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A grower-centred examination
into definitions of and impacts on success
in aquaculture ventures in Nova Scotia

A thesis submitted in partial fulfillment
of the requirements for the Degree
of Master of Arts in Atlantic Canada Studies.
Saint Mary's University

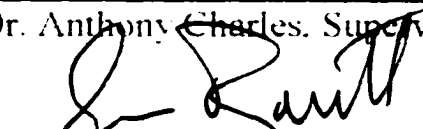
By Jennifer Hatt
September 2002

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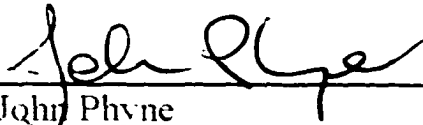
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Abstract

A grower-centred examination into definitions of and impacts on success in aquaculture ventures in Nova Scotia

By Jennifer Hatt
September 2002

This thesis explores, from the growers' perspective, perceptions of success in individual aquaculture ventures and the aquaculture industry in Nova Scotia through the use of four main sources – a review of published information on definitions of success in societal, corporate, and personal arenas; a review of published sources of aquaculture industry development globally, nationally and provincially; an examination of development in related regions; and, most importantly the observations and experiences of individual growers and industry associations. As well, this project was designed to highlight areas worthy of more in-depth research.

Examination of individual leaseholders' self-declared objectives yielded measurements of success that extend beyond the traditional financial markers to include a rich blend of personal interests, core values, and quality of life elements. Positive impacts upon these objectives included supportive individuals within the government agencies responsible for development and regulation and good community relations, essentially any person or system that respected the individual grower's motivations and needs. Likewise, negative impacts included regulations and lease acquisition systems which seem designed solely for large-scale operations, and the public hearing process which sets the aquaculturist in a defensive role. Species choice and farm size also factored into individual abilities to meet objectives, with those producing shellfish, or operating multi-site farms, tending to have a greater chance of success.

This study is an indicator of the potential diversity within the Nova Scotia aquaculture industry, and the need for equally diverse regulatory and development support if this direction is to continue. It is also an indicator of individual satisfaction within the industry, which could be an asset for future development.

Acknowledgements

As this study illustrates the numerous impacts upon leaseholder success in Nova Scotia, it illustrates the numerous impacts upon the personal success of the author. I would like to briefly acknowledge the agencies and individuals that played a role in the successful completion of this thesis.

Thank you to my sources, including:

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- **staff at the Aquaculture Association of Nova Scotia, Aquaculture Association of New Brunswick, New Brunswick Salmon Growers Association, Maine Aquaculture Association, and Prince Edward Island Aquaculture Alliance**, each of whom contributed vital perspectives to this study
- **staff at the Nova Scotia Department of Agriculture and Fisheries**, who provided access to the leaseholders database as well as valuable information on the industry evolution, regulation, and development in Nova Scotia

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Chapter 1

Introduction

Aquaculture is the practice of growing and harvesting shellfish, finfish and/or marine plants. North Atlantic aquaculture pioneers saw their industry as “the second Neolithic revolution ... (it) implies a dramatic change from dependence on unmanageable stocks of wild fish to the controlled cultivation of selected and genetically improved marine organisms” (Sandberg and Didriksen, 1986: 64). In Atlantic Canada, aquaculture was “seen by some as the last step in mankind’s 10,000-year journey from hunter-gatherer to food producer...there is the same delicate balance of living in harmony with nature while trying to guard against its capricious whims.” (Cayo, 1993: 26)

During the past 30 years, increasing attention has been devoted to aquaculture world-wide as countries face downsizing of their fisheries and the reality of a loss of their food supply. “We may already be extracting the maximum from our capture fisheries,” Department of Fisheries and Oceans researchers Dave Aiken and Michael Sinclair wrote in 1995, “and further increases in marine protein production may have to come from the world’s culture fisheries.” (15) The FAO estimated that in 1993, the world population of 5.5 billion consumed an average of 13 kg of seafood per capita per year, for a total of 72 million metric tonnes of seafood. By 2010, even if average fish consumption holds steady, the world population is expected to reach 7 billion, pushing the seafood demand to 91 million metric tonnes.

The search for social and economic well-being has served to raise aquaculture's profile in Canada, particularly in province's bordering the oceans. Atlantic Canada's catastrophic experience with its traditional fishery in 1993 mirrors that of northern Norway coastal communities in 1989, when that region was hit by the closure of its groundfishery. (Jentoft, 1995) Part of that country's solution to the ensuing unemployment and outmigration from rural communities was to heighten its aquaculture production.

A 1996 study for the Atlantic Canada Opportunities Agency acknowledged this region's deep roots in food production, adding "although food production has been important in the historical development of the region, its role could well become even more important in the future." This same report listed aquaculture as an "expanding" sector in food production.

That expansion has occurred in some regional and product sectors. New Brunswick, across the Bay of Fundy from Nova Scotia, grew its farmed salmon industry from one worth \$40,000 in 1978 to one worth more than \$100 million in 1999 (NBDFA 1999), in similar geographic, cultural and federal regulatory conditions as Nova Scotia. Prince Edward Island in the past 25 years has developed a cultivated mussel industry worth \$19 million (PEIDFA. 2000), and is also a noted exporter of oysters and a key research base for a variety of fish health products and services. Nova Scotia's industry, too, has grown, from \$7 million in 1995 to \$50 million in 2001 (NSDAF. 2001). Yet, after being among the first in the world to embark on commercial aquaculture in the 1970s, overall

growth in Nova Scotia's industry in terms of product, markets, jobs and economic impact has lagged behind its Maritime neighbors and other jurisdictions, despite similar biological and geographical assets conducive to industry development. A question emerges – is aquaculture's performance in the Nova Scotia industry truly 'lagging', or do the traditional measures of aquaculture performance do a disservice to the accomplishments within the Nova Scotia industry?

1.1 Purpose

In the early days of Canadian commercial aquaculture development, Pritchard (1976) and the Science Council of Canada (1985), identified job creation, foreign trade and rural development as among the benefits to be had from the industry; growth, as in any industry, was measured in tonnage, production values, and job creation.

However, there remains a question of whether statistics alone effectively monitor and rate industry development. The FAO, in its examination of small-scale aquaculture, discovered "the need for greater clarity about objectives, the means for their achievement and their measurement" (1997:33), a concern that was echoed at its Millennium conference where "better indicators" were listed as a means to ensure the development of a sustainable industry (FAO, 2001). Atlantic Canada researchers, too, have questioned the use of production levels and dollar figures to measure industry development. "The economics of aquaculture must give way in importance to the notion of progress ... [it] is an attitude, a mindset, that is shared by many members in the aquaculture community. It is a feeling that aquaculture can make a difference and is

reflected in the energy and enthusiasm of the industry people, scientists, educators, and administrators and in the dialogue going on between them.” (Boghen, 1995:24)

In the midst of activity by biological researchers, legislative analysts, marketing experts, government agencies and special-interest groups are the root of the industry – the growers, who in Nova Scotia are a diverse group of individuals and companies producing an estimated two dozen species of marine animals and plants in ocean, lake and land-based sites across the province. History reveals the voices of these front-line individuals are rarely invited or offered, even though from the growers comes a perspective rich in experience and detail that cannot be duplicated by third-party observation.

This thesis investigates from the grower’s perspective for a picture of Nova Scotia’s aquaculture performance to date, and the tools it may need to prosper. The exploration goes directly to the front lines of industry activity, examining industry development from the perspective of leaseholders who have in the past or who continue to work in the Nova Scotia industry. This thesis is a qualitative and quantitative analysis focused on definitions of success and impacts caused by social, ecological and economic issues. since “aquaculture should be seen not only as a technical and biological innovation, but also as a socioeconomic enterprise that requires the same kind of social analyses as any other production system.” (Bailey et al, 1996:7) Biological, technical, and marketing issues will be included, in general terms, as they pertain to data analysis, as it is

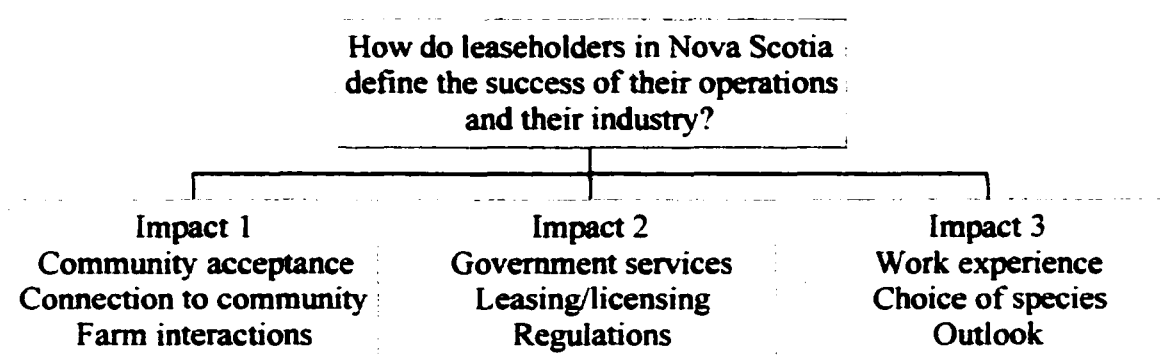
recognized that “aquaculture technology cannot be separated from the social issues of property or morality” (Millar and Aiken, 1995: 624).

1.2 Areas of analyses

As described above, this study focuses on the socio-economic issues of aquaculture development. Definitions of success, globally and provincially, in political, corporate and social arenas, are examined for context. Individual leaseholder responses and those of industry associations are compiled through surveys developed upon previous studies by the FAO and the Fisheries Research Board of Canada.

Based on these previous hypotheses for potential measures of aquaculture development success, information for this study is gathered, compiled, and analyzed for insight into the following major research question and three subquestions (summarized in Chart 1).

Chart 1: Key Research Questions



How do leaseholders in Nova Scotia define the success of their operations and their industry?

Industry success in Canada is measured by purely economic markers, such as the Gross National Product (GNP) or the Gross Domestic Product (GDP). Aquaculture statistics for each Canadian province record tonnage of product grown, and gate value of that product. In those terms, Nova Scotia's industry is becoming larger, but at a slower pace than its neighbors, and with unknown costs and benefits. In keeping with the grower-centred focus of this study, an alternate measure of success – a measure set by the individual producer – is used as the benchmark for examination of individual farm performance and that of the Nova Scotia industry. This study asks growers – those with their time, effort, money, and goals directly involved in aquaculture production past or present – if they are successful and if their industry is successful. Then, from their self-declared performances, exploration continues with the following subquestions:

What role does a community play in the success of aquaculture in Nova Scotia?

Nova Scotia is deemed biologically and geographically suitable for aquaculture, both by researchers and those who have farmed or who are farming marine animals and plants (Murphy, 1997). An aquaculture farm cannot function in isolation, particularly if it is a marine site (as opposed to land-based) where a common resource must be used in production. As a result, this thesis explores the impact a community has on an operation's success, as defined by the operator. This question will be explored in the following subsets:

- community acceptance of aquaculture in relation to traditional employment base

- leaseholder's connection to the community
- extent and nature of farm interaction with the community, including socio-economic impacts and species farmed

It is hypothesized that those leaseholders in communities with good acceptance of aquaculture, and with good residential relations and positive economic will generally be successful. It is also hypothesized that those leaseholders with long-standing community connections will be more readily accepted than those who are new to the community or who have no community connection.

What role do the federal and provincial governments play in the success of aquaculture in Nova Scotia?

Government for the purpose of this study includes both federal and provincial agencies, as well as individual civil and public servants that are directly or indirectly involved in the regulation and development of the aquaculture industry in Nova Scotia. This question is explored in terms of:

- government services available in the past and present
- the leasing and licensing system
- the public hearing process
- the overall effect of government regulations, services, employees and support on the aquaculture industry in Nova Scotia

Since there are 22 federal acts containing 25 specific regulations that relate to aquaculture in Canada, as well as eight provincial acts for Nova Scotia, eight for New Brunswick, and six for Prince Edward Island, (OCAD, 2001) smooth navigation through

the bureaucracy is critical. Therefore, it is hypothesized that those with positive government experiences will generally be successful; conversely, those reporting difficulties with aspects of government regulation or service will not be achieving their objectives.

What role do individuals' attributes play in the success of aquaculture in Nova Scotia?

For the purpose of this study, individual attributes are:

- work history and experience in the aquaculture industry

It is hypothesized that individuals with a background in food production or resource-based industries will be more successful than those with little experience in these areas.

It is also hypothesized that those with more experience in the aquaculture industry will tend to be successful in greater numbers than those with little industry experience.

- choice of species

In general, finfish require extensive equipment, feeding, monitoring and husbandry to grow to market size, compared to that required by shellfish. However, kilogram per kilogram, finfish at the time of the field research for this thesis provided a much greater financial return at the farm gate. It is hypothesized that finfish growers will have different definitions of success and a generally lower level of success achievement, compared to shellfish growers, because of the heightened demands of capital and biological support. It is also hypothesized that choice of species may impact community acceptance of aquaculture.

- outlook for the individual operation and for the Nova Scotia industry

As previously stated, researchers and government officials have for years described the potential of the Nova Scotia industry. This question explores the outlook from the perspective of those who have operated or who are operating aquaculture farms; those who have invested time and money and set their personal goals upon this potential.

Individual respondents are asked:

- What is the outlook for your farm?
- What is your outlook for the Nova Scotia industry?
- Do you want to be farming in five years?

Their outlook is compared to their self-declared objectives and whether they are meeting these objectives.

1.3 Information sources

Primary and secondary sources

Nova Scotia's aquaculture development is examined in terms of its regulatory and developmental framework, and via the opinions and experiences of those who have tried to make and/or continue to make some form of a living from aquaculture. Nova Scotia's industry is diverse. No one region or species dominates. As a result, examination and analysis will be from one primary source - a random sampling of finfish, shellfish and marine plant site leaseholders in locations across the province – complemented by surveys of industry associations and information provided by key informants. Secondary

sources are published information, including government reports, consultant reports, agency analyses, books and periodical articles.

Associations and regions of comparison

Nova Scotia has two industry associations. For comparative purposes, and to gain input from expertise not included in the random sample, both associations were contacted for their experiences and opinions. Industry associations also served to provide needed grower input in the regions of comparison, where constraints upon time and finances prevented the random sample process from being repeated in each selected province and state.

Three regions of comparison were selected for their similarities to Nova Scotia in regulatory environment, geography, cultural evolution and aquaculture industry elements. New Brunswick and Prince Edward Island were chosen because of their shared land and/or waterways with Nova Scotia, similarities in climate and economies and similar federal regulatory framework. The State of Maine was selected because of its proximity to Nova Scotia, its close social and cultural ties and similar climate. The regions of comparison and Nova Scotia grow similar aquaculture species, and produce them primarily for export.

