculture production.

- Recommendation #20 - "Sufficient market information exists to also proceed with development, costing, and test-marketing of specific value-added products. ... DOF should facilitate this process by subsidizing the development costs."

- Recommendation #21 - "...initial mussel product development work required would seem a logical role for the Marine Institute..."

- Recommendation #31 - "...high priority should be placed... on resolving marketing issues with mussels..."

cont../3

The GNPDC has recently submitted a proposal to conduct a two year research project into the feasibility of culturing Arctic Char at Daniel's Harbour. This proposal represents the culmination of research which the Corporation has conducted over the past couple of years with technical support and assistance from the Marine Institute, the National Research Council, the Ocean Sciences Centre, the Centre for Fisheries Innovation, several private consulting firms, as well as, from personnel in other government agencies ranging from hydrogeologists to lands management personnel. Thus far, the National Research Council, the Marine Institute, and the Department of Development have provided the key financial support for this work. The resulting proposal outlines a detailed plan to effect the development of a pilot scale research facility which will effectively determine the feasibility of culturing Arctic Char on the GNP. The project would be unique in its concentration on freshwater Char culture without overwintering as mentioned on page 18 of the report's Executive Summary. The facility will be able to lend itself to research into various Char strains and production strategies. Again, this work is very much in line with the recommendations in the "Aquaculture Development Strategy" currently under review:

- Recommendation #31 - "cautious approach with Char" - our proposal is just such an approach having an appropriate level of flexible research capability without involving the expenses or risks of full scale commercial development, yet offering that option given positive results.

- Recommendation #10 - "development of disease-free stock within Newfoundland" - while this refers to Rainbow Trout in the "Aquaculture Development Strategy", the proposal by the GNPDC for Daniel's Harbour permits the same goal to be effected with Arctic Char since the watersource is a well.

- Recommendation #25 - "Private sector participation in aquaculture research should be encouraged..."

- Recommendation #30 - "Governments should immediately address the critical needs for working capital and technical and marketing support. Other necessary elements of the strategy include increased field research... . Support for additional infrastructure is also crucial...."

cont'd.../4

The Corporation has also had the intiative to begin investigation of other potential aquaculture development opportunities on the GNP. This includes the potential usage of waste heat from the Roddickton Generating Station which the Corporation had analyzed by Arnold Sutterlin while it was still in the design stage. The Corporation will continue to assess this opportunity as the facility becomes fully operational. Again, this directive by the GNPDC has now been substantiated by this report which mentions this particular site as offering possible potential for Salmon culture (Recommendation #8) and perhaps some marine fish species research (Page 19, Executive Summary).

In general, we are pleased this Development Strategy very much supports the initiatives being pursued by the GNPDC. However, the implementation of Recommendations 12 through 15 (Financing) will be critical in determining the fulfillment of these aquaculture development goals, particularly in the early stages of development. Furthermore, Recomendations 37 and 38 outline a good policy for Regional Development Associations (RDA's) and, at the same time, give recognition to the successful efforts of certain RDA's and our own Corporation, which is a unique vechicle keyed to nurturing economic development in all areas including aquaculture. As mentioned in this report, our involvement in aquaculture has also included the development of a regional aquaculture development plan earlier which has guided our efforts to promote and develop aquaculture on the GNP.

After reviewing the "Aquaculture Development Strategy" report, we feel very satisfied that the direction recommended for aquaculture development in this document is very much in line with the direction we are pursuing as demonstrated in the above assessment. We look forward to your Department's full implementation of this report in the manner outlined and with future industry and public input as noted in Recommendation #35. Specifically, we now look forward to your response concerning the mussel product development and testing proposal recently submitted to NIFDA and our proposal to conduct a two year research project into the feasibility of culturing Arctic Char on the Great Northern Peninsula.

Sincerely,

Abe Gibbons Jr.

Abe Gibbons Jr.
Aquaculturalist

cc Honourable Chuck Furey

Memorial
University of Newfoundland

Department of Biochemistry

April 2, 1990

Mr. Strat Canning
65 Monkstown Road
St. John's, Newfoundland
A1C 3T6

Dear Strat,

I found the session on Aquaculture Development Strategy on the 31st a very informative one. I thought that it would be useful to advise you that there is expertise among a number of the members of the faculty of Memorial University that those interested in aquaculture development might like to access. Besides members of the faculty of the Ocean Sciences Centre, others in the Biology and Biochemistry Departments and the Food Science Group of the Biochemistry Department may be able to be of help in the development of the industry in the province.

Among the faculty in these departments are people with interests in genetic selection and stock assessment by modern molecular biological techniques, in developmental biology of marine invertebrates, and in toxicology. One of our new faculty is interested in animal nutrition including the possibility of the development of aquaculture feeds.

The members of the Food Science Group provide a wide variety of professional experience and interests that may be used in the development of aquaculture. Interests include quality assessment, food preservation, food processing, product development, and food microbiology, among others. Those faculty who have expertise or interests in these areas may be a useful source for potential consultation and research and development projects in the industry. The Food Science Group in the Department of Biochemistry has a particular orientation towards applied projects of the type of interest to various food industries.

The Food Science Group in the Department of Biochemistry is also now equipping a modern state-of-the-art food processing pilot plant which can be used for product development and scale up. This will become accessible to local industry under various kinds of arrangements. The members of the aquaculture industry may be able to avail themselves of this facility in future product development.

St. John's, Newfoundland, Canada A1B 3X9 • Telex: 016-4101 • Tel.: (709) 737-8530 • Fax: (709) 737-4000

I hope that this information can be communicated to those interested in aquaculture development. I shall provide any further information that may be of use to you in the compilation of your final recommendations on this area.