1.4 Chapter overview

Chapter 2 contains the results of a literature review into definitions of success. Searches were conducted into modes of production, corporate development, community development, and individual activities. Definitions are arranged in general categories that sequentially focus upon resource industries, and in particular, aquaculture.

Chapter 3 provides the historical context for the thesis. Aquaculture evolution on the global, national and provincial/state scales is highlighted. This provides the historical backdrop against which growers function in Nova Scotia, and the regions of comparison – New Brunswick, Prince Edward Island, and the State of Maine.

Chapter 4 explains in detail the methodology behind the information gathering and analysis. Included in this chapter is a description of the survey development and administration process, and an explanation of the data analysis.

Chapter 5 contains the analysis of results obtained from the both the individual and association surveys. Quantitative and qualitative data is examined in context of the key research question and five subquestions identified in section 1.2. Key points arising from the literature review and historical overview will be integrated into the analysis.

Chapter 6 concludes the thesis with a summary of analysis results and recommendations for further action.

Chapter 2

Success defined

Exploration of the nature and impact of Nova Scotian aquaculturists' definitions of success begins with an examination of variations in definition of success and its synonyms, including 'priorities', 'objectives', 'goals', or 'values.'

This chapter begins with an overview of basic modes of production – capitalism at one end of the spectrum, socialism at the other, and blended regimes that fall in between, and their influences on definitions of success for producers, aquaculture included, functioning within these modes. The chapter then proceeds to definitions of success influenced by modes of business, including corporations and small-scale operations, both of which include aquaculture development. The examination concludes with definitions of success within aquaculture itself, as it is the focus of this thesis, but since aquaculture often falls within agriculture and/or fishery research and regulation, and shares issues of food production, the examination includes the resource industries of fishing and agriculture as well. The chapter's conclusion will revisit key similarities and differences, which will serve as guideposts for analysis throughout the thesis.

The examination includes definitions of success, as well as factors influencing those definitions, to ensure context. Also included are identification of emerging issues and trends in success measurement and forecasting, as definitions and perceptions of success continue to shift in response to social, political and economic forces. "The production

structure put into practice in a society indicates how that society has chosen to meet its needs,” (Francis, 1994 :3) Society is not static, nor will be its definitions of success.

2.1 A general view

Definitions

Webster’s Dictionary defines success as an “outcome or result,” but offers a second choice of “attainment of wealth, favor, or eminence.” It defines ‘to succeed’ as “to attain a desired object or end.”

In the time of Aristotle, humans considered themselves not as “self-sustaining, self-defining individuals”, but as members of a community influenced by the group rather than their own determinations (Solomon, 1999: 43). In 1690, success was measured by observations of “no more beggars in the streets,” the number of grand travel coaches and public theatres, the size of His Majesty’s Navy, the reasonable price of food, and “that men eat, drink, and laugh as they use (sic) to do,” (Petty: 1690: p4). Nearly three centuries later, “Economic growth and development are today the goal of nations all over the earth, those long-industrialized as well as those called underdeveloped,” (Southworth et al: 1970: 1) In the individual arena, “success is the goal of most people – in their careers, their relationships, and in their lives overall.” (Watson, 2001:viii) Newfoundland Premier Joey Smallwood quantified his province’s success in its early days of Confederation membership by the increase in indoor toilets for public schools. There were 84 the day he became premier, 838 twenty years later (Matthews, 1977).

Modes of production

Modes of production, and their attached values system, have traditionally been polarized along capitalist or socialist lines. Industrial development, including that of aquaculture, falls along these lines, and the value systems of these modes of production have influenced the individuals within them as well as the systems in which they work and live.

Capitalism “is distinguished by a set of social relations in which the owners of the means of production purchase the labour power necessary to utilize these means for productive and profitable purposes (Murphy, 1990:204) Every element of production and consumption in capitalism is a commodity: growth and wealth acquisition are its goal, and therefore its fundamental successes are defined by degree of growth, and by profits. Western countries, including Canada, are considered capitalist (Howlett & Ramesh. 1996: 16), founding their economies on the freemarket system and wealth accumulation. Within this system, success is defined by growth measured within an economic framework – Gross National Product, Gross Domestic Product, employment levels, and consumer spending.

Socialism is, as its name suggests, a mode of production in which social values play a dominant role in public policy and economic activity. Success is measured in job creation and preservation, cultural preservation and promotion, as well as economic generation.

Modes of operation

A business corporation “is an institutional arrangement developed to facilitate business activity,” (Paton, 1965: 1); successful facilitation of that activity includes attracting the human services required for production, and attracting or earning capital, the funds to launch and sustain activities. From capital “comes the first breath of life into matter, previously inert,” (Carnegie: 1907, 285). This reflects the American explanation of corporate position that the condition required for corporate success was the production of profit (Sethi, 1990). This contrasts to the Japanese approach that puts profit acquisition first, but follows it with employee welfare and societal responsibility (Sethi, 1990). Industrialist Kim Woo-Choong, founder of Hyundai Corporation and known as Korea’s Andrew Carnegie, echoes the need of a successful company to make profit, but not for personal gain (p239).

Dynamic capitalism, first advanced by Joseph Schumpeter, has shown that “entrepreneurship creates new owners and jobs,” by penetrating the markets of established large corporations (Kirchhoff, 1994: 3). In addition to size, small ventures tend to be distinguished from large-scale operations by attention to innovation (Kirchhoff, 1994), community ties (Apostle and Barrett, 1992; Sacouman, 1990) and priorities beyond quantity of profits.

Another mode of production is community economic development (CED). CED embraces a holistic approach, defining its success by the degree to which its initiatives nurture the spiritual and cultural needs, as well as the physical needs, of its citizens.

Community-driven activity takes into account the social and environmental costs and benefits, as well as the economic and business potential (White, 2000; United Nations Department of International Economic and Social Affairs, 1982). But for a community-driven system to work, its individual members must subscribe to the community view, and alignment of definitions of success is not always possible. Emerging conflicts between the economic and environmental (White, Preston, 1990), and between private property rights and public interest (White), are among current conflicts encountered in community development and planning, particularly in coastal regions where a common resource – the lake, river, or ocean – is a dominant feature.

As evolution has blurred traditional global borders, so too has it blurred the delineation between corporate, small-scale and CED. Each now begins to assume qualities of the other. Corporations “in pursuit of short-term, bottom-line targets,” once the yardstick of success, are discovering “that success can lead to failure,” as priorities shift to uncontrolled and unresearched growth, and away from employees, customers and leadership (Miller: 1990). Public opinion, too, is shifting away from gratitude for the large business role in economic growth to hostility for the related deterioration in quality of life (Sethi, 1990). Reactions among industrialized countries have focused on an expansion of priorities to social issues. In Canada, the United States, and Britain, a trend has been for corporations to forge partnerships with CED initiatives, providing the corporation with marketing and image-building support, while fostering the job creation.

human services and key relationships that can enhance its profit-making ability (Loizides, 1995; Moore and Richardson, 1990).

In Canada, researchers are examining an alternative measure to the GDP. Economic growth statistics alone as measurement “devalues the importance of our natural and social capital ... [it] also fails to distinguish economic activities that contribute to well-being from those, like crime and pollution, that cause harm,” (Colman, 2000: 3) The Genuine Progress Index, or GPI, uses social and environmental components, as well as economic indicators, to measure progress of sectors and activities (4).

2.2 Resource industries

Definitions of success in resource industries range from pure commodification of products from the forests, land, and sea to small-scale production which claims to have the well-being of the resource and future generations at heart, rather than pure profits. Conflict in the latter 20th century between Maritime petty forest producers and the major pulp mills that consumed their raw commodities brought to light differences in priorities between the producer and purchaser (deMarsh, 1990; Sandberg, 1992). Corporate purchasers were concerned with pricing and supply; a regional marketing effort initiated and installed by a co-operative approach by New Brunswick producers was deemed a success because it not only met the pricing and supply requirements, but also reduced the outflow of economic surplus from the rural areas of origin, improved the producers’

standard of living, fostered spin-off development, and helped improve forestry practices on locally-owned woodlots (deMarsh, 1990: 229).

The following discussion will focus on definitions of success in the resource industries of fishing, agriculture, and aquaculture, in that order. Aquaculture is often defined as an agricultural activity, because of the use of husbanded livestock in controlled environments. In Canada, however, aquaculture control has traditionally been under fisheries regulation and development, because of its involvement of aquatic life and the common water resource. A look at all three industries will offer a blend of relevant perspectives.

Fishing

The harvest of marine life has been carried on for centuries for food and for profit. In socialist countries, commercial enterprises are often state-owned and success is defined by maximization of both profit and edible protein supply. "Fish products are often 'valued' in terms of nutritional and other characteristics, and resources allotted to their production accordingly," (Cunningham, Dunn, and Whitmarsh, 1985: 20).

In Canada, commercial fishing activity is statistically defined by tonnage and gate values of landed catches. That stems from post-war state policy, "based on modernization and large-scale industrial development" (Barrett, 1992: 83) that encouraged the purchase of larger vessels and the modernization of fish plants to increase production to enhance food production and industrialize a fishery seen as

“inefficient and archaic,” (Davis, 1991: 71). Government policies and incentives encouraged the transformation of the industry from small producer, whose success was defined by self-sufficiency, to commercial production, where success was defined by volume and gate price. As early as 1976, Canadian policy reconsidered the concept of ‘Best Use,’ which stated that fisheries management should “maximize the sum of net social benefits (personal income, occupational opportunity, consumer satisfaction, and so on),” (Cunningham et al, 1985: 229); however, economic returns and maximum yield remained dominant in policy and action (230).

Following fishery downturns in the 1960s and 1970s, and particularly following the 1980s downturn leading to the 1992 moratorium which closed the Atlantic groundfishery, some research has focused on the ability of the fishing industry to support an industry “complete with well-remunerated jobs and an institutional configuration associated with a modern society,” (Felt, 1988: 45). One study determined that many fishing skippers can be called capitalists, because of their desire to purchase larger boats, increase their crew, or expand their production; however, they define their success in terms of making loan payments or maintaining a lifestyle for another season (Palmer and Sinclair, 1997:92).

Quality of life issues are included in definitions of success in some coastal communities and individuals. In Atlantic Canada, the fishing industry’s ability to foster rural settlement patterns and provide a positive quality of life for some of those involved (Apostle and Barrett, 1992), is included in the industry’s definition of success. In

addition, many fishing boat captains in these communities expressed strong personal satisfaction with work (261). One study found that a prime motivating factor for those entering or remaining in the industry was the Worker Satisfaction Bonus (WSB), including such things as pleasure – as in a challenge or freedom – personal and general economic well-being, identity (way of life), and occupation (‘my’ job) (Cunningham et al, 265). In the community of Caye Caulker, Belize, small-scale local development in the form of a fishing co-operative was viewed to be successful because it improved the economic situation and reversed a pattern of colonial exploitation (Sutherland. 1986). Quality of life, however, without economic gain, cannot be eaten or spent, as illustrated by a Newfoundland dragger skipper who views support for the small-scale fishery as a nostalgic ideal. As a dragger skipper said, “Sure we could go back to a small-boat fishery, but I for one don’t intend to have to starve again,” (Palmer and Sinclair. 1997:96). Another traditional success marker – employment levels – also may not apply to the fishing sector, “since there is a wide divergence in labour productivity and capital intensity in fishing between countries,” (Lawson, 24)

Agriculture

Success in agriculture is defined by its contribution to rural livelihoods, foreign exchange, food supply, raw materials, markets for linked industries and an investible surplus (FAO: 49)

Definitions of success vary with agriculture’s three general forms – commercial, independent commodity production, and subsistence. Commercial agriculture is

production in response to world market demand (Ilberry, 1985: 4), in which success is measured by gate price (price per unit sold) and volume produced. Independent commodity production occurs when land and capital are owned by the producer, and labour is provided primarily by the producer and family members. (Murphy, 1990: 204) Production values and profit are also measures of success, but are not sole motivators. For example, "expanded reproduction is motivated by demographic and socio-cultural pressures rather than economic pressures," (Pile, 1990: 9) Subsistence farming is production for consumption by the producer and family, involving little capital or technology (Ilberry, 1985: 4). Its success is measured by production volume for personal use.

The small, family farm was the original unit of traditional agricultural production, surviving through the ages due to a blend of fulfilling both the physical and social requirements for production and reproduction (Francis, 1994: 2) The farm's primary objective, however is subject to debate: varying theories cite profit maximization, economic security, risk minimization and food security (6).

In developed countries, farming is increasingly dominated by "vertically and horizontally integrated production, processing and distribution of generic inputs for mass marketable foodstuffs," (Friedland, 1991: 3-4) Traditional measurement of success has been the industrial model, which examines volume, gate value, production per acre, and/or production per worker. There is a shifting view away from this industrial perspective "to a concern with the conditions under which an agricultural

surplus can occur and be sustained.” (Hayami and Ruttan, 1985: 11) It is also argued that quantitative statistics alone cannot provide an understanding of the “relative importance of profit, sustainability and need satisfaction,” (Francis, 1994: 202).

Farmers have also been found to make decisions based on a number of factors, including “family security and a satisfactory income to being creative and belonging to the farming community,” (Ilberry, 1985: 31).

Impacts on definitions of success come in three general forms. In the first, challenges to agricultural production, particularly in less-developed countries, were found to center on policies, rather than technical and institutional innovations (Hayami and Ruttan, 1985: 416). In the second, the perception of traditional farming as an ideal has been criticized for policies that “redistribute income regressively and towards a small section of society, and impose economic costs both at home and abroad,” (Winters, 1993: 11) Thirdly, from a different perspective, production and income generated by farming combined with the independence of self-employment and the social and economic advantages of land ownership, “it might be considered that in developed countries farmers as a class are rather better-off than their non-farming compatriots.” (Ghatak and Ingersent, 1984: 5)

Canada’s agricultural policy is designed to provide equitable standard of living for farmers, stabilize income and domestic prices and preserve and encourage family farming (Winters, 1993: 14). The same objectives can be found in policies of the United States, Austria, Switzerland, and the EEC. In western Europe, particularly Germany, the

voting power of small farm operators held the potential to shift agricultural policy toward social objectives and small farm support (Goodman, 1991: 60), and in 1987, French President Francois Mitterand, in voicing his opposition to a purely industrialized agricultural system, stated that the vision of 'rural civilization' had to be taken into account, as well as profitability (60). This blend of industrial values - profitability and conglomerations, for example, and commitment to small-scale operations has also been seen in Italy (Mottura and Mingione, 1991), Sweden (Vail, 1991), Norway (Almaas, 1991) and Portugal (Moreira, 1991).

2.3 Aquaculture

The culture of marine life for food and/or profit falls into two broad categories: subsistence and cash crop (Cunningham et al, 1985; Boghen, 1995). Countries of large rural populations and traditional seafood diets tend to have dominant subsistence aquaculture activity (Cunningham et al, 1985; FAO 1989), although industrialized nations like Japan also have a significant commercial aquaculture industry as well. Western economies, Canada included, tend to view aquaculture as a business where "the fundamental goal is to make profits." (Ridler, 1995: 559).

Overall, global aquaculture is seen as a means to increase global food supply and enhance economic growth and foreign trade (Pritchard, 1976; Pillay, 1982; FAO, 1996; Bailey, Jentoft and Sinclair, 1996; FAO, 2000). In developing nations, aquaculture is seen as a generator of household food security and income generation, either on a full-

time or supplementary basis (FAO, 1996), and a system that can “contribute significantly to human food needs, particularly to those individuals in densely populated countries at risk of under-nutrition and malnutrition,” (FAO, 1989: 3). In Canada, aquaculture has been seen as a potential contributor to the food supply, rural development, wealth, employment, recreation and foreign exchange (Pritchard, 1976; Science Council of Canada, 1985; Boghen, 1995).

Measuring aquaculture’s success requires customized priorities suited to the country or region’s socioeconomic conditions, environmental suitability, and scale of operations (Pillay, 1993). A common objective of small-scale, co-operative, and commercial ventures is the maximization of production or of sales revenue (Cunningham et al. 1985). Economic viability, even for small-scale farms, is crucial to access financing (FAO, 1994) and maintaining survival, as aquaculture faces the same constraints as any enterprise (Ridler, 1995; Boghen, 1995). Satisficing behaviour – that is, an approved performance in profits, growth, or other activity – is an objective, typically of small-scale operations. (Cunningham et al, 1985).

Aquaculture development globally is measured in tonnage of product. In Asia, Africa, and other regions of intensive rural development, progress is measured in terms of sustainable growth and development of related industries (FAO 1989, 2000). In Norway, success of aquaculture development was measured not only by overall industry growth and productivity, but by the trend toward numerous small-scale farms rather than consolidated large operations, and by the benefits obtained by coastal communities

(Jentoft, 1993; Holm and Jentoft, 1996; Aarset and Foss, 1996). Scotland cited its industry's success in terms of employment numbers and production growth, adding location of jobs in traditionally hard-to-develop areas, vertical and horizontal integration, diversity, and value-add capabilities, as related measures (Shaw, 1989).

In Canada, early development of small-scale ventures and government-supported projects were seen as but a precursor to the presence of "successful commercial expansion," (Science Council of Canada, 1984: 5). Viability was defined as commercial success, with an added suggestion for local employment (Science Council of Canada, 1985). The definition was broadened to include economic development in rural areas, research and development, and linkage development (Comeau, 1988), but the focus remained production tonnage and gate value (Brown and Stechy, 1997; Office of the Commissioner for Aquaculture Development, 2001).

There is a question of the ability of production figures alone to indicate the industry's overall value. "Many factors can influence the worth of an industry: for example, value-added features, quality of the product, geographic region from where the species originates, etc." (Boghen, 1995: 9). Species, as well, can influence measurements of success. Finfish farming, including salmon, which is a dominant species in major world producers, requires relative strength of "state, capital, and social movements," in addition to conducive ecological conditions (Phyne, 1999: 209), and success is measured on an industrial scale (Phyne, 1999). Social conditions include innovation,

environmental impacts, production organization, property rights, user-group conflicts, community linkages, and role of the state (Bailey et al, 1996).

2.4 Summary

Definitions of success tend to be found in combinations that depend upon the modes of production, modes of business, individual preferences, and the economic, social and political climate. The commonality is income or product generation, which is required for the survival of any operation, be it subsistence, independent producer or large-scale development. Diversity occurs in the quantification of that generation, the volume desired, the means and costs of attaining it, and the method of distribution. Success may be set by a dollar value, production volume, or employment level, as is in traditional industrial models. It may be measured by customized combinations of profits, job creation, moral values and social impact. It may also be gauged by the personal and/or professional standards of self, a family member, community leader, financier, or government, as in small-scale, co-operative or socialist settings. As a result, the same activity deemed a success in one setting has the potential to be rated an absolute failure in another.

Renewable resource industries, and food production in particular, have a diverse choice of success measurements because of the importance of their products to basic human needs as well as to capitalist expansion. Aquaculture, a primarily agricultural venture sharing the common water resource and markets with fish harvesters, is subject to the

success markers of general industrial and subsistence activity, as well as those unique to food production. Applicable measurements of success include, in general groupings:

- Corporate development milestones, including product volume and product value
- Community milestones, including employment levels, linkage activity, rural benefits, and environmental sustainability
- Individual milestones, including individual satisfaction, income security, economic growth, and economic sustainability

Impacts upon these successes include access to information and technology, market conditions, regulatory policies, and legitimacy of the industry as perceived by regulators, neighbors, and fellow users of the common water resource.

Chapter 3

Historical overview of aquaculture globally, nationally and provincially

Archeological findings support theories that several ancient cultures used some type of containment system to raise fish (Tiddens, 1990). East Asia is considered the “cradle of aquaculture”, where the Chinese began raising fish 4,000 years ago and neighboring countries such as Japan, the Philippines and Viet Nam have been cultivating fish for several hundred years (FAO, 1989). There is also evidence of North American coastal tribes, prior to European contact, capturing wild stocks and growing them in submerged baskets until plump and needed for food (Tiddens, 1990). “Large-scale aquaculture is a relatively recent development, but small-scale aquatic farming existed in inland areas in some countries from ancient times, most likely from the time of evolution to pastoralism and land cultivation” (Pillay, 1987).

3.1 Global perspective

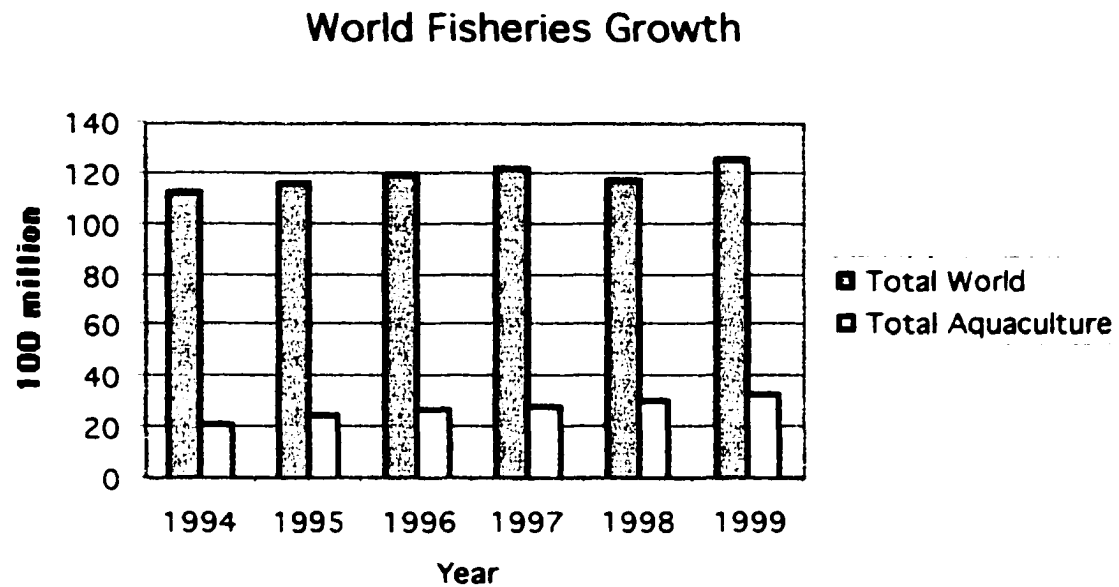
Growth in aquaculture development worldwide has been most rapid in the past 50 years, and has been called “the world’s fastest growing source for food.” (FAO, 2001).

Worldwide aquaculture production totaled 32.9 million tones in 1999, more than 80 % of which came from developing countries (FAO, 2000). At the same time, world marine fishery catches have quadrupled since 1950 but now 25 % of all stocks are considered depleted or in danger, with another 44 % being fished at their biological limit (Currie, 2000). Fish raising, rather than fish harvesting, is seen by major seafood consumers and

exporters as a way to provide quality control, year-round supply, trade potential and a self-sufficient food source.

Table 3.1

World fishery production – 1994 to 1999



Data source: FAO (2002)

The growing demand for seafood protein, and the need for a sustainable supply to feed this hunger, has fuelled the global aquaculture industry. So too have scientific breakthroughs in fish nutrition, genetics, farm management and ecology, which provide the technical means for rapid expansion. (Bailey et al, 1996)

3.2 National perspective

In Canada, the earliest recorded aquaculture operations were hatcheries built in Nova Scotia and New Brunswick in the 1800s to enhance the wild salmon population in rivers frequented by sport fishermen (DFO, 1986). Oysters and pond-cultivated species such as trout were grown on a cottage-farm basis by hobbyists and those looking to supplement their incomes and food sources.

By the 1960s, bureaucratic and scientific interests were piqued in the farming of aquatic plants and animals, in part by growing world attention, dwindling fish stocks and the potential for job creation. In 1973, Winnipeg hosted the first national aquaculture conference, which brought together scientists and regulators with applicable expertise and interest in the field. A decade later, in 1983, The Department of Fisheries and Oceans and the Science Council of Canada followed up with a conference in St. Andrews, New Brunswick to chart the industry's future. Canada's aquacultural assets were identified as an abundance of clean water, fishing and agricultural expertise and a ready, local supply of fish products to convert into farmed fish feed. Another asset cited was its similarity to Norway, which by this time had become a world leader in the cold-water industry (Lucas, 1984)

Training, capital funding, a legal framework and long term research and development were cited as crucial to realizing the industry potential in Canada. To keep aquaculture a bright spot rather than a "black hole", players were urged to establish a lead agency for aquaculture, focus on key species with the greatest potential for profitability, do

commercial pilot projects, do market surveys and establish government assistance programs for the industry. In return, the industry would provide a use for existing over-capitalization, enhancement of fish habitat, low energy requirements, replacement of imports, increase of exports and job creation. (Saxby, 1984)

In 1985, the Science Council of Canada released a statement on the role of aquaculture in the Canadian fishery. Its agenda for action urged federal and provincial governments to recognize commercial aquaculture as a high priority for development, establish lead agencies, direct these agencies to co-ordinate industry funding, establish a legislative and legal framework for industry development and establish necessary extension services, such as veterinary and pathology resources. Also in 1985, the Department of Fisheries and Oceans issued a discussion paper on aquaculture development. It admitted Canadian development "has been more limited and slower" than its counterparts in the United States and Europe, primarily because of "environmental conditions and wild fisheries resources" which at this time was actually increasing in volume and scale (2). There were at this time about 1,000 licensed commercial aquaculture operations and 4,000 hobbyists in the country, producing 6,000 tonnes of product worth about \$15 million. Statistics from this era, however, are incomplete as there was no single system of data collection in place and many aquaculture products were grouped in with other species and categories. DFO's agenda for development closely resembled that of the Science Council of Canada, calling for aquaculture development to be a government and private sector priority, with the latter possessing the lead role, and clarification of the legal and regulatory framework. (DFO, 1985).

Aquaculture poses a complex regulatory situation because of its sometimes exclusive use of water and land, its need for species introduction, and its need for regulations that cross federal and provincial jurisdictions, lawyer and aquaculture legislation expert Bruce Wildsmith said (1984). This is compounded, Wildsmith continues, by existing regulations that were often developed in response to specific geographic or species issues, often as an addition to capture fisheries regulations (1984).

Since the federal government is the lead fishery agency, and the provinces legislate use of private property - at least on land - governance of aquaculture must fall to both levels of government. In the mid-1980s, Department of Fisheries and Oceans began negotiating Memoranda of Understanding (MOUs) with the provinces to outline public sector regulatory and development control of the industry. At the same time, provinces began adopting new aquaculture legislation, or revamping their fishery acts to encompass aquaculture activity.

While working on Nova Scotia's provincial legislation to govern aquaculture (discussed below), Wildsmith was working on federal regulations to encompass the emerging industry. His draft National Aquaculture Act (1985) suggested the creation of an Aquaculture Development Council to plan industry development on a national basis, and an Aquaculture Development Fund to support the council and its endeavours. It left leasing and licensing, and the definition of property rights, to the provinces. The Act to date has not been implemented. Aquaculture federally continues to be regulated under

the Fisheries Act and 21 other related Acts (OCAD, 2001) Some argue that this is in line with Nova Scotia's history of weak support of its non-corporate natural resource producers. "Inshore fishers lack bargaining rights endorsed by the provincial government, independent loggers face public policies favoring large forest processors and aquaculturists have weak property rights." (Phyne, 1996:85)

Development in Canada proceeded throughout the 1980s. Canada produced a total of 17,739 million tonnes of product in 1990, valued at more than \$195 million. Canada's industry rose in the FAO ratings from 50th out of 87 producing countries in 1984 to 29th out of 154 countries in 1992 (Boghen, 1995). Also, "a survey conducted by the Canadian Aquaculture Producers Council in 1991 revealed that revenues generated by associated supportive-product and service industries amounted to almost as much as farm gate sales." (10). Yet the industry continued to be perceived as 'potential' rather than existing.

In December 1998, the Minister of Fisheries and Oceans created the Office of the Commissioner for Aquaculture Development (OCAD) to co-ordinate aquaculture development and promotion across the country. In its mid-term progress report issued in December 2000, OCAD indicated a legal framework of the national industry was completed and in the hands of DFO officials to develop an implementation plan. It has done marketing and promotional studies, and funded various provincial initiatives ranging from environmental policy development to information and communications systems. Its future agenda includes encouragement of departments to implement

recommendations from the legal review, produce information sheets on aquaculture, recommend ways to increase industry's access to financing and promote dialogue between the traditional and farmed fisheries. In its 2001 report, OCAD indicated key issues were the need for a clear definition of aquaculture, operational stability for aquaculturists, risk management and a clear federal development mandate.

In 2000, Canada produced 56,440 tonnes of product valued at \$611 million (DFO, 2002). It supports an estimated 7,000 direct jobs and another 7,000 indirect jobs and is a rural and youth employer with over 90% of the direct jobs located in rural and coastal communities and 49% of employees under the age of 30. (Wouters, 2000).

3.3 Provincial and state perspectives

Much of Nova Scotia's aquaculture production today is salmon, trout, blue mussels, American and European oysters, sea scallops and marine plants. There is also an emerging roster of new species, including halibut, haddock, winter flounder and American eel. The Canada-New Brunswick-Nova Scotia New Finfish Aquaculture Species Development Program, which ran from 1995-2000, provided financial and technical support for the study and development of operations to farm these species (Chang, 2001). Under this program, a halibut hatchery was established in Digby County. A second halibut farm was set up in Shelburne County, with government financial support but no funding from this specific program.

Nova Scotia produced 10,456 tonnes of product in 2000, valued at \$43 million.