Yours sincerely,

K.M.W. Keough
Professor and Head

KMWK/dmo

cc Dr. T. Patel, Department of Biochemistry, Food Science Group
Dr. H.W. Hulan, Department of Biochemistry, Food Science Group
Dr. A. Whittick, Acting Head, Department of Biology

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1B 3X7

Oceans 2000 Secretariat

Telex: 016-4101
Fax: (709) 737-4569
Tel.: (709) 737-4799

April 10, 1990

Mr. Strat Canning
36 Monkstown Road
St. John's
A1C 3T5

Dear Strat:

Having reviewed the DPA Aquaculture Report and attended the meeting sponsored by the Department of Fisheries in Grand Falls on March 31st, I would like to offer for your consideration the following suggestions for inclusion in the addendum to the report.

GENERAL OBSERVATIONS

Individual Species:

Mussels

Secondary processing should be recommended for the value-added benefits which can accrue to the industry.

Fresh mussel production should be promoted and geared toward the European market for the following reasons:

- Europe 1992 is a huge market (320 million people) where a demand for mussels already exists;
- Canada has a favourable image among Europeans -- it should be used for our advantage. Newfoundland coastal waters should be used as a powerful marketing tool because our seas are pristine in comparison to those where European-produced mussels and other shellfish are grown;
- Geographically, Newfoundland is the closest potential supplier of Canadian aquaculture products to Europe;
- Greater access to the European market will soon be available through Aeroflot whose Gander location is close to important Newfoundland production areas of mussels and other fish products. Aeroflot expects to have Canadian government clearance this summer to ship direct from Gander to both Havana and Shannon. From Shannon, Aeroflot serves numerous European countries. Aquaculture operators (and fish processors) take advantage of this market access opening which no other Atlantic province has;

- Newfoundland aquaculturally produced mussels are a quality product whose uniform size and absence of external barnacles and internal grit have the potential to become a prized food to the Europeans.

Scallops

I was disappointed to see that scallops were not more emphasized both as two-year "on the half shell" and in the traditional fully grown size.

Arctic char

Arctic char which are native to Labrador were not considered as appropriate for aquaculture along the Labrador coast. Properly promoted, Arctic char could become an important product in Europe.

Rainbow trout

If rainbow trout are sea trout (as I have been given to understand verbally), then they are not the rather tasteless, pale, fatty fish which are marketed in England as rainbow trout. I would recommend that any possible confusion of what it is we are talking about should be cleared up.

It is important that diverse species of fish and shellfish be grown in order to avoid over-reliance on any given species province wide. In choosing that variety, species for which there is already an established market should be encouraged, and less-established species for which chances appear to be good should also be tried.

Marketing of all these products in Europe should start now.

THE REPORT

Specific Issues:

Under the heading Related Strategic Issues and Questions, #5, the statement "Culturing of new species in the province is dependent upon: developments elsewhere; federal/provincial coordination; and private sector initiatives" bothers me -- especially the first part. Why should Newfoundland aquaculture wait for things to happen elsewhere? Such a 'me too' attitude ensures that Newfoundland will always be behind, as we are currently with salmon and Arctic char.

Under the heading Industry Regulations, #4, "Depuration facilities should be discouraged in favour of better pre-planning and site allocation facilities". This attitude is limited. Aquaculture in satisfactory water is clearly preferable from many points of view; however, depuration, which can be considered a value-added process, should not be discounted especially for production of fresh produce.

Scientific Backup:

I was disappointed that the Ocean Sciences Centre with its Marine Sciences Research Lab at Logy Bay was not featured more prominently in the report. Scientists from MSRL have been instrumental in the early development of much of the existent aquaculture in Newfoundland, and continue to provide a rich source of expertise to an industry which is noted for its reliance on science and technology.

No mention is made of other University facilities, for example, TETRA, a telecommunications facility which can beam programs into Newfoundland communities. Scientists and operators can have direct two-way audio and audiovisual communication to demonstrate techniques and delineate problems. The University and its various facilities should be looked at with regard to its existing and potential capabilities for promoting aquaculture in Newfoundland.

FINAL COMMENTS

We Newfoundlanders have allowed ourselves to marginalized by our distance from central Canada. We often assume that we cannot do things here because we are too far away from markets, and when we do not have this attitude ourselves, someone from the mainland will all too quickly force the view upon us. We must look outside Ontario, Quebec, and Boston for markets on which to sell our fish products. **It is important for us to realize that in the international market, Canada is one country, and all parts of Canada are equally Canada. Internationally, there is no prejudice against Newfoundland merely because it is not Ontario.**

In trading with Europe we can have an advantage over the rest of Canada: we are closer both geographically and mentally. While the transportation maps in the report show sea and air routes heading off only into the great Canadian belly, Newfoundland is much better situated than that, with the shortest sea and air routes to Europe of the whole of Canada; by sea we are closer to South America than New York is. International airlines already land here (35 Aeroflot planes a week and a smaller number of Air Cubana) and ships from many countries of the world currently bypassing our ports, pass close by our shores. If we choose to remain isolated, we have only ourselves to blame.

Yours sincerely,

Helen Peters

c.c. Brian Meaney
Department of Fisheries

DPA Report.

Comments from P. Dabinett, Ocean Sciences Centre, Marine Sciences Research Laboratory, Memorial University.

While acknowledging the many positive aspects of the DPA report and agreeing with the recommendations suggested, I wish to submit the following critical comments for consideration.

Comments on Volume 2 particularly with respect to scallop culture

p 4-1. "Suspended culture so far has not proven to be economically viable while bottom culture appears to be as long as predation mortalities are low."
I disagree. There is no solid evidence yet to support this statement. In Japan, approximately half the production comes from suspended culture and half from bottom culture. The economics are thus likely to be similar. The deciding factor is the availability of suitable sites of appropriate depth.
The quote above was made in the absence of any data on ear-hanging which is the preferred method of suspended culture.

P 4-2 The zone assessmants should be considered tentative.
B.MacDonald found in his detailed studies of scallop physiological ecology, that scallops from a site in zone 6 outperformed those from

zone 5. These zone assessments may create an inaccurate mind-set in policy makers.

p 4-2 Wild spat collection (Port au Port) is now approaching 20 million per year.

p 4-3 "About half of Japan's production is from aquaculture." This statement is misleading. Almost all of Japan's production comes from aquaculture, 1/2 from suspended culture and 1/2 from bottom culture. This combined production comes from a seed supply secured by aquaculture methodogy.

p 4-6 The preliminary estimates of operating costs of lantern net culture and loop cord (loop cord is not the latest most efficient method of ear-hanging) are misleading. The Japanese now favour ear-hanging (using plastic tags not loop cord) and I presume this is based on economic realities.

Comments on Volume 3

p 3-2 Objective 1. "The Newfoundland and Labrador aquaculture industry should be economically viable without ongoing government assistance."
I would like to see this concept adjusted as follows

"The Newfoundland and Labrador aquaculture industry should be economically viable AND SHOULD RECEIVE THE SAME PROPORTION OF ONGOING GOVERNMENT ASSISTANCE AS THAT AFFORDED THE CAPTURE FISHERY" Surely the aquaculture fishery deserves the same proportionate share of government assistance as the capture fishery and enhancement fishery receive. If this is not the case, then the capture and enhancement fisheries are tacitly subsidised by government support not afforded the aquaculture industry. These principles are particularly important when the product of each fishery might be the same e.g. scallop meats.

Government should cover aquaculture costs associated with disease diagnostics and fish inspection services.

The report does not comment on the fundamental differences between finfish and shellfish culture which may affect policy decisions. Finfish culture is generally capital intensive (net pens, cost of stock, feed costs) requiring low labour. Profit margins are used to defray capital costs and returns on investment. The area required by a lease is normally small.

Shellfish culture is generally less capital intensive and more labour intensive than finfish culture. Profit margins are used to defray labour costs. The area of lease required is large because the food supply for shellfish is provided naturally and final stocking densities must not approach or exceed what nature can sustain.

Large shellfish leases could be community based rather than

individual company based. Shellfish culture may be more amenable to community development while finfish culture may be amenable to corporate development.

Scallop Culture: Research recommendations:-

SEED SUPPLY

-spatfall prediction, the timing, size,density and distribution of larvae in collecting areas in relation to spat collection and yield of seed.

-timing, depth, location and type of spat collector gear.

-hatchery production of spat

-nursery culture of post-larvae or juveniles

INTERMEDIATE GROWTH

-stocking density and size studies

-strategies to minimise fouling

ON-GROWING

-evaluation of culture techniques

ear-hanging

bottom culture

- predator control

-food supply (seston analysis)

-carrying capacity determination

HARVESTING/MARKETING

-investigate whole young scallop marketing

-toxicology studies

-value-added processed products

-gonad attached products

-test market with real product

GEAR MANUFACTURE

-pearl nets

-ear-hanging tags

-tags-on line

ECONOMIC POLICY

-buy foreign gear?

-manufacture gear?

-socio-economic make-work project applications?

-aquaculture as a form of income supplement

-family farms

-community ventures

-corporate sector involvement

FUNDING/INCENTIVE PROGRAMS

-loan boards

-gear banks

demonstration farm.

Newfoundland Shellfish Ltd.,
P.O Box 495,
Gambo, Nfld..

Strat Canning,
36 Monkstown Rd.,
St. John's, Nfld..

Dear Mr. Canning,

Please find enclosed our submission to the DPA report concerning the Aquaculture Development Strategy for Newfoundland and Labrador.

Under Industry Regulations: Licensing, Appeals, and Processing:

Recommendation # 7:
"Development of new Processing facilities for aquaculture should be discouraged in favour of increased utilization of existing plants"

We feel that the term discouraged to be very strong because a number of the major Processors have already been approached but to date have done little work in developing the industry. We suggest that the recommendation read as follows:
"Wherever possible existing plants be utilized for secondary processing but development of new facilities maybe required for primary declumping/grading/debyssing of mussels.

Recommendation # 4:
"There is no need for an appeal system at this time, but this item should be periodically reviewed."

The right to appeal is a basic human right and we suggest that this recommendation be deleted from the report.

Under Marketing And Promotion:

Recommendation # 4
"Tarket marketing should concentrate on North America."

When a person considers the location of Newfoundland in reference to the world, we quickly realize that Newfoundland is close to the center and therefore markets should be on a global scale.

Our company is composed of several mussel farmers who would like to take this opportunity to express their concerns on other issues raised in this report.

Under Financing:

Recommendation # 1 &2

"Assistance programs should be provide working capital to aquaculture enterprises."
"Assistance programs should also be used to develop and support supply firms."

Mussel growers have expressed this opinion on various occasions and feel that these recommendations be acted upon immediately. We feel that one avenue for funding this program already exist in the Fishery Loan Board. Because the infrastructure is already in place, this objective can be reached in the near future.

Under Marketing and Promotion:

Recommendation # 1 & 2.
"A province-wide mussel growers association is needed and membership be mandatory."
"Government should provide initial seed money support for such an organization.