Tables 3.2A and 3.2B show aquaculture production figures, by species, for the three Maritime provinces from 1986 to 2000.

Table 3.2A

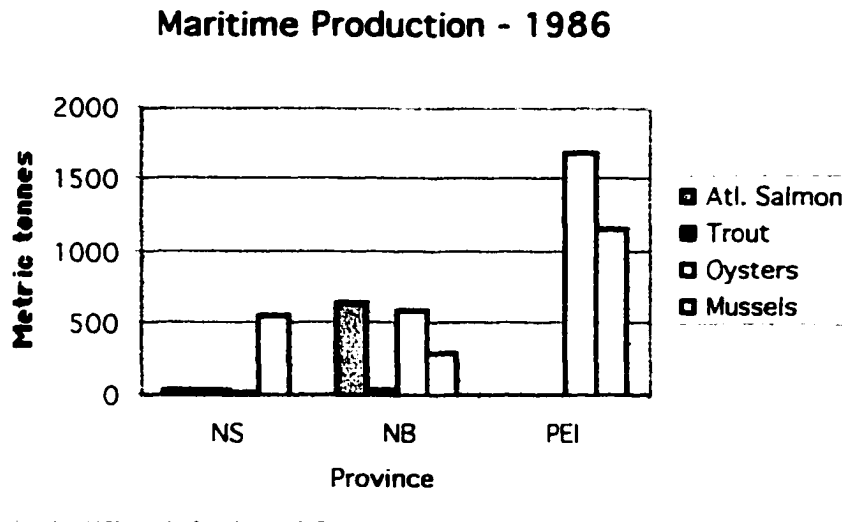
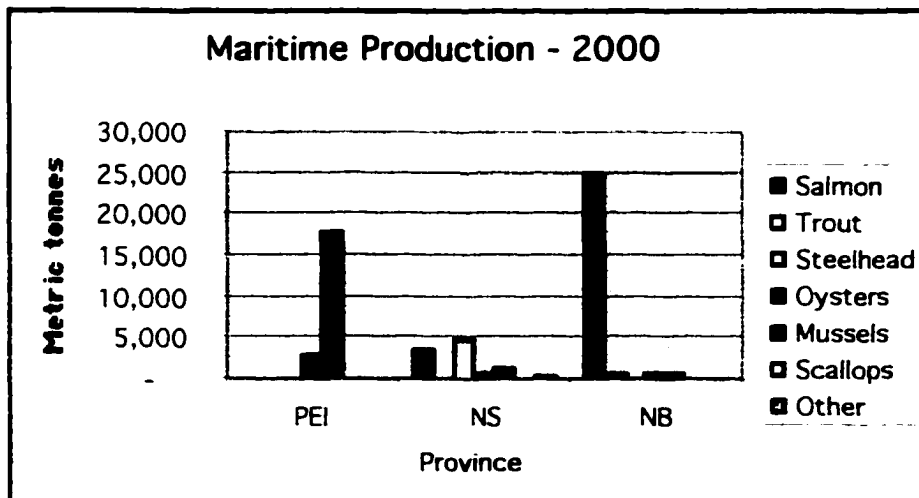


Table 3.2B



Data source for 3.2A and 3.2B: Department of Fisheries and Oceans (2002)

Following is an overview of Nova Scotia and the three regions of comparison – New Brunswick, Prince Edward Island, and the State of Maine.

Nova Scotia

Geography

The Province of Nova Scotia has an area of 55,490 square kilometers (Day, 1997). Estimates of its coastline length vary, depending on the inclusion of major inland waterways, from 7,579 kilometres (National Atlas, 2001) to 10,427 kilometres (Canadian Encyclopedia, 1985). It is Canada's second smallest province in terms of size, and seventh largest in population. Population density ranges from 20-30 people per square kilometer in the urban center to 0-5 people per square kilometer in the remote regions of the central mainland and northern Cape Breton Island.

With the exception of the 40-km wide Chignecto Isthmus connecting the province to New Brunswick (National Atlas, 2001), Nova Scotia is bordered by water – the Bay of Fundy, which it shares with New Brunswick; the North Atlantic Ocean and the Northumberland Strait, which it shares with Prince Edward Island. The Gulf Stream in the Atlantic Ocean moderates oceanside coastal temperatures, giving average January temperatures of –3 C and July temperatures of 18 C (Day, 1997). The conditions are adequate for salmonid production, although sudden dips in temperature can cause superchill and death of the animals, and sudden warming can result in algal blooms which are harmful to finfish health and shellfish quality.

In addition to ocean waters, Nova Scotia is home to more than 3,000 lakes and several small rivers. The province's largest lake, the Big Bras d'Or Lake in central Cape Breton Island, is 930 square kilometers and is used extensively for shellfish aquaculture, recreation and shellfish harvesting because of its high salinity and negligible tidal activity (Canadian Encyclopedia, 1985).

Industry evolution

In Nova Scotia, from 1876 to 1913, the government managed a farmed oyster industry. The province enacted the Oyster Fisheries Act in 1913 to enable private property owners to hold leases to aquatic sites. (Litzgus, 1994). A federal salmonid hatchery program was begun in the province in 1875 to enhance wild salmon stocks for the recreational fishery and today, after an unsuccessful attempt at privatization, the Department of Fisheries and Oceans continues to operate two salmon hatcheries in the province for the purpose of stock preservation.

In 1970, the Province of Nova Scotia built a bivalve shellfish demonstration site and began studying culture methods for blue mussels (NSDFA, 1998). Throughout the 1970s, provincial fisheries staff conducted experiments in bivalve and salmonid production, and offered information support to producers.

Since 1983, the Province of Nova Scotia has been responsible for the development of commercial aquaculture in the province, and issues leases for aquaculture sites. In 1986, a Memorandum of Understanding (MOU) was signed between the province and DFO

“directed at ... The establishment of ‘one-stop’ licensing and leasing of commercial aquaculture ventures.” (Cook & Simpson, 1995:503). The MOU makes the province responsible for promotion, training, development, licensing and leasing; the federal agency maintains its role of protecting and conserving the fishery and fish habitats, controlling export and transport of fish and supporting research and development.

In 1980 Wildsmith began work on Nova Scotia’s Aquaculture Act, a legal document that would become the first aquaculture-specific act in the country. Included in his original draft was a framework to ease potential conflicts between users of the common resource. The initial draft defined property rights of aquaculturists and provided for a consultative process with other users of the resource. It defined aquaculture development areas and protected the industry from activities that could be to its detriment in these areas. It established an Aquaculture Appeal Board to give individuals a recourse to appeal decisions made contrary to the act. Yet when the Aquaculture Act was adopted by cabinet in 1983, it was minus the appeal process and the designation of aquaculture development areas was subject to approval by five other provincial departments and three federal departments (Phyne, 1995). According to Wildsmith (1995), this allowed personal and professional vested interests by these other departments to overrule aquaculture development and failed to establish the property rights of aquaculturists. The Aquaculture Act was amended in 1990, and in 1996, it and other fisheries legislation were merged into the Nova Scotia Fisheries and Coastal Resources Act. The new Act is one of eight provincial Acts to which aquaculture operations may be subject.

A 1987 market analysis study by Ian R. MacLeod stemmed from the assumption that “the mussel industry in Nova Scotia can contribute much to the economy of the province and help maintain a quality of life that we as Canadians take for granted” (2). In addition, his research found a detrimental lack of agreement within the mussel growers, which at the time of his interviews numbered about 15 major producers across the province. The Nova Scotia Department of Fisheries did not then, and still does not, have a policy or strategy for the marketing of mussels, awaiting industry consensus before implementing a program. MacLeod also cited lack of knowledge on the part of the growers as a major stumbling block, stating many growers thought their operations would offer quick return with little investment of money or time.

From that, he said, came an atmosphere of mistrust and conflict among growers, exacerbated by a lack of co-ordination of efforts among different levels of government and industry, and a lack of communication among all concerned.

A 1993 study of mussel growers (Freeman) indicated some negative fallout from the 1986 MOU, with some respondents suggesting the agreement supported an alleged hidden agenda by officials to stop aquaculture development. Freeman, however, in his research concluded that it was a potential lack of enthusiasm by individual agencies or rivalry between them that posed obstacles to development.

Another politically charged issue involved the leasing situation in Nova Scotia. “We used to have a saying about issuing leases,” says Murray Hill, former director of

aquaculture and inland fisheries for the province. "If you could crawl off the elevator and make it to the front desk, you could get a lease." (pers. corr., 1997) Business plans, or proof of ability to develop the lease, were unheard of, he said and as a result, he feels, most of the prime aquaculture sites are sitting idle, in possession by those who went bankrupt or who did little to enable sites to reach full production. This problem was further compounded by a lack of recourse for the province to reclaim unused leases. Terms for recent leases are for 10 years; leases from generations ago were issued for life and until they became available or were voluntarily given back, they could not be reclaimed. In response, Hill in 1994 instituted a policy setting a minimum production requirement on American oyster leases; those leases that did not meet the minimum were to be reclaimed by the province. The policy remained in place for about six months, and generated an enormous backlash against Hill and the provincial Department of Fisheries. Critics alleged the policy displayed "a lack of sensitivity for the historically authenticated social reality that some rural dwellers derive their income from a mix of activities, including the culture of oysters." (Drinnan, 1995: 652). Soon after, the Department of Fisheries was restructured and Hill was made director of inland fisheries only. A new director of aquaculture was hired from out-of-province.

The legislation itself may be geared to generate conflict rather than avert it. "Opposition to aquaculture in Nova Scotia is a product of conditions where an alliance of professional and traditional fishing interests, combined with compulsory public hearings, facilitates conflict" (Phyne, 1996: 75).

Studies on Nova Scotia's mussel industry dating back to 1993 cited "infrastructural problems" as hindering industry development . (Freeman, 1993) This study also found biological, bureaucratic and regulatory concerns, as well as grower attitudes toward themselves, peers and their industry were also significant roadblocks to development. The growers are small in number but diverse in objectives, location, skill sets and education, findings which were mirrored in the random sample of individual leaseholders interviewed for this study. Further, Freeman's 1993 study profiled a range of mussel growers, from full-time farmers with deep respect for the environment and in-depth biological and industry knowledge to hobbyists looking for a pastime or a quick source of income. There were also cases of farmers who did not strive to meet standards of environmental stewardship and production quality, but Freeman termed the occurrences as rare. The diversity has resulted in a continued lack of consensus, even though both private and public studies have pointed to the need for a co-operative effort to enable the small industry to successfully compete for market share. The issues identified in Freeman's 1993 study of mussel growers will be explored in Chapter 5 in the modern day context of diverse species producers.

The adaptation of traditional fishery regulators to include aquaculture jurisdiction has also been of questionable success, some argue. "Unfortunately, regulations aimed at the conservation of wild stocks are often applied as well to their cultured counterparts, even though many are inappropriate to aquaculture and inimical to its development," former DFO aquaculture official Roy Drinnan writes (1995: 650-1). There is also increasing pressure from industry within Nova Scotia, based on examples seen in other provinces

and countries, to regulate aquaculture as an agricultural venture rather than a fishery. "We're farmers," said Marli MacNeil, former executive director of the Aquaculture Association of Nova Scotia. "The people I represent are growing a crop. Their pastures are a bit wetter than those on the traditional farms, but they have a lot more in common with land farmers than with any other industry." (pers. corr. 1997) The association is working to strengthen its partnership with the agriculture industry, and is lobbying for regulatory changes that reflect the philosophy that aquaculture is a form of agriculture. The educational sector is strengthening a similar alliance. The Nova Scotia Agricultural College in 1996 graduated the first students from its new Bachelor of Science degree with a specialty in aquaculture, and in 1998 completed a \$6 million aquaculture wing on its animal sciences building, funded in part by Agri-Food Canada. The provincial fisheries department in 1997 changed its Department of Fisheries to the Department of Fisheries and Aquaculture. In April 2000, the provincial Department of Fisheries and Aquaculture and Department of Agriculture were merged, resulting in the Department of Agriculture and Fisheries. Aquaculture remains a separate division under its control.

Leasing and licensing

The Nova Scotia Department of Agriculture and Fisheries is the lead agency in aquaculture development. It is responsible for the issuance of leases and licenses, both of which are required for marine aquaculture production. Land-based aquaculture operations require licenses, but no leases since the operations take place on private land.

Applicants must submit an application form, development and business plan, a digital planimetric plot or orthophoto with the site drawn to scale, and a \$500 processing fee. Applicants usually deal first with the regional fisheries representative, who can check departmental hydrographic charts for conflict, and who ensures the application package is complete before forwarding it to the aquaculture office in Halifax. Once the package is approved for basic criteria, it is issued a number and submitted to the full review process. This four-step process requires approval by the department, then by related federal and provincial review agencies, then by the public, either via a Regional Aquaculture Development Advisory Committee (RADAC) or public hearing, and ultimately by the Minister of Fisheries and Aquaculture. RADACs are composed of community and industry volunteers selected by the province, and are instituted in areas of active aquaculture development. The RADAC's opinions are non-binding, but are used by the Minister in his decision of whether or not to approve the application. In areas where no RADAC exists or is deemed necessary by the department, the aquaculture division places public notice of the applicant's intent to farm, seeking feedback from the community. If no concerns are raised, the application is approved. If there are concerns, the application goes to public hearing. At such a hearing, the applicant and the department present plans for operation and respond to questions or concerns raised by participants. Information gathered from the public hearing is forwarded to the Minister for consideration in the decision-making process.

Once an application is approved, a lease is issued for 10 years, and is eligible for five-year renewals after that. There are no minimum production or performance quotas

attached to a lease - it may sit fallow for the duration if that is the owner's wish. A lease may be revoked if guidelines set out in its issuance are violated - a different species is farmed, the size or population density exceeds approved amounts or environmental laws are breached. The province has also cancelled approved leases located in zones that later became designated as 'no-aquaculture' zones due to public pressure. To date, no-aquaculture zones have been declared in the Annapolis Basin and Tatamagouche Bay, in response to public opposition to aquaculture development. In addition, a lease renewal was denied in St. Margaret's Bay in 2000, despite the RADAC's recommendation to permit the renewal with conditions, when the Minister's office received letters urging him to reject the renewal. In 2001, a farm expansion application in a nearby site was approved, despite a vigorous anti-aquaculture campaign by some local citizens. The citizens are exploring court action against the province. In February 2002, the provincial Minister of Fisheries approved a large-scale mussel farm development plan in Cape Breton, the largest operation of its kind to be approved in the province. The situation polarized the community into two vocal, opposed camps. The reputation of the proponent – long-time producers from Prince Edward Island – and the proponent's involvement of local members as partners, were selling points, as were the plans for environmental monitoring, job creation and waterway sharing (Nova Scotia Department of Agriculture and Fisheries [DAF], 2002).

New Brunswick

Geography

The Province of New Brunswick is physically joined to Nova Scotia by the 40-km Chignecto isthmus, and was politically a part of Nova Scotia until 1784 when British

decree divided the territory in two (Canadian Encyclopedia, 1985). Its boundaries, in addition to the Chignecto isthmus, are the Bay of Fundy to the south, the State of Maine to the west, the Province of Quebec to the north and the Gulf of St. Lawrence to the east. It has a land area of 73,440 square kilometers (Konrad, 1997), and is Canada's third smallest province both in land mass and population. More than half of its residents reside in rural areas. Charlotte County, an area of intense aquaculture development, has a density of about eight people per square kilometer. The province averages -8 C in January and -18 C in July, although warmer winters and cooler summers are usual along the Bay of Fundy.

Industry evolution

Commercial farming of Atlantic salmon began in the Bay of Fundy in the 1970s near Deer and Grand Manan islands, which for generations had relied on the sea for its primary employers – the fishery and tourism. Commercialization of the New Brunswick salmon industry began in July 1985 under the Southern New Brunswick Aquaculture Development Committee Five-Year Development Initiative (New Brunswick Department of Fisheries and Aquaculture [NBDFA], 1993). This was a joint initiative of local industry and the federal and provincial governments.

In 1988, the provincial departments of Fisheries and Natural Resources developed the Protocol on Aquaculture Site Allocations. In 1989, the Canada-New Brunswick Memorandum of Understanding on Aquaculture Development was signed, making research and development a federal responsibility and giving the province control over

application approval, administration and program development. The province remains the lead agency for aquaculture development.

Shellfish farming is primarily on New Brunswick's northeast shore, and produces primarily blue mussels and American oysters. New shellfish species include quahogs, bar clams and softshell clams (New Brunswick Department of Fisheries and Aquaculture [NBDFA], 2002).

In contrast to Nova Scotia, "the social and legal conditions in New Brunswick aquaculture facilitate a politics of incorporation rather than one of protest." (Phyne, 1996: 75) New Brunswick's Aquaculture Act was drafted in 1988 and an amended version was passed by cabinet in 1991. It was modeled after Nova Scotia's aquaculture legislation, but contains a few key differences. There is no public hearing process. There is also a recognition of the relationship between traditional fishing and aquaculture, interdependent because of the common water resource and shared human skill sets. This recognition "serves to prevent the alliance between traditional fishers and other interest groups that has occurred at public hearings in Nova Scotia." (Phyne, 1996:78) There is also an appeal process for applicants whose submissions are rejected.

Atlantic salmon production in the Bay of Fundy represents more than 95 % of the province's total aquaculture production (New Brunswick Department of Agriculture, Fisheries, and Aquaculture [NBDAFA], 2001). Annual production is estimated at 25,000 tonnes, with a farm gate value of \$190 million and resulting in \$30 million in

wages and benefits annually. More than 2,000 direct and spin-off jobs, most in Charlotte County, are attributed to the salmon farming industry (Irving, 1992).

Leasing and licensing

In 2000, New Brunswick's Department of Fisheries and Aquaculture was merged with the Departments of Natural Resources and Agriculture to form the Department of Agriculture, Fisheries, and Aquaculture. Aquaculture remains an autonomous division within.

The New Brunswick Department of Agriculture, Fisheries and Aquaculture is the lead agency for aquaculture development in the province, and is both developer and regulator. The department's Aquaculture Branch issues all aquaculture licenses and leases. It also provides fish health services, develops policies and promotes research and development.

The New Brunswick Minister of Agriculture, Fisheries and Aquaculture also has the final say on the issuing of licenses, like in Nova Scotia, but in an autonomous environment rather than one tied to the desires of fellow ministries. Government attributes industry success to quick recognition of aquaculture's potential and accompanying support via development programs, financial incentives and efficient administration (Litzsgus, 1994).

Prince Edward Island

Geography

Prince Edward Island is physically part of a plain stretching into eastern New Brunswick and Northern Nova Scotia (Day, 1997). It is separated from New Brunswick by the Gulf of St. Lawrence and from Nova Scotia by the Northumberland Strait. It is Canada's smallest province, and the most concentrated in population, with an average of 21 people per square kilometer (Canadian Encyclopedia, 1985). Its crescent shape offers about 1,260 kilometres of coastline (National Atlas, 2001), and its temperate oceanic surroundings provide a moderate climate ranging from +1 C in January to +18 C in July.

Industry evolution

Prince Edward Island differs from the other two Maritime provinces in that it has left the federal Department of Fisheries and Oceans as the lead agency for aquaculture development. The provincial Department of Agriculture and Fisheries plays a supporting role, providing extension services and leasing assistance.

In the 1970s, PEI began exploring the ability of traditional harvest shellfish species to be cultured and exported. It focused on the native blue mussel and American oyster. In 1980, the aquaculture industry had an export value of \$1 million. In 2000, the export value was in excess of \$28 million. (McDonald, 2000) This includes some emerging finfish production, but is still predominantly mussels and oysters

Leasing and licensing

With the assistance of the federal government, the provincial Department of Agriculture and Fisheries designated aquaculture zones in PEI. Lease applications for these areas can be approved in 24 to 48 hours. Lease requests outside these areas are not entertained.

State of Maine

Geography

Maine is the most northeastern of the continental United States. It shares a 1000-km land border and the Bay of Fundy with the Province of New Brunswick, and a ferry link across the North Atlantic with Nova Scotia. It has an average annual temperature of +4 to -7 C, with temperatures falling to -7C along the Atlantic coast in winter and rising to 20 C in summer (Rolfe, 1997).

History

The state's shellfish aquaculture industry dates back to 1949, when European oysters from the Netherlands were first stocked in Maine. Experimental cultivation by government researchers began in the late 1960s, and the state's first finfish farm began operation in 1970. In 1973, the Maine Aquaculture Law was enacted to govern leasing of public waters by private interests, and in 1975, the first aquaculture lease was granted.

Salmon, trout, mussels and oysters are the Maine industry's primary products, and development work continues on the raising of halibut, clams, groundfish, urchins and scallops. In 1999, there were 49 farms producing a harvest valued at \$70 million and representing a capital investment of more than \$75 million.

Maine is the single largest producer of Atlantic salmon in the United States (Alden, 1997) and has aquaculture as its second largest seafood product, behind lobsters. Employment in Maine's aquaculture industry has almost doubled since 1990. There are now 810 jobs in hatcheries, processing facilities and fresh and salt water farms. More than 75% of these jobs are in the finfish sector concentrated in Washington county. The remaining jobs are spread over nine counties, including York, Kennebec, Piscataqua and Lincoln. Currently there are 63 shellfish leases in the state, including 26 experimental leases. Most are in the Damariscotta River area where warmer waters allow for rapid growth. (Maine Department of Marine Resources [MDMR], 2001). There are 44 finfish sites, mostly for the culture of Atlantic salmon. The majority of leases are located in Cobscook Bay, but some are located as far west as the Sheepscot River in Wiscasset. Because of the discharges that result from finfish cage culture, the Finfish Aquaculture Monitoring Program (FAMP) was initiated, in which underwater surveys to determine water and benthic quality are conducted annually, twice annually if evidence of a potential problem is found.

Leasing and licensing

The lead agency for aquaculture is the Maine Department of Marine Resources (MDMR). The Commissioner of Marine Resources, equivalent to a provincial departmental minister, has final say on lease approval. A lease is required for all aquaculture operations.

The application process varies with species and location, with more complex issues requiring up to a year from application submission to decision. Standard leases are granted for up to 10 years and 150 acres of subtidal waters, and are renewable for all species.

As a newcomer to water use, aquaculture is expected to fit the existing culture and water use patterns. As a result, aquaculture is a designated use of Maine's marine waters by Water Classification Law, but under the state's Aquaculture Lease Law will only be allowed if the marine environment and existing and traditional uses of the water are protected. Once a lease application is considered by DMR to be complete, a 30-day public comment period begins and the Aquaculture Environment Co-ordinator commences a site review to verify location, sustainability and potential conflicts with other users. All standard lease applications go to public hearing. During this process the co-ordinator's information is submitted as departmental testimony, and information is received from the applicant, related departments, interveners and citizens. The Commissioner must release a decision within 120 days of the public hearing.

DMR also issues experimental leases for up to three years and two acres of subtidal waters. They are designed as an enabler for small-scale commercial operations to enter the industry, and are also used to foster research. Commercial experimental leases are non-renewable, but those used for scientific research can be renewed. The information-gathering process is less detailed, and applications only go to public hearing if five or more people request it, and the Commissioner has 60 days from the hearing to release the decision.

3.4 Summary

Aquaculture remains an important subsistence activity in Asia and Africa, and worldwide continues to gain attention and market share as a commodity seafood supplier. In Canada, commercial aquaculture development has been pursued and monitored by federal and provincial governments since the late 1960s. Evolution has occurred primarily in coastal regions, much of it in the Maritime provinces. Aquaculture of both finfish and shellfish species in Nova Scotia dates back more than a century, and in the 1960s the province was among the first in the world to experiment with commercial production. In 1988, Nova Scotia became the first province in Canada to enact legislation specific to the aquaculture industry. Yet with these milestones, industry development in Nova Scotia today has not attained the level of economic generation or recognition as gained by some neighboring regions.

Putting Nova Scotia's aquaculture development in context requires an examination of aquaculture industry evolution in these neighboring regions. The State of Maine shares

similar geography, biological attributes, and regulatory structures to that of Nova Scotia; it also has the species diversity and similar conflict issues as those experienced in Nova Scotia. The provinces of New Brunswick and Prince Edward Island share similar geography, biological attributes, and federal regulator to those of Nova Scotia, yet have followed distinctly different paths of evolution. New Brunswick, choosing early in its evolution to focus on Atlantic salmon production in a concentrated area, has grown to become among North America's largest salmon producers. Prince Edward Island, also early in its development, chose to focus on mussels and oysters, and has since grown to be a major North American shellfish exporter. Yet, we can learn from their differences as well as their similarities to Nova Scotia. New Brunswick has a regulatory structure mirroring that of Nova Scotia, in which aquaculture is governed in a Memorandum of Understanding (MOU) between the federal Department of Fisheries and Oceans and the provincial counterpart, the latter being the lead agency for development. New Brunswick's Aquaculture Act is based on Nova Scotia's act, yet does not include the requirement for new leaseholder applications to submit to a public hearing, a process that has gained criticism in Nova Scotia for its perceived bias against the proponent. Prince Edward Island has retained as its lead development agency the federal Department of Fisheries and Oceans; the provincial counterpart acts in a supporting rather than a partnership role. Early on, Prince Edward Island instituted a zoning system which designated specific areas for aquaculture development, something unique among the Maritime provinces. Also, both New Brunswick and Prince Edward Island chose to focus on a small number of species; Nova Scotia continues to pursue a diverse industry in which 10 or more species are commercially produced. The impacts of Nova Scotia's

regulatory environment, public hearing process, common water resource issues, and species selection will be further examined and analyzed in Chapter 5, in the context of responses gained from individual leaseholders in Nova Scotia and industry associations in comparison regions.

Chapter 4

Methodology and Data Sources

The previous chapter gives an overview of perceptions and influences on success in general production, business, resource and aquaculture industries. Now, attention turns to individual leaseholders in Nova Scotia and industry associations in Nova Scotia and neighboring regions of New Brunswick, Prince Edward Island, and the State of Maine.

This chapter explains the customization and delivery of the data collection system for both individual respondents and industry associations, as well as the foci for analyses of the qualitative and quantitative data obtained. Findings attained from the following system are merged and analyzed in Chapter 5.

4.1 Information sources

Individual respondents

As introduced in Chapter 1, a primary source of information for this study are leaseholders past and present in Nova Scotia. It is believed that as current or former operators within the system, they can attest to the success or challenge of various elements, and offer informed opinions as to what they as individuals and the industry as a whole requires to be sustainable and to reach its maximum potential.

This study is guided by the belief that leaseholders are a valuable source of information because of their direct experience with the regulatory and support systems necessary for a successful venture. However, leaseholders are a challenging survey group. A leaseholder's motivation, background and goals must be accurately gauged, as each can influence activity and perspective. They are also a challenging group due to geographic spread, busy schedules, varying willingness to share information, mistrust of systems perceived as bureaucratic or academic and discomfort with the quantification of their tasks. In addition, leaseholders are of a variety of educational and occupational backgrounds, reside in locations across the province and produce a variety of species – salmon, trout, mussels, oysters, scallops, urchins, halibut, marine plants and other species. However, the reasons that make the group challenging also make it and its members vital information sources. Each perspective is valuable and deserves to be recorded and recognized.

To ensure the inclusion of leaseholder concerns, this thesis presents findings obtained through a custom research system designed to provide a balance of objective and credible subjective information, confidentiality for individual respondents, and credibility of data. This system was devised to gather and record both objective and subjective data of qualitative and quantitative nature to assist in the understanding and interpretation of Nova Scotia's industry development to date and its future prospects.

In an ideal setting, each leaseholder past and present who is willing to participate would be personally interviewed, in depth. However, time, logistics and financing were all

limiting factors in this research. A way had to be devised to accurately elicit and record responses, in a time frame that was academically sound and by means that are affordable for a researcher completing a project not funded by any external source. A random sample of leaseholders past and present, of all species and of all regions in the province, was chosen as the best method to get a representation of all facets of the industry

Sample selection process

The starting point was the Nova Scotia Department of Fisheries and Aquaculture (2000) leaseholders database. This is the only official record of aquaculture leaseholders in provincial waters and land-based facilities. Every applicant is listed, with lease status delineated as issued, expired, cancelled, withdrawn or refused. 'Issued' means the lease application was successful and accepted by all parties. 'Expired' means the lease was issued, but not renewed upon its expiry date. 'Withdrawn' means the applicant halted the application process prior to completion. 'Cancelled' means the lease was issued, but a change in quality or usage of waters in which the lease was located changed, resulting in a halt to the lease by the province. 'Refused' means the application was unsuccessful.

This database posed a number of challenges. It is not routinely updated; as a result, leaseholders' contact information and status were often not as they appeared in the listing or some leases listed as issued had since expired or changed ownership. The database also contained a listing for every person who applied for a lease in the province and an individual listing for each lease; some applicants had all applications refused or withdrawn. As a result, these applicants had no experience operating a lease, and would

have little information to offer this study. The database, and the province, also does not categorize activity of a lease beyond 'issued'. An issued lease could be active or inactive; it could be held by someone raising stock for commercial production, harvesting a few animals for a hobby or allowing the site to lie dormant. The database also does not distinguish between growers of marine plants and animals, harvesters such as sea urchin divers, and oyster fishermen who use sites to depurate their animals – rid the meat of impurities by submersion in government-approved clean-water sites - and U-fish operators who must acquire leases to stock their ponds with live fish but do not raise livestock. Some U-fish operations were identified as such, but others were listed as land-based operations.