The farmers in our group have worked long hours over the past two years to form such an organization. The Eastern Mussel Growers represents approximately 30 farmers in Newfoundland with representation from Northern Pennisula, Norte Dame Bay, White Bay, Bonavista Bay and Trinity Bay. The association has been running on a government grant of $1000.00 per year for a newsletter and membership totalling $600.00 per year. We strongly feel that if the association is to continue growth it will require a full time person along with operating funds for a two year period. This will allow the association proper organization that will ensure a successful future for the industry.

In summary, I would like to take this opportunity to personal thank your group for making the first attempt at mapping a possible course for the aquacultural industry in this province.

Yours truly,
Lester C Green
Lester Green, Pres.
Newfoundland Shellfish Ltd..

Bus: (709) 582-3042 Res: (709) 582-3445

Rainbow Trout Farms Ltd.
South Dildo
Trinity Bay, Nfld.
A0B 1R0

April 10, 1990

S. Canning
Planning & Development Consultants
36 Monkstown Road
St. John's, NF

Dear Sir:

Re: Aquaculture Development Strategy

We are the owners and operators of Rainbow Trout Farm Limited, the only trout farm/fee fishing facility in Newfoundland. After five years of trying to establish markets for our rainbow trout in Newfoundland and other parts of Canada, we've discovered that it is more economically viable to concentrate our efforts on the tourist end of our business.

We feel that their should be some restrictions on the number of licences granted to individuals who wish to start a fish out pond or trout farm in Newfoundland. We basically service the area from St. John's to Gander, and it would be ludicrous for the Government to even consider supporting or financing another operation such as ours in this immediate area. Based on figures kept by us for the past five years we are absolutely certain that approval for another fish out pond in our area would be detrimental to our business. Because we are privately owned and operate without any financial support from the government it would be impossible for us to compete with any business that was being supported by the government. We manage to acquire a modest living from our business by working long hours, many of which we receive no compensation for. We do not have the population base to justify the government even considering financing another such operation. Great care and consideration should be taken before any commitments are made to anyone.

Another point worth mentioning is the financing of research and development of rainbow trout at the Bay D'Espoir hatchery. This seems particularly odd to us considering that in 1985 when we started to operate the trout farm in Hopeall, we were told by the Government of Newfoundland that their would be no money available for research and development of rainbow trout in Newfoundland. They believed at that time that the business of growing rainbow trout in Newfoundland was certainly not a viable business and they therefore were not interested in financially assisting us, Now it seems they have done a complete about face considering they are now financing the development of rainbow trout in Bay D'Espoir.

In closing I would like to compliment you on a job well done, I was very impressed with this report and found it to be very in tune to the needs of the Aquaculture industry in Newfoundland. I to look forward to the day when the industry will be economically viable without ongoing government assistance.

Sincerely,

Linda Lahey

Linda Lahey

Trinity Blue Aqua Farms Ltd.

BOX 73 PORT REXTON, NFLD.
TEL: (709) 464-3554

"Quality Fast and Fresh"

April 11, 1990

The authors; Newfoundland and Labrador
Aquaculture Development Strategy: January 1990
-The DPA Group Inc.
-Hatfield Consultants Ltd.
-S. Fudge and Associates Ltd.
-S. Canning Planning and Development Consultants

Dear Sirs;

Subject: Formal presentation-Company concerns with content of Newfoundland and Labrador Aquaculture Development Strategy, 1990.

We at Trinity Blue Aqua Farms Ltd. have reviewed your submission of study results and we were represented at Grand Falls, March 31/90 for the public presentation of your viewpoints.

During the meeting at Grand Falls, I took issue with the subject matter as it relates to our company. At this time, I would like for this correspondence to act as formal written presentation of our concerns.

It is unfortunate that during the course of obtaining and compiling data you did not deem it necessary to contact my company (and others). I am sure we could have released information concerning our activities and, of course, we would in the very least have identified published material we utilized during review of our area.

There remains the question: Why did our company's name appear in your report without our knowledge?

Please find attached our formal presentation of concerns and a little background on our company.

Sincerely yours,

Trinity Blue Aqua Farms Ltd.
Robert Freeman
President

TRINITY BLUE AQUA FARMS LTD.

Company background

Company location: Port Rexton, NF
P.O. Box 75
A0C 2H0

Company activities:

-Blue Mussel culture at Cap Cove, Trinity Bay.

-Arctic Char culture at Freshwater River.

-Retail seafood marketers (tourist trade).

-Consultation to "NFLD Elver Utilization-Second Stage Assessment" for Bonaventure/English Harbour Development Association and project managers, Davis Engineering and Associates Ltd.

-Consultaion to Isle Aux Morts Development Association-Arctic Char/preliminary site assessment.

-Preparation of Environmental Preview Report: Freshwater River finfish culture facility.

-Development of specific pathogen free Arctic Char broodstock.

-design consultaion on a "pay for fishing pond" for Carcajou Ranch, Port Rexton.

-Design of "live haul Eel tank", "water activated Elver trap", and"inter-tidal Elver net trap" for Bonaventure/English Harbour Development Association.

-Design and construction of prototype Arctic Char hatchery with gravity inflow systems.

-Design and construction of prototype biological filtration system (12 volt) for live transport tanks.

Company activities: (cont'd)

-Preparation of hypothetical five year viability analysis for 25-75 tonne landbased Arctic Char hatchery and growout operation, in conjunction with Wendall W. Moore, C.A. and NORDCO Ltd (used to determine production requirements for economic viability).

-Establishment of market contact list for farm raised Arctic Char, through the use of mailout market survey sheets (to be used during market development strategy).

-Marine and freshwater water quality sampling program for Cap Cove, Freshwater River, and other watersheds or sites within the Bonavista Peninsula areas (ongoing since 1987).

-Successful completion of first feed and weaning to prepared dry diets of American Eel Elvers for Bonaventure/English Harbour Development Association.