Applicants with only refused and/or cancelled leases were removed from the list, as were identified U-fish operations, since they could not provide answers based on industry experience. From the remaining list of 264 entries, a random sample of 79 was taken by use of a random number table; the first 79 corresponding lease numbers were selected.

Associations

Another primary source of information are industry associations in Nova Scotia and the regions of comparison – New Brunswick, Prince Edward Island, and the State of Maine.

There are two industry associations in Nova Scotia – the Aquaculture Association of Nova Scotia (AANS) and the Nova Scotia Oyster Growers Association. Both

associations were asked for their input via a survey, and a completed survey was obtained from the AANS; data obtained provided a comparison with responses obtained from individual growers, and to gain perspective of Nova Scotia growers who may have not been included in the random sample.

Industry associations were approached to provide a leaseholder perspective in the three regions of comparison - New Brunswick, Prince Edward Island and State of Maine – in lieu of obtaining information from individual growers in these regions. Completed surveys were obtained from the Aquaculture Association of New Brunswick (AANB), the New Brunswick Salmon Growers Association (NBSGA), the Prince Edward Island Aquaculture Alliance (PEIAA), and the Maine Aquaculture Association (MAA).

Findings of the surveys completed by industry associations in Nova Scotia and regions of comparison will be presented and analyzed in Chapter 5.

Key informants

The third primary source are key informants: government officials past and present with direct experience in the aquaculture system, and non-leaseholder industry experts. A total of four government officials – three currently with the Nova Scotia Department of Agriculture and Fisheries' aquaculture division and one formerly with the division and now with the Department in a different role – and two industry consultants were interviewed. Most information obtained was used as background.

4.2 The survey

Two surveys were developed – one for individual respondents, another for associations. The approach taken in the present surveys is based on that used in two major aquaculture studies of the past, and on findings of the literature review into definitions of success, detailed in Chapter 2.

In 1976, the Fisheries Research Board of Canada posed the question: does aquaculture have a place in this country? The ensuing discourse examined the potential industry in terms of values the Board felt would impact the industry's growth: food production, rural development, resource use, wealth, employment and recreation (Pritchard, 1976). It also points out, "the single most important requirement for aquaculture is innovative policy development." (p2).

The Food and Agriculture Organization of the United Nations in 1984 published a worldwide survey of aquaculture growth. In its analysis of factors affecting aquaculture development, it selected environment, space, technology, production and marketing as factors of comparison. It further split the environment factor into sub-factors of physical (temperature, water quality and quantity and similar characteristics), institutional (governmental policy, programs, financing, training, education, extension services) and social (traditions, customs, beliefs, religion). Space was defined in terms of both land and water, taking into account users of one, the other or both which may clash in their objectives and activities.

Drawing from previous work of the FAO and the Fisheries Research Board of Canada, and upon the definitions and influences of success outlined in Chapter 2, surveys were developed to obtain information in the following categories:

- *Physical environment*, examining the geographic ability of the region to grow sea-farmed species
- *Institutional environment*, examining the availability and nature of government regulations, development policies
- *Extension services*, education, training and financing
- *Social environment*, examining culture, customs and traditions that affect the social acceptability and community support of aquaculture, as well as infrastructure such as transportation and communication links
- *Space and availability*, including available water and land for fish farming, water and land needed for farming, other users, potential conflicts
- *Ecological impact*, examining impacts of fish farming past and present, coping methods, overall environmental effects, future outlook
- *Economic impact*, examining the value of marketed product to date, role of industry in provincial/national economies, speed of industry growth in terms of production and value, value of spinoff industries
- *Social impact*, examining employment created both direct and indirect, nature and location of jobs, quality of life, community development and future outlook.

Surveys for both individual respondents and associations were designed to record both objective and subjective information in a format standardized to reduce bias in types or

forms of questions. The surveys contain a blend of multiple choice, yes/no, listing and open-ended questions to generate quantitative data and be flexible enough to record the equally valuable qualitative responses.

Survey questions for individual respondents were organized under the above listed headings, and in the order given above. Questions were ordered to enable conversation to flow; for that reason, questions of a more sensitive nature, such as production and income levels, personal reflections and future plans were left to the end, allowing time for an interviewer-respondent relationship to build and facilitate free-flow of information.

The survey administered to individual growers formed the basis of the questionnaire administered to associations. Questions specific to individual farms were removed or adapted to enable an association representative to give clear information from a group perspective. Qualitative questions seeking individual opinions were removed. The result was a survey seeking similar information, but with fewer questions and in a format suited to group rather than individual responses.

Copies of the surveys for individual growers and for associations both surveys are contained in Appendices A and B respectively.

Survey Administration

Individual respondents

The 79 random names obtained from the provincial database resulted in 26 entries for which the contact information was out-of-date or incomplete, preventing contact with these subjects. Of the remaining 53, a total of 16 completed surveys were obtained.

Surveys were administered either in person or by telephone. Some respondents had e-mail and most had fax machines, but preferred a live discussion to complete the questions. One respondent, however, chose to complete the survey in writing and return it by fax. Several others received advance copies of the survey via fax or e-mail, and used them to prepare for follow-up phone interviews.

Each completed survey was labeled with a sample number to avoid the inclusion of identifying information. The sample number was generated by the researcher and recorded on a master list with the contact name and information of each respondent. This list was required to enable follow-up contact as research and writing proceeded.

Questions were asked in sequence. Questions that did not apply, due to lease status, species grown or experience of the respondent, were reviewed with the respondent and then marked N/A for Not Applicable. As introduced in the previous section, questions were ordered to place potentially sensitive queries near the end of the survey, enabling a rapport to be established between interviewer and respondent, or, in the event of a

written response, to enable the respondent to become comfortable with the survey and the topics before being required to divulge or recall personal information.

Survey interviews were conducted between December 2000 and February 2002.

Logistics proved to be a challenge. Participants were in every county of Nova Scotia, in mostly rural locations. Travel and telephone calls are time-consuming and costly.

Added to this was the unavailability of subjects. There was only one outright refusal; in other cases, time constraints were a possible factor, as was perhaps an unwillingness to participate. An estimated three to four hours of unsuccessful contact time was spent for every hour of survey obtained. Often, an hour of telephoning would yield nothing but wrong numbers, no answers, or answering machines. In other cases, phone calls yielded invitations to send the survey or call back; subsequent attempts to make contact were then met with no answer or unavailability of the subject (not home, too busy, back in a minute, etc.) Telephone surveys took between 20 minutes and two hours each, depending on time available and the talkative nature of the participant. Personal interviews took between 45-90 minutes on average, usually terminated because of participants' time constraints. Those working full-time in the industry seem to be busy year-round with harvesting, seeding, disease management, marketing and government lobbying. Those working part-time in the industry are carrying full-time jobs in a variety of sectors while carrying out activities necessary to the survival of their aquaculture businesses. For all of the reasons cited above, the timeline for primary information gathering was a long one.

On a positive note, the majority of those reached were willing to complete the survey. As previously stated, there was only one outright refusal – the potential respondent was a short-term leaseholder for sea urchin harvesting. There were numerous cases of unreturned telephone messages and broken interview appointments, but it cannot be stated whether the cause was disinterest, busy schedules or other reasons unrelated to the study. The majority of respondents were agreeable to the terms, satisfied with the questioning and forthcoming with information on topics in which they felt knowledgeable. Several expressed an interest in the research topic and a desire to know the outcome.

Associations

Associations – two in Nova Scotia, four in New Brunswick, three in Prince Edward Island and one in Maine – were each initially contacted by phone, and followed up by fax or e-mail according to each contact's preference. Each was given an initial timeline of two weeks to submit their responses; after that deadline, follow-up phone calls were made to those not responding. A one-week extension was given to those expressing interest in participating. A third call was made to any not meeting this deadline. The survey collection was then terminated.

4.3 Data Analysis

As introduced earlier in this chapter and in Chapter 1, data obtained in the surveys was both qualitative and quantitative. The qualitative information was used in its entirety as

background information, and is shared in this thesis where its inclusion is of importance to the analyses and when confidentiality of respondents can be preserved. The quantitative data is compiled and analyzed in its entirety; again, data is shared where crucial to the analyses and in a method that ensures preservation of respondents' anonymity.

Confidentiality protection is not applicable to associations; data obtained from their surveys is used in its entirety, and presented in this thesis where applicable to the analyses.

Analysis is contained in Chapter 5, and contains both qualitative and quantitative data from individual and association surveys, as well as information obtained from published sources in Chapters 2 and 3, organized and examined under the key research question and three subquestions introduced in section 1.2.

The small quantitative sample is used as an indicator, rather than conclusive proof, of trends or issues. The qualitative data is also used as an indicator, as well as an illustrator to put the growers' responses in context and enable the readers to experience the industry from the growers' perspective.

4.4 Summary

Individual grower responses in Nova Scotia and representative association responses in Nova Scotia, New Brunswick, Prince Edward Island, and the State of Maine, were obtained by use of a custom questionnaire. The survey was built upon previous work of national and international aquaculture research organizations, and adapted with the results of a literature review focused on definitions of success to answer, from a grower-centred perspective, the key research question: “What is the definition of success of growers in Nova Scotia?” and the four subquestions identified in section 1.2.

Administration of the survey in person or by phone, fax, or e-mail, to a random sample of individual leaseholders past and present, and to applicable industry associations, yielded a small but detailed sample with both quantitative and qualitative data. This data is examined and analyzed in Chapter 5.

Chapter 5

Comparative Analysis

In this chapter, findings from individual respondents' surveys and the association surveys are merged and examined under the key research question and three subquestions.

To recap from section 1.2, the key research question is:

How do leaseholders in Nova Scotia perceive success of their operations and their industry?

The three subquestions are:

- What role does the community play in the success of aquaculture in Nova Scotia?
- What role do the federal and provincial governments play in the success of aquaculture in Nova Scotia?
- What role do individual attributes, namely work history and industry experience, choice of species, and outlook for the future of individual operations and the industry, play in the success of aquaculture in Nova Scotia?

This merging of findings from individual respondents in Nova Scotia and the associations representing them in Nova Scotia and their peers in New Brunswick, Prince Edward Island and Maine puts the experience of the Nova Scotia grower in context to neighboring regions, and serves to highlight issues of importance to individual growers and to the industry to which they belong. This final analysis of findings also provides a

multi-perspective view of front-line activity, and of what direction individuals, the industry, and those able to influence its operation, must take to foster success.

5.1 Summary of respondents

A total of 16 completed surveys were obtained from past and present leaseholders in Nova Scotia, representing 28 active marine leases, five inactive marine leases and five active land-based sites. These 38 sites are in communities throughout Cape Breton Island, northern Nova Scotia, Eastern Shore, Annapolis Valley and South Shore. Species represented include oysters, Atlantic salmon, trout, halibut, quahogs, sea scallops and eels. Two respondents were owners of land-based sites. Respondents had been involved in their operations anywhere from two to more than 30 years. Respondents were not asked their age; in addition, listing numbers by gender could endanger the confidentiality of respondents, as few of the group, and few in the industry in Nova Scotia, are female.

Association surveys were completed by the Aquaculture Association of Nova Scotia, Aquaculture Association of New Brunswick, New Brunswick Salmon Growers Association, Prince Edward Island Aquaculture Alliance, and Maine Aquaculture Association.

The Aquaculture Association of Nova Scotia (AANS) was founded in September 1977 to represent aquaculture producers across the province. As of March 1, 2002, there were

60 members involved in both finfish and shellfish – species including rainbow, brown and speckled trout; Atlantic salmon; Arctic char; halibut; haddock; tilapia; mussels; scallops; quahaugs; American and European oysters; and clams. The association represents a self-declared 75 % of its target population, which are aquaculture producers in Nova Scotia.

The New Brunswick Salmon Growers Association (NBSGA) was founded in 1987, and represents Atlantic salmon producers in southwestern New Brunswick. It declined to provide a specific number of members, but stated it represents 80 % of its target population.

The Aquaculture Association of New Brunswick (AANB) was founded in July 2001 to represent growers in southwestern New Brunswick. Species include Atlantic salmon, halibut and cod. As of February, 2002 the association had 14 members and nine associate members, representing 50 % of its target population.

The Prince Edward Island Aquaculture Alliance (PEIAA) was formed in February 1998, and represents producers across the province of mussels, oysters, clams, arctic char and trout. The association declined to provide exact membership numbers or percent of target population represented.

The Maine Aquaculture Association (MAA) was founded in 1976, and represents growers of all species across the state. As of February 2002 it had more than 100

members and represented a self-declared 99 % of its target population. Species represented include trout, salmon, halibut, baitfish, Arctic char, worms, oysters, clams, mussels, scallops and urchins.

5.2 How do leaseholders in Nova Scotia perceive success of their operations and their industry?

Pillay's (1993) observation that measurements of aquaculture success require customized priorities suited to the region involved is supported by the findings of this study. Objectives of leaseholders for their farms vary from hobby to full-time sole proprietorship to corporate profit. It is recognized that income-generation of some form is required for a aquaculture operation's survival (Ridler, 1995; Science Council of Canada, 1985), but in line with the grower-centred approach of this study, analysis is based not on a traditional marker of success, such as increased profits, growth in employee numbers, or rise in production, but on whether respondents are meeting their self-declared objectives.

Of the 16 respondents, two listed their objective as hobby, six as income supplement, seven as full-time sole proprietorship and one as corporate profit (Table 5.1). Nine respondents indicated they are meeting their self-declared objectives; seven said they are not.

Table 5.1 : Objectives of individual respondents

Objective	Meeting objective: Yes (/16)	Meeting objective: No (/16)	Total
Full-time salary	3	4	7
Corporate Profit	1	0	1
Income supp.	3	3	6
Hobby	2	0	2

Of those seeking full-time salary, three were meeting their objective and four were not. Of those seeking income supplement, half were meeting their objectives and half were not. The corporate profit respondent, and both hobbyists, indicated they were meeting their objectives. It is important to note that the term 'hobbyist' is based on the grower's self-perception of motivation, rather than operation size. A hobby operation, in fact, could be larger than a site operated by a respondent seeking income supplement, yet the hobby farm is run by one who has as his prime objective the enjoyment or accomplishment of the activity, rather than income generation.

Qualitative data can provide some insight into these results.

Two of the three respondents not meeting their objective of income supplement – a finfish producer and a shellfish producer both seeking income supplement – hope to meet their objectives in the next two to three years. The finfish producer had been in operation less than a year at the time of the interview; the shellfish operator had been in operation for less than two years. Both operators feel time will assist them in nurturing their operations to desired income generation.

The third operator seeking income supplement, but not meeting his objective, said he is earning enough money from his site to classify it as income supplement. However, because of the large volume of work required for that supplemental income, he said his shellfish operation is more akin to a hobby; despite the low hourly wage his operation generates for him, he does not want to give it up. "I love the work," he said, "and I've invested so much time in it, I hate to quit."