There are several other activities that Robert Freeman (the company's president) or Trinity Blue Aqua Farms Ltd. have, to some degree, been involved with. Robert Freeman is the chief shareholder of the company and since 1987 has been employed in the aquaculture field. The company is also a founding member of the newly formed Aquaculture Development Foundation.

Company facilities

Prototype Arctic Char hatchery:

This small hatchery is located on private property adjacent to Freshwater River near Port Rexton, Trinity Bay. This facility was constructed to provide much needed data on fish survival at site, disease status of spring water supply, practical "hands-on" Arctic Char rearing, growth of fish at ambient spring brook conditions, etc.

Results of operation to date:

- Fish mortalities have been minimum.
- Growth under ambient temperatures has been acceptable.
- Facility, fish stock, and present water supply have been accorded full Certified Disease Free status under the Fish Health Protection Regulations (DFO).
- Present developed gravity fed groundwater capacity of 450l/min, with potential of larger supplies from pumping (potential for a total of 800+ l/min).
- Surface water from river available by gravity flow is in the range of 2500 l/min, with 700 l/min being the lowest daily flow recorded (using extrapolated data from adjacent Salmon Cove River).
  Note: There exists storage capacity that could be utilized during low flows, also the figure of 700 l/min was recorded for one year only, 1987.
- Water quality parameters have been regularly measured and recorded for groundwater and surface water. These parameter values have been found to be within the safe limits for fish culture. It is notable that water temperatures have reached a high of 18.2° c directly above the proposed intake for the surface water supply. This figure was recorded on August 21, 1989.

Shellfish site:

The company's shellfish activities take place at Cap Cove, Trinity Bay. Evaluations of water quality, stock growth, and meat yields have been conducted at site.

Site characteristics:

-The Environmental Protection Agency has surveyed the site for contamination and have found it to be acceptable (1988-89).

-The Department of Fisheries and Oceans have conducted laboratory analysis for P.S.P. and other toxins, using Blue Mussels. No toxins have been detected (1988-89).

-Cap Cove freezes over to a degree suitable for winter harvesting. No pack ice enters the cove from "arctic ice flows", although a very small degree of loose, thin ice existed during a few days following break-up. No ice damage has resulted since 1986.

-We have never encountered wave action that would be prohibitive to operations, in fact, the site is most suitable for floating rafts or wharfs.

-Water depths in excess of 60 feet exist at the farm site. A minimum of 12 ft exists near shore throughout most of farm site.

-A wharf facility exists 5 minutes from farm site by boat. The site is located adjacent to a road for additional access.

-Meat yields have reached 58-60%, with an average of 43% for mussels 18-24 months of age. Marketable mussels have been obtained in 18 months (25-30%).

-Spat fall has been excellant and consistant.

-Shore fastening systems can be utilized.

-Cap Cove's location allows for excellant equipment security.

-Sizable stocks of wild mussels, Giant Scallop and Icelandic Scallops occur at this site.

Company concerns and/or misleading information

contained in your report

Page 3/54, Volume #1

Second paragraph: "There are however, numerous protected inlets and bays."

Cap Cove should be identified here. It is probably one of the most sheltered inlets or coves to be found in Trinity Bay.

Page 3/56, Volume #1

Fourth paragraph: "The following areas were identified as being contaminated with coliform bacteria".

You have stated that Northwest and Southwest Arms of Trinity harbour are contaminated. This statement is not true. Only a very small portion of Northwest Arm has been classified as contaminated.

Your statement can be viewed as misleading. Please refer your data to the Environmental Protection Agency for clarification.

As Cap Cove is part of Northwest Arm and it is not contaminated, your report should point this out.

Page 3/74, Volume #1

3.3.2.1 Groundwater

Could your study team not consider that Trinity Blue Aqua Farms Ltd. has a developed groundwater capacity of 450 l/min? Also, there is additional potential for twice this amount.

Further more, please refer to Hydrogeology of Bonavista Bay Area, Nolan Davis and Associates Ltd, 1981, Water Resources Division, Department of Environment. Two deep wells at Upper Amberst Cove yield 405 l/min each.

Please consider these reports.

Company concerns cont'd

Page 3/81, Volume #1

3.3.3.5 Zone 6

Surface flow, water quality and temperature data is available for this zone.
Please refer to these publications:

(A) Canada-Newfoundland Water Quality Agreement: Site Documentation, 1988

Available from Provincial Department of Environment or Inland Water Environment Canada.
Note: Data from Southern Bay River can be extrapolated to zone 6.

(B) Historical Streamflow Summary: Atlantic Provinces, 1986. Inland waters/land directorate, Water Resources Branch; water survey of Canada, Ottawa, 1987.

(C) Surface Water Data 1987; Inland Water Directorate, Water Resources Branch; water survey of Canada, Ottawa, 1988.

Note Salmon Cove River near Champney's.

(D) Hydrogeology of Bonavista Bay Area; Nolan Davis and * Associates Ltd, St. John's, NF, 1981. Department of Environment, Water Resources Division, St. John's.

* Twice this amount of wells have been drilled and developed since this report.

Additional data is available from Trinity Blue Aqua Farms Ltd. for Freshwater River (water quality parameter measurements).
If your study team were to visit our site, we can arrange for you to view at least nine spring water sources along Freshwater River, with the smallest flowing at 100+ l/min.
Data on wells constructed since the Nolan Davis report is available from the Provincial Department of Environment.
Please bear in mind that most wells in Newfoundland were drilled in locations of convenience, with no intention of full aquifer development or large flows. These wells were

not engineered, as groundwater supplies for hatcheries would be.

Our groundwater supply has been stable in pH value. Two years of data have revealed a value of 6.6, which is within safe limits for Salmonid culture.

Please elaborate on your statements of water quality in zone 6. We have had fish at our facility for more than one year and water quality has never been a problem. Our present hatchery has received Certified Disease Free status, this attests to water quality.

Please consider the effects inaccurate data can have on proposed or existing aquaculture businesses.

Page C/1, Volume #1

American Eel

Please refer to the Provincial Department of Fisheries. You will find that research on American Eel Elvers has been ongoing since 1988 by the Bonaventure/English Harbour Development Association. It could be beneficial to your report to contact this association.

Page 2/7, Volume #2

Zone 6

We take exception to your statement that finding suitable volumes of good quality water will likely be difficult for freshwater culture in this zone. If you would take a closer look at our activities and consider that a facility can be designed to suit any reasonable site, you will see that this statement is misleading.

As well, what is meant by Lockston power plant being north of suitable net pen locations?

This area is indeed suitable for seasonal marine net pen farming.

Lockston power plant utilizes storage capacity from Trinity Pond. This pond is being assessed for freshwater land based Char culture. Results to date are promising. Please consider that this station is an older type, three megawatt electric generation plant, it would not function if adequate flows were not present.

In short, your study team did not make a real effort in analyzing the freshwter aquaculture potential of zone 6. Not all aquaculture is founded on marine or other net pen methods.

Page 3/8, Volume #2

First paragraph: "On the west side of the bay, protected areas include..."

Here you have not included Cap Cove, which is our shellfish site, and it is very protected.

As well, please clarify the contamination concerns, in particular Northwest Arm, as we stated earlier.

Exhibit 3.2, Volume #2

Your ranking for physical suitability of a "5" for zone 6C is totally false, if you consider our site at Cap Cove. Again your study team should have made a site visit or, at the very least, you should have reviewed the topography of the area more closely. If Cap Cove does not warrent a value of "1" or "2", then you should re-rank all other zones.

Your ranking for biological suitability of a "3" should be looked at more closely. Our spat falls in Cap Cove, Northwest Arm, and Champney's Arm have been very good. Meat yeilds at Cap Cove have been excellant.

Page 3/7, Volume #2

Zone 6

"Cap Cove offers potential on a smaller scale".

What do you define as small or large scale?

Would a development size that is suitable for economic viability not be considered adequate for an aquaculture business?

Please clarify your interpretations.

Page 5/1, Volume #2

Arctic Char

Your study team has made, what we consider to be, serious errors in the data contained on page 5/1 and 5/2.

(A) When you decided to print our company's name in your report, you should also have given us the opportunity to include the results of assessments conducted at our site. (Please refer to our company background.)

(B) You did not indicate that sufficient surface water and groundwater supplies exist at our present site for hatchery development, that our present hatchery operates on gravity fed groundwater (450 l/min) which is drawn from a spring brook, of which the maximum recorded summer temperature has been 14.2°c, or that winter groundwater temperatures are 6.5°c, etc.

Consultation with us would have provided this information.

(C) Why does your report not consider that it is possible to keep only broodstock on one water source, and that eyed eggs and Char fry can be transferred to other locations (ie. Trinity Pond) for freshwater growout? If your study team considered this, it should have been elaborated on and contained in your report.

We are assessing the potential of our present site for hatchery development and the Trinity Pond area for growout of pan sized fish. Our assessment methods have involved published data review, direct site measurements, and "hands on" Char survival trials, also consultation from government representatives and engineering firms.

We consider our efforts to be very detailed, very serious, and they represent sizable financial expenditures.

If one were to consider the "lightness" of your comments on our company, quite a different view could be taken.

Page 5/5, Volume #2

5.4 Financial viability

How was the figure of $5 million for capital costs of a land based Char facility arrived at? Why did you use the production figure of 200 tonne?

May I suggest that an economically viable land based Char farm and hatchery can be constructed for less then $1 million. This facility could produce 100 tonne of pan size Char (constructed by entrepreneurs).

The growout period for pan sized Arctic Char is far less then that for market size salmon.

Char have been grown to pan size from 25 g in 5.5 months. Given the right mixture of ground and surface water, it is possible to raise pan size Char to market size in 14-18 months. This method has proved feasible for Rainbow Trout culture in Ontario, Idaho, and Europe. This situation does exist in Eastern Newfoundland.

When you considered including a section on financial viability for Arctic Char, you should not have limited it to the space utilized.

The point of Char culture having greater financial risks than salmon culture can be argued and, quite likely, considered incorrect. Why are so many other provinces, states, or countries very determined to farm Char? It was not too many years ago that such concerns were directed at Rainbow Trout and Catfish.

Aquaculture is a business and true businessmen do not exist to lose money.

Page 2/5, Volume #3

2.4 Arctic Char

It can be argued that Newfoundland <u>can</u> have an advantage over other regions of Canada. When you consider Char culture, you are talking relatively groundfloor opportunity, and, as with any groundfloor business, those that capitalize first become established in the market place.

Company concerns cont'd

It would appear that you are portraying Newfoundland as having poorer conditions for Char culture than other parts of the country. This is false.

Char have survived in Newfoundland as wild stocks for quite some time, as well Newfoundlands surface freshwater temperatures are considorably lower than Ontario or Manitoba during the summer months, also, there is groundwater in this province.

Fish companies would argue that transport to mainland markets can be viable and cost effective.

Please carefully reconsider what you have written in this paragraph.

I am of the opinion that your motives have been somewhat biased. Throughout your report you have portrayed Newfoundland as having little potential for aquaculture. A little consideration is required.

Concluding Statements

(1) It would appear that your study team did not portray our involvement in aquaculture as being serious or worthwhile.

(2) Your study team did not feel it was necessary to allow us an opportunity to present our case.