Of the four respondents not meeting their objectives of full-time salary, all are finfish producers. One was a former producer whose lease renewal was denied, one was a finfish producer who sold his operation to a corporation that subsequently went bankrupt. Both were not working in aquaculture at the time of the survey. A third respondent, also a finfish producer, was earning a full-time income, but felt the lack of security offered by his job and volume of effort required to maintain that income was not in keeping with his objective. The fourth respondent is an established producer in another province who withdrew his application for a lease site in Nova Scotia in the face of what he felt was threatening and potentially violent opposition by some members of the community in which his farm was to be located. He continues to work in aquaculture in another province.

One respondent meeting his objective is a long-time finfish producer seeking full-time salary ; examining his operation and accomplishments, his success is multi-faceted. He fulfills the traditional corporate definition of success, measured in growth and profits – in 30 years his business has grown from a single company operating one farm to three

companies operating four sites. These companies gross about \$1 million annually and employ up to 41 full-time and 56 part-time workers in rural communities. Yet when asked to define his success, his first statement is “Put three children through college at once. The fish paid for it.” He also uses the terms “excited and passionate,” to describe his involvement in the industry; aquaculture, he says, has enabled him to be his own employer, to be self-sufficient and to create sustainable employment – from an economic and an environmental perspective – for skilled workers in rural areas that traditionally have few options for employment. He also avails himself of the opportunity to promote the industry. “We need more success stories like this,” he says of his operation.

Another respondent, a long-time producer, in shellfish, has a more modest view of success. His two leases provide what he describes as a ‘comfortable’ income but more importantly, he adds, it provides the opportunity to work on the water in the scenic region of his youth. He has employed up to five full-time harvesters in the spring and summer, many of them family members, but his objective of full-time income is firmly entrenched in his own operation. He is not planning to expand, has no desire to create employment, and has no wish to become an industry advocate. He wants only to toil quietly with his secured markets, to gain full-time salary now, and perhaps pass the business to his children when he retires.

A finfish producer describes his aquaculture venture as successful, even though he no longer holds a lease. He sold his operation several years ago, and in his five years of

operation, encountered two major fish kills. However, he says he “set out what I intended to do,” which was to prove that aquaculture was possible in the province and in his region, and that aquaculture and the commercial fishery could co-exist. The fish kills, he says, were setbacks but were not insurmountable; he still looks upon his venture as a success, and maintains a positive outlook for aquaculture in Nova Scotia.

Response of the Aquaculture Association of Nova Scotia (AANS) and the Maine Aquaculture Association (MAA) for members’ objectives resemble the results obtained from individual leaseholders (Table 5.2). When asked to describe objectives of association members, the AANS listed as first sole proprietorship, followed by corporate profit and income supplement. According to the MAA, most members are in the industry as sole proprietors seeking full-time salaries, followed by corporate profit and income supplement. NBSGA and AANB members have as a main objective corporate profit, followed by sole proprietorship for full-time salary. Hobby farmers are not represented by any of the responding associations.

Table 5.2 Objectives of Association members

	Corporate profit	Sole Proprietorship	Income supplement	Hobby
AANS	2	1	3	-
NBSGA	1	2	-	-
AANB	1	2	-	-
PEIAA	-	-	-	-
MAA	2	1	3	-

The above objectives could represent a difference in development strategies among regions. New Brunswick, from its early days of recent aquaculture development,

focused on Atlantic salmon production, in which large companies formed the foundation of industry activity and growth. Nova Scotia and Maine have a more varied approach; there has been a continued blend of corporate and small-scale development, with no particular focus given by regulators or developers.

In summary, the sample of Nova Scotia individual growers yielded a diversity of objectives; the very large and very small operations – corporate and hobby – indicated success in meeting their objectives. Four of seven full-time sole proprietors and three of six income supplement operators indicated successful fulfillment of objectives.

Association surveys showed most association members in New Brunswick are either corporate or full-time sole proprietors; Nova Scotia and Maine associations indicate memberships primarily of sole proprietors, followed by corporate and income supplement.

5.3 What role does the community play in the success of aquaculture in Nova Scotia?

Community acceptance

It is recognized that an aquaculture operation cannot function in isolation, but rather must work within a social and cultural settlement framework and be subject to the impacts of beliefs and actions within that framework (Phyne, 1999; Bailey et al, 1996).

It is expected, then, that individual leaseholders supported by their communities' good

acceptance of aquaculture will tend to be successful; those in communities with fair or poor acceptance of aquaculture will tend not to be successful.

Table 5.3A shows a tendency of leaseholders meeting their objectives to be in communities with good acceptance of aquaculture. Seven of nine respondents meeting their objectives are in communities with good acceptance of aquaculture. One of these respondents clarified that residents have good acceptance of the industry. Seasonal dwellers, he says, have a poor acceptance of aquaculture.

However, four of the seven respondents not meeting their objectives are also in communities with good acceptance of aquaculture.

Table 5.3A : Community acceptance vs. meeting objectives

Community acceptance	Meeting objective: Yes (/9)	Meeting objective: No (/7)	Total (/16)
Good	7 (*)	4	11
Fair	1	2	3
Poor	2(*)	1	3

*The sample size is 16, but one respondent who was meeting his objective gave two answers: he rated acceptance by permanent community residents as good, and acceptance by seasonal community residents as poor.

Table 5.3B examines the relationship of community acceptance to individual respondents' objectives. All respondents except one meeting their objectives were in communities with good or fair acceptance of aquaculture; one hobbyist indicated community opposition had no impact on the success of his operation.

Table 5.3B Community acceptance vs objectives

Respondent	Objective	Meeting (Yes/No)	Aquaculture acceptance
1	Full-time salary	No	Good
2	Full-time salary	No	Good
3	Full-time salary	No	Fair
4	Full-time salary	No	Fair
5	Full-time salary	Yes	Poor-seasonal Good-residents
6	Full-time salary	Yes	Good
7	Full-time salary	Yes	Good
8	Income supplement	No	Good
9	Income supplement	No	Poor
10	Income Supplement	No	Good
11	Income supplement	Yes	Fair
12	Income supplement	Yes	Good
13	Income supplement	Yes	Good
14	Hobby	Yes	Good
15	Hobby ("experiment")	Yes	Poor
16	Corporate profit	Yes	Good

The findings indicate a potential relationship between leaseholder success and acceptance of the community in which the lease is located; however, there is also an indication that community acceptance alone cannot determine a leaseholder's success.

Community traditions

Areas with a tradition closely tied to the sea would be expected to be more knowledgeable of aquaculture, and more appreciative of its contribution to food production and livelihood. The quantitative results show that the majority of communities with a tradition close to the sea had a good acceptance of aquaculture, but some with the same traditional ties did not support aquaculture in their areas.

A total of 12 respondents listed the fishery as a former or current major employer of the communities in which they farm. Acceptance of aquaculture is described as good in eight of those communities. In one case, however, acceptance was listed as good only for the residents; the respondent indicated acceptance by seasonal cottage dwellers was poor.

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Of those meeting their objectives, eight are in communities with the fishery as a traditional employer. However, four of those not meeting their objectives are also in fishery communities. (Table 5.4)

Table 5.4 Community traditional employer

	Fishery	Resource	Other	Total
Meeting Objective	8	1	0	9
Not Meeting Objective	4	1	2	7

All associations listed the fishery as the primary traditional employer in areas of active aquaculture development. Both the AANB and the PEIAA listed community acceptance as good. The AANS described it as fair; the MAA listed it as fair to poor. The MAA states as its primary obstacle the opposition of aquaculture development posed by seasonal property owners and “wealthy” landowners, situations described by some individual respondents in Nova Scotia. New Brunswick and Prince Edward Island did not list problems with other water users as a major concern, even though the centre of New Brunswick salmon production – Charlotte County – is home to traditional resort areas and wealthy seasonal dwellers as well, and Prince Edward Island is world-famous

for its cottage country. The maturity of the industry in these two regions, evolved on a scale of legitimacy could explain this lack of conflict. An additional explanation is the regulatory environment, which in Prince Edward Island provides zones for aquaculture development.

What is seen here is a tendency of fishing and/or resource base regions to be conducive to leaseholders' self-declared objectives. Common resource user conflicts can also make the traditional base of a community a detriment to leaseholder success, possibly seen in cases where leaseholders are not meeting their objectives in fishing or resource communities. Rural communities are also changing in employment base and demographic, meaning those who worked close to the land or sea may have since moved away or passed away, their voices replaced by new seasonal or permanent residents with an urban, rather than rural, connection.

This is illustrated by the experience of one respondent, who, when his 10-year lease came up for renewal, was faced with neighbors who had changed in the past decade to those closely tied to the community and its traditional fishing history, to those who had recently moved to the coastal community for refuge from urban life. The fact that he and his fish farm had been there years before his new neighbors carried little weight against opposition from well-educated, well-financed detractors well-versed in lobbying and public relations.

Connection to community

Nine of the 16 respondents indicated they were born and/or grew up in the communities in which they farm, which influenced their decision to seek lease sites in those communities; one of these respondents now has a multi-site operation, with most of his sites now in communities in which he does not live. Five respondents said they moved to their communities specifically to start their farm operations. One respondent did not live in the community where he applied for a lease. The corporate respondent did not answer this question, as he was representing a company rather than an individual grower.

There is also evidence from association responses that members in Nova Scotia and Maine select sites based on personal choice as well as biological indicators (Table 5.5); the Aquaculture Association of Nova Scotia (AANS) estimates that 70 % of its members live in the communities where their farms are located; the Maine Aquaculture Association estimated that 99% of its members live where they farm. According to association responses, leaseholders in New Brunswick and Prince Edward Island (also a region with focused, production-centred development) make decisions solely on biological factors. However, there is a residential connection as well. The Aquaculture Association of New Brunswick estimates that 95 % of its members live in the communities in which their farms are located. The New Brunswick Salmon Growers Association stated that all its members live in Southern New Brunswick, the area of salmon farming production in the province.

Table 5.5 Influences on site selection

	Site characteristics	Lease availability	Want to stay in community
AANS	Yes	Yes	Yes
NBSGA	Yes	Yes	-
AANB	Yes	Yes	-
PEIAA	Yes	Yes	-
MAA	Yes	Yes	Yes

It is expected that leaseholders with long-standing community connections will be more readily accepted than those who are new to the community or who have no community connection. However, qualitative and quantitative data supports the potential that community acceptance of aquaculture does not seem to depend on the amount of time a leaseholder lives in the community, or even if the leaseholder lives in the community. “This is a flawed assumption,” maintains the producer with sites in communities in which he has never lived. “We have created over 40 permanent, interesting, rewarding jobs in my companies ... in these communities,” he stated. He stated that the economic benefits and the “openness, integrity and communication,” his companies exhibit toward the communities in which they operate have forged positive relationships, without his permanent residency.

Conversely, the finfish producer who faced opposition to his lease renewal had family ties to the area dating back more than a century, and had himself grown up in the community and farmed there for nearly 20 years. However, that connection was not binding upon new residents in the area, many of whom were the most vocal opponents to the continuation of his farm, which predated their arrival to the community.

Commercial fishermen concerned about competition for the water resource and potential negative impact on their livelihoods, were also unswayed by the leaseholder's long-standing community ties.

As well, the quantitative data in this specific sample shows no direct impact by length of time lived in a community on the ability to the leaseholders to meet their objectives. Six of those meeting their objectives had been in their communities for more than a decade, but five of those not meeting their objectives have lived in their communities more than 10 years, as well (Table 5.6). Also, one-third of those meeting their objectives do not live in the communities where they farm, or have lived there less than one year.

Table 5.6 Length of time in community

	Not in Comm.	<1 year	1-5 yrs	6-9 yrs	10+ yrs	Total
Meeting Objective	1	2	0	0	6	9
Not Meeting Objective	1	0	1	0	5	7

Extent and nature of community interaction

Socio-economic impacts

It is expected that a community's positive acceptance of aquaculture is influenced by the amount of money injected into the local economy and number of local jobs created by the aquaculture operation. Aquaculture success in many European and Asian regions

(Jentoft, 1993; Holm and Jentoft, 1993) is in fact measured in terms of community benefits as well as traditional production values.

Respondents meeting their objectives spend an average of half of their gross income on salaries. Most employees come from the rural communities in which the farms are located, and others come from neighboring communities. These respondents buy an estimated 60-100 % of their goods and services in Nova Scotia. Those disclosing financial information reported spending \$33,000 to \$500,000 annually in the province in salaries and/or purchase of goods and services.

However, leaseholders not meeting their objectives spend or spent an average of one-third of their gross income on salaries, with 50-100 % of employees coming from the communities in which the farms are located. Anywhere from 25-100 % of purchases were made in Nova Scotia.

Table 5.7 compiles the socio-economic impact of aquaculture in Nova Scotia and comparison regions, based on information from representative industry associations.

Table 5.7 Socioeconomic impacts of associations

Association name	Employees from Farm community	Employees from Nearby areas	Employees from away
Aquaculture Association of Nova Scotia (AANS)	50%	40%	10%
Aquaculture Association of New Brunswick (AANB)	60%	30%	10%
Maine Aquaculture Association (MAA)	70%	25%	5%

These findings indicate that local economies can be positively impacted through purchasing and job creation, as seen in New Brunswick (Irving, 1992), but it also appears that in some regions, the economic benefit may not be sufficient to earn legitimacy or acceptance for the industry. Associations in Nova Scotia and Maine, with 90% and 95% of its members respectively employed in the farm community or neighboring areas, both described conflicts with other water users or neighboring landowners. Individual Nova Scotia leaseholders who reported employment and spending information also hired and spent locally, but encountered community opposition, lack of financial support, and lack of government advocacy. Their economic generation, whether at levels to meet their objectives or not, does not seem to always garner them support to facilitate that generation.

Species farmed

It is expected that community acceptance of aquaculture will vary with species of fish farmed. There is an indication that shellfish farming is generally better accepted than finfish farming, although shellfish farming is not completely embraced in some areas. As seen in Table 5.8, of communities described by individual leaseholders in the survey, seven of nine indicated good acceptance of shellfish aquaculture, compared to four of seven for finfish aquaculture. Shellfish acceptance also gained only good or fair ratings: in addition to the 'good' acceptance of finfish farming, there was one community with only fair acceptance and two with poor acceptance.