(3) The statements contained in your report are already printed and have been reviewed by interested parties. Consider the effects of this on our company, it is very easy to see that problems can arise as a result.

(4) If there is an opportunity for amendments to your report, then your title should be "Proposed Aquaculture Development Strategy".

(5) Space and time frames do not permit addressing my concerns in a more detailed format. This is unfortunate and I would welcome the opportunity to address issues more comprehensivly.

SHELL FRESH FARMS

P.O. Box 7003 St. John's, Newfoundland A1E 3Y3 Telephone (709) 368-7480

April 13, 1990

Mr. Strat Canning
Canning Planning Development Consultants
36 Monkstown Road
St. John's, Newfoundland

Dear Mr. Canning,

I am happy to enclose for your review, our comments on the Newfoundland and Labrador Aquaculture Development Strategy, recently released to the Department of Fisheries by yourself and the other consultants, DPA Group Inc., Hatfield Consultants Ltd., and S. Fudge & Associates.

I hope our observations and suggestions for Giant scallop culture will be helpful in finalizing this document. I am confident that we will soon have a successful industry in the province.

Thank-you for considering our recommendations.

Sincerely,

Jennifer R. Caines

Jennifer R. Caines

KEY FINDINGS AND RECOMMENDATIONS

In general, we agree that scallop culture in Newfoundland is feasible, given long-term development of both traditional and non-traditional markets, and short-term strategies for technical problems. However, we would like to point out that the other Atlantic provinces and Quebec are endeavouring to develop a commercially viable industry, and are investing considerable time and money to do so. Newfoundland's current 'edge' in this industry may be short-lived unless we can solve some of the technical problems currently facing us.

This potential should not be viewed as a green light for every possible site to be developed. There are many problems that require research at the farm level prior to broad expansion into other farm sites. An illustration in the province where premature expansion has occurred in the past is the mussel culture industry. An incentive program resulted in many mussel farms without concurrent market development. Serious problems in marketing are only now being addressed.

We recommend that for the immediate future, emphasis and support be on those three farm sites which are actively involved in attempts at commercialization; Shell Fresh Farms, Thimble Bay Farms Limited, and Port au Port Economic Development Association. We do not advocate 'throwing ' money at industry, but there has to be some real support to growers at this stage of development, especially to the two private farms which cannot easily access the same funding as a Development Association.

The high risks involved given the inability to predict certain important factors (survival rates, labour requirements) makes financing from current sources next to impossible. Until some economic success can be demonstrated, it is difficult (actually nearly impossible) to access funding from ACOA, NLDC, let alone commercial lending institutions. Therefore, it is unlikely that the industry could expand until some degree of economic viability from these three areas has been demonstrated.

Given the degree of success these three farms have experienced over the past 4-5 years, we recommend further support for research and development projects. The two privately-owned farms require operational support for fair assessment of commercial potential. This support is essential to the continued operations of the farms, given the long grow out time of scallops and the financial risks involved. The private investment is essentially owner supplied, as other lenders refuse on the grounds that scallop culture has not yet been proven economically viable.

REGULATIONS

In general, we agree with the statements made regarding regulations, with the following additions.

The current assessment-based fee structure for scallop culture leases are appropriate. Developmental licenses are adequate for several years of a scallop culture operation. This is due to the long grow out time for scallops (3-5 years) relative to mussels or fin-fish.

We do not agree that development of new processing facilities be discouraged. There are few existing plants that are equipped for scallop meat processing, and new scallop products that are expected to be developed require specialized equipment. These new products need immediate access to processing and new facilities may required. We note in particular that Zone 11, which is classified as having good potential for scallops and mussels does not have an over-capacity problem, but rather suffers from inadequate services, or at least inadequate transportation routes.

The report does not address the protection of local scallop stocks in the major culture areas. Scallops are somewhat different than other shellfish in this regard since they are also harvested in a wild capture fishery. Commercial and recreational fisheries for scallops are under the jurisdiction of DFO. Both stock assessment and protection are necessary for the continued success of spat collection, which has historically been the stumbling block for scallop culture.

Port au Port (under the Gulf Region of DFO) has been successful in eliminating recreational dragging or diving for scallops in their area. However, commercial and recreational activity in the other culture areas are not sufficiently regulated. There must be protection of scallop stocks in the other culture areas. Depletion of inshore stocks by the commercial and recreational fisheries will likely affect the success of spat collection. A meat count and drag mesh size which is actively enforced by the Department of Fisheries and Oceans is required to ensure sustainable recruitment. The recent closure of areas of the south coast to scallop fishing by recreational divers does not adequately address this problem. Recreational dragging is widespread whereas Scuba diving is isolated in this area, and regulations are rarely enforced. This threatens the potential of Shell Fresh Farms to identify collection areas for itself and other possible growers by reducing the potential broodstock in the immediate area.

The report should consider the implications of stock management policies. This may have been overlooked due to the lack of communication among the many government departments which exert control over coastal inshore waters. The result of this lack of communication is that actions are taken in isolation with little regard to other policies. This stresses the need for better co-ordination among different agencies.

The potential for problems does not exist only with stock management, but extends to other issues as well. For example, treatment of environmental concerns, particularly municipal sewage, will require coordination with aquaculture planning if we are at all to build a successful industry for any species.

The report should reflect a realistic view of the water quality in near shore areas of the province's coastline. If Newfoundland is to be a future supplier of both cultured and wild fish and shellfish, then water quality must be given priority. Untreated sewage and other wastes from municipal sources is a major problem in the identification of shellfish culture sites. There is need for a concentrated effort on the part of the provincial and federal Departments of Environment and municipalities to address the growing problem of water pollution in Newfoundland and Labrador.

FINANCING

We support the idea of economic viability without ongoing government assistance. This does not preclude assistance at the outset, but rather that efforts be targeted at those species which are likely to show commercial success. However, the aquaculture industry should be afforded some assistance like that received by the wild capture fishery. This includes support for health diagnostics, marketing and promotion, environmental monitoring and protection among other services.

We generally agree with the recommendations regarding financing. The absence of working capital programs is a major stumbling block for potential farmers. Current programs which offer assistance (grants or loans) for capital costs require demonstrated availability of operating money. Without operating funds, farmers are ineligible for any capital support. The scallop culture industry in Japan allows interest-free loans for scallop farmers; this

should be considered in Newfoundland, given the current state of the economy and the development of the aquaculture industry.

MARKETING

We support generic promotion of Newfoundland's aquaculture products. We do not agree that target marketing for Newfoundland cultured products should be directed at North America. For example, although the U.S. and mainland Canada are potential markets for Newfoundland scallops, prices in North America are much less than the premium prices paid for scallops in Europe and Asia. The same situation applies for mussels. The consumption of mussels in Europe is huge compared with North America and market opportunities should be explored. There may be similar findings with other species such as cod, Arctic char, Halibut etc. Newfoundland's proximity to Europe is a definite advantage and should not be discounted.

RESEARCH, EXTENSION AND EDUCATION

We agree with the recommendations for an Aquaculture Research Advisory Council. While industry should be the driving force for the direction of research, it is the responsibility of Government as its lead role in development to initiate and coordinate the council.

A demonstration farm complex should be initiated for scallop culture, with sites in the existing three major areas of scallop culture. The location and distinct nature of the three sites, Fortune Bay, Notre Dame Bay and Port au Port Bay would allow for a wide evaluation of site specific biological and physical factors, farm technologies, and husbandry techniques. It would also provide a network for scallop culture training. The Japanese industry benefits greatly from farm research facilities similar to demonstration farms in the different scallop culture areas.

We recommend that efforts be taken to identify alternate sites for spat collection. Although the Port au Port area may provide spat supply should local farm sites fail, additional collection sites would provide alternate sources and reduce the dependency on one area.

There should be continued support for the development of hatchery production of scallop spat. Failure of natural spat settlement would demand supply from hatchery sources.

OTHER STATEMENTS AND RECOMMENDATIONS

We do not agree with the statement that bottom culture, as opposed to suspended culture, appears to be commercially viable. The reference indicated is not completely given, however the studies did not compare bottom culture with the now-preferred suspended culture technique of ear-hanging. Such a statement creates a mind-set against suspended

culture. These techniques are being currently assessed in the province and will determine strategies for potential growers.

The estimates given for survival rates in bottom culture are for the Japanese industry and are premature for Newfoundland conditions. As survival rates are crucial to economic modelling, this statement should be qualified.

We noted that some remarks made during interviews appear to have been taken out of context and stated without further research. For example, some terminology used in scallop culture was inconsistent and implied conflicting results with respect to relative success of suspended culture (ear-hanging and loop-cord) and bottom culture.

The report implies a lead role was taken by the provincial Department of Fisheries in organizing the Japanese field study mission in 1988. In fact, DOF neither planned nor participated in any way. For the record, the mission was initiated by the Marine Institute and the National Research Council (including NLDC) in response to our own inquiries about current Japanese grow-out technology. It later included participation by Memorial University, DFO (Gulf region), Port au Port Economic Development Association, and the North Shore-Bay of Islands Development Association.

The Venture Centre
An Industrial Incubator

Stentaford Avenue
P.O. Box 149
Pasadena, Newfoundland
Canada A0L 1K0

Tel: (709) 686-2078
Fax: (709) 686-2081

April 13, 1990

Strat Canning
36 Monkstown Road
St. John's, NF
A1C 3T3

RE: Aquaculture Development Strategy - Depuration

Concerning the view of depuration taken by the consultant in the strategy, it seems there is some conflict within the information that is being used to assess the viability of depuration in the mussel industry. In my opinion, the consultant is taking a very shortsighted and narrowly focused view of the role of depuration. Consider the following points:

In Newfoundland, over the past year, the Environmental Protection Services water quality testing program has indicated that nearly 50% of all sites had unacceptable water quality. This situation will worsen as time goes on with increased pressure from water users such as boaters and municipalities (sewage lines). In time, some approved sites that have mussel farms will no longer be acceptable (this has already occurred in the province) and these farmers will need a solution.

There is also very strong indications from the marketplace that certain buyers want a depurated product. The extra monitoring and depuration process produces a product that is "safer" than the regularly harvested shellfish and these buyers are willing to pay premium price for the extra assurance. This has been demonstrated by groups such as Marriott Hotels and by a clam depuration operation in Prince Edward Island. The owner has found the price so much better for a depurated product over the regular harvest that he now buys clams from approved areas and goes through the added cost of depurating to get that premium price. Depuration is being viewed as "value-added".

Finally, it seems depuration is evaluated in the context of adding the extra cost and competing in the fresh mussel marketplace. But, on the other hand the consultant is stating that the fresh mussel market is not the way for Newfoundland to proceed. If the view is taken that depurated mussels will be used in secondary processing, or some form of value-added, the process is not as unattractive economically as is indicated by this report.

Thank you for the opportunity to express my views and I hope you consider these remarks in your final summation. I would like to congratulate The DPA Group Inc. on the completion of an enormous task and I look forward to future correspondence.

Sincerely,

Shawn Robinson
AQUACULTURE CONSULTANT, WESTERN NEWFOUNDLAND

cc. Brian Meaney — Department of Fisheries
Denis Williams — Department of Fisheries and Oceans