Table 5.8 Community acceptance of aquaculture

	Good	Fair	Poor	Total
Shellfish	7	2	0	9
Finfish	4	1	2	7
Total	11	3	2	16

Both the New Brunswick Salmon Growers Association and Aquaculture Association of New Brunswick, representing finfish producers, described community acceptance as good. The Prince Edward Island Aquaculture Alliance, which has mostly shellfish producers as members, described community acceptance as good. Industry associations in Nova Scotia and Maine, both representing a mixture of species, described acceptance as fair. These perspectives suggest that species alone may not determine a community's acceptance. They could also suggest that species do not mix well with each other, or in isolation with communities. New Brunswick communities may be accepting of finfish aquaculture, for example, because finfish operations are clustered in an area that has come to be recognized by residents and visitors as a salmon-growing area. Also, Prince Edward Island's zoning system has created similar clustering for its shellfish operations. Nova Scotia and Maine industries have a combination of finfish and shellfish interspersed among communities that are not recognized as species-specific or even aquaculture specific. This grouping, instead of or in addition to the species being grown, may contribute to the user conflicts described in these regions.

Environmental stewardship

A shellfish producer with 25 years in the industry and a lifetime connection to his community says his lease is in prime cottage country; he says acceptance of his

operation and aquaculture in general is good because he is a good neighbor – “buying local, hiring local ... don’t pollute and keep your head down.” The majority of respondents indicated some environmental elements to their operation, ranging from formal codes of practice, primarily for larger finfish producers, to self-declared environmental objectives. One shellfish producer with three sites says he switched to a four-stroke outboard motor to lessen noise and avoid pollutants in the water; several spoke of cleaning up beaches, whether the litter was from their site or not.

This may work best, however, in tandem with other mindsets. The producer whose lease renewal was opposed and subsequently denied by the Nova Scotia Department of Fisheries and Aquaculture had been pursuing registration to an international environmental standard, prior to his lease expiry. Some leaseholders added that some producers, particularly in the early years of aquaculture development in the province, lacked the knowledge and/or the commitment to properly care for their sites and as a result, tangled buoys, abandoned cages, and assorted farm litter would wash ashore. “That’s what some people still think of when they think of aquaculture,” a long-time grower said, “even though what they’re talking about happened 20 years ago.”

Most respondents also explained that environmental stewardship was essential to their business, as finfish and shellfish need clean water to thrive. Some noted that environmental impact was often felt by their farms from other water users, including those accusing the farms of negative environmental impact. These impacts come from community-based actions, such as lack of treatment plants for raw sewage or silt runoff from major construction sites. They can also be from individuals, such as the neighbor

who disposed of his barn manure in the same waterway as a producer growing shellfish, or the cottager whose leaking outboard engine floats oil near a shellfish growout site.

It appears that interactions between leaseholders and neighbors mirror that of any resident or business with those who share an interest in the occupied land and/or water. These can foster and nurture good community acceptance, but cannot eradicate opposition. Likewise, leaseholders who farm in the common water resource must contend with a potentially damaging double-standard, particularly in areas of poor aquaculture acceptance but also in areas that claim to be aquaculture friendly but may be unaware of the negative impact of its actions. This double standard refers to the expectation of an aquaculture operation to exceed environmental standards, while individual or community activities that impact the lease may fall short of those same standards.

In New Brunswick, modern feed technologies, such as computerized feed distributors and underwater surveillance systems, are used to minimize environmental impact, according to the New Brunswick Salmon Growers Association. Members also follow protocols to minimize therapeutant use and manage waste. Members are also involved in a third-party Environmental Monitoring Program, which is in its seventh year of providing operations with annual environmental ratings. The Aquaculture Association of New Brunswick stated that education of site workers and frequent site inspections by a fish health veterinarian are key aspects of environmental stewardship. Members of the Prince Edward Island Aquaculture Alliance adhere to Environmental Codes of Practice

(ECOP), industry-developed as a proactive means to promote environmental sustainability. Maine Aquaculture Association members also has a third-party industry environmental code, motivated by “doing the right thing and getting our story out effectively.”

Other activities

Five respondents indicated open dialogue with citizens as an effective relations tool. “Openness, integrity and communications,” one respondent stated succinctly. Involving citizens and communicating directly with them were found to be effective. Other tools included respect of neighbors, creating jobs, buying and hiring locally and being open-minded about concerns.

Respondents also highly rated the quality of services essential to business operations – roads, telephone service, cellular phone coverage, and internet access, all received good ratings from half or more respondents. Alternate transport routes – rail, water, and air – received a fair rating from five respondents, a poor rating from four, and a good rating from two. Five respondents said they had no opinion, as their communities did not have these transport options. The Aquaculture Association of Nova Scotia (AANS) gave good ratings to all services with the exception of cell phone coverage, which it rated good to fair. The Prince Edward Island Aquaculture Alliance (PEIAA) gave a good rating to all but internet service and alternate transport routes, which it rated as fair. The New Brunswick Salmon Growers Association and Aquaculture Association of New Brunswick described telephone service as good, but gave differing assessments for the

remaining services. The State of Maine rated alternate transport routes as poor, and all other services as fair.

5.4 What role do the federal and provincial governments play in the success of aquaculture in Nova Scotia?

There are 22 federal acts containing 25 specific regulations that relate to aquaculture in Canada (OCAD, 2001). In addition, there are provincial acts also regulating the industry in each specific region: a total of eight for Nova Scotia, eight for New Brunswick, and six for Prince Edward Island. (OCAD, 2001). As a result, it is expected that government decisions and actions impact aquaculture success, as the industry is dependent on state support as well as social and ecological conditions (Phyne, 1999). What emerged in a general view of government impact on aquaculture in Nova Scotia and in neighboring regions were shared needs and issues among those achieving success, and those not meeting their goals; in other words, some leaseholders and regions were achieving success despite their negative encounters with government agencies and activities, and others were not achieving success despite government experiences they described as positive.

Challenges identified qualitatively by those meeting their objectives and those not meeting their objectives were ineffective regulations and weak government advocacy, and access to financing. Both groups also listed lease tenure security, support for research and development, more effective regulations, security of tenure and more co-

operation among government agencies as issues requiring resolution in Nova Scotia for aquaculture to reach its potential. These issues were identified by both the Department of Fisheries and Oceans and the Science Council of Canada in 1985, in their plans for future aquaculture development on a national scale. The need for a lead aquaculture agency and a regulatory framework conducive to development was reiterated by the Office of the Commissioner for Aquaculture Development in 2000 and 2001.

Leasing and Licensing

All aquaculturists in Nova Scotia are required to have from the provincial Department of Agriculture and Fisheries a lease and licence for marine-based sites or a licence for land-based operations. It is expected that those with positive leasing and licensing experiences tend to be meeting their objectives.

However, of those not meeting their objectives (Table 5.10), five of the seven indicated a good or fair experience at startup. Also, one indicates a good experience now, even though he is not meeting his objectives.

Table 5.9 Leasing/Licensing experience – Meeting objectives

	Good	Fair	Poor	No opinion	Total
Startup experience	4	2	1	2	9
Present day experience	5	2	1	1	9

Table 5.9 compares the meeting of objectives to experience with the leasing and licensing process. Of those meeting their objectives, six of the nine had a good or fair experience at startup and seven of the nine have a good or fair experience now. Of those not meeting their objectives (Table 5.10), two of the seven had a poor experience at startup, and two of seven describe their experience now as poor.

Table 5.10 Leasing/Licensing experience – Not Meeting objectives

	Good	Fair	Poor	No opinion	Total
Startup experience	2	3	2	0	7
Present day experience	1	0	2	4	7

Respondents reported a wide range of leasing and licensing experiences and timelines. Lease approval times ranged from a few weeks to 10 years. One respondent indicated it took six weeks to get the required federal approval, but six years to get his lease from the province. In an opposing light, another respondent said his first lease was issued in 1988 in less than a year, yet his second lease in a nearby location took more than two years to be issued in 1999 because of a “roadblock” by the Canadian Coast Guard. A long-time shellfish producer had his first lease issued within 2-3 weeks in 1996 and his second lease approved within days in 2001; a third application has been under review for two years. His previous leases were for shellfish bottom culture: the third lease is for suspended culture which, because it breaks the water column, requires approval by Canadian Coast Guard. The respondent who had a 10-year wait for his lease approval

cited as the cause Department of Fisheries and Oceans; in 1985 the federal agency was the approval body for leases. “Local officers had to approve the leases, but didn’t want them because (the leases) meant more work for them,” this producer, also a long-time shellfish grower said. “We had to go over their heads to get our approval, and that created a lot of anger and animosity.” This farmer now has three active leases, all near where he lives and works, and finds his present day experience with the system remains poor. He, too, has been waiting up to two years for approvals of new leases.

The New Brunswick Salmon Growers Association reported difficulty with its province’s leasing and licensing system, which it described as “new and cumbersome.” Those involved with the administration, as well as those in the industry, feel the system needs streamlining. A key problem, the association stated, is “federal government is developing policy as it goes.”

Public hearing

As a public hearing is a component of every new lease application, it is expected that those meeting their objectives have had a positive public hearing experience; those who are not meeting their objectives have had a negative public hearing experience.

Table 5.11 Objectives + public hearing experience

	Hearing Good	Hearing Poor	No opinion
Meeting Objective	3	0	1
Not Meeting Objective	0	3	0

Of the seven respondents who had a formal public hearing, three said the experience was good, three said the experience was poor, and one had no opinion (Table 5.11). An interesting finding here is the clear delineation of objectives in relation to the public hearing experience. All three of the respondents meeting their objectives reported a good public hearing experience, and all three of those not meeting their objectives reported a poor public hearing experience. There are two possible interpretations. From one perspective, respondents could be rating their experience based on the outcome. However, it could also be interpreted that the public hearing process either has an impact, or is at least clearly felt by the leaseholders to have an impact, upon their operations' success.

Those who have experienced (some respondents said 'endured') a public hearing also give mixed reviews. One respondent, a land-based operator who was not required to have a public hearing because his facility is on private land, chose to have a hearing as a means of involving the community in his operation. The exercise was an opportunity for residents to answer questions, and his 'going the extra distance' helped lay the foundation for a positive community relationship.

Several respondents, some who had positive experiences and some who did not, agreed that the public hearing process is good in principle. "People should be able to voice their concerns, and get some answers, and meet the people involved," one respondent said. "In a community where citizens and fishermen were open-minded, the (public hearing) process gave them information they wanted and needed, and they were objective enough

to accept it with cautious optimism,” another offered. But, this same respondent added that open-mindedness alone could not combat the lack of knowledge of the aquaculture industry held by those empowered to influence the provincial minister’s decision-making process. Regional agencies that are supposed to be regulating and supporting aquaculture, he said, have a “poor understanding” of the industry, “and a lot of researchers have a moral opposition to aquaculture.” Another respondent added that the public hearing process was made negative by “having to deal with misguided individuals, especially those who have other agendas.” As previous research showed (Phyne, 1996), the system became a catalyst for conflict. “It fuels animosity between groups,” a respondent said of the hearing process, in which he says lease applicants are put on “the hot seat,” and forced immediately to the defensive position, rather than being able to discuss the issue as an equal participant.

Three individuals specifically mentioned the RADAC – the Regional Aquaculture Development Advisory Committee - formed from community members selected by the Minister of Agriculture and Fisheries. One respondent did not go through public hearing, but felt the RADAC was a good way to involve all players in the decision. Two respondents found their dealings with RADACs to be negative. One respondent served as a RADAC member, and found his interests to be grossly outnumbered. “It had 21 of the 22 members firmly committed to stop aquaculture here, and they were there to do that, not to listen.” There was no screening process, he added, to make the committee more balanced in its representation. The other respondent had a lease renewal examined

by a RADAC. The process, this respondent said, “excluded those with knowledge of the industry.”

When asked if the public hearing process directly affected his success, one grower said the opposition to his proposal expressed at the public hearing made no difference.

“People at the hearing didn’t want it, but I got my lease anyway.” Another grower said his public hearing was adversarial, but at its conclusion the Regional Aquaculture Development Advisory Committee (RADAC) chose to support his application, if a series of conditions were met. It was the province, he continued, that refused the application. A third respondent is unsure of the impact of his public hearing. He had raised finfish and shellfish for 15 years when, in 1996, he made an application for an additional lease. The extra acreage, he explained, was for fallowing – the practice of resting a growout site for one or more growing cycles, a similar principle for fallowing of soil in land crop production. Fallowing requires an additional site to house the fish stocks. However, when his application went to public hearing, the result was an “environmental hijack” where critics, he said, were convinced the additional lease was for more fish. “They didn’t understand fallowing, and they didn’t want to listen,” he said. An environmental assessment supported his application. The case went to the province for a decision, which to the leaseholder’s knowledge was never made. A fourth respondent withdrew his lease application as a result of the public hearing process. He found it confrontational and a bit “frightening,” with outward threats of violence and vandalism issued against his operation if he went ahead with its

development. These threats prompted him to withdraw his application, even though approval seemed to be forthcoming from the province.

There is an indication, however, that the public hearing system itself cannot be held accountable for leaseholders not meeting their objectives. More than half of those not meeting their objectives – four of seven - had no public hearing (Table 5.12).

Table 5.12 Objectives + public hearing completion

	Had a Hearing	Had no hearing	Total
Meeting Objective	4	5	9
Not Meeting Objective	3	4	7
Totals	7	9	16

There are two possible explanations for this range in findings. Firstly, respondents who indicated 'No' for a public hearing experience would have submitted applications to which there was no concern or opposition voiced. Also, some respondents who indicated 'Yes', and a positive experience, fell into this same category, indicating a positive experience because there was no actual hearing. At the same time, those who indicated a poor experience with the public hearing also tend to be not meeting their objectives. Their rating may be based not on the actual system, but on the outcome.

Those who have successfully completed their lease applications, and who are farming to their objectives, would be expected to have had a positive public hearing, since any criticism or opposition voiced at that time did no impact their applications. Also

expected are negative experiences from those not meeting their objectives, particularly if the public hearing process played a role in the delay or refusal of planned operations.

Other elements

The leasing and licencing process, including the public hearing, as required elements pose the strongest of government regulatory influence on individual leaseholder operations. Qualitatively, leaseholders and associations listed numerous other areas in which government regulations or activities impacted operations.

Two-thirds of respondents offered comment on regulations or policies negatively affecting their farms at startup, encountering issues of inappropriate or conflicting regulation designed for the capture fishery rather than fish farming (Drinnan, 1994), or becoming caught in inter-agency rivalry or anti-aquaculture sentiment said to exist in government agencies (Freeman, 1993). Four respondents cited problems with federal regulations or officials – one told of difficulty in working with local DFO representatives, another one described trouble in working within DFO's system of approved and unclassified waterways, and two described frustration in working with Canadian Coast Guard. "I felt they had no interest in aquaculture development – one (Coast Guard) employee went out of their way to field their opposition," one respondent said. Another respondent identified the general DFO mindset as problematic. "They are the lead agency for aquaculture (in Canada), yet they are sworn to protect the world from aquaculture," he maintained. Four respondents described difficulties with provincial regulations. In general, "provincial policies and operations or lack thereof

were problematic,” one stated. Another cited the lengthy lease approval wait. A third listed the site allocation process as a challenge. A fourth experienced problems with the export regulations. “A fully-qualified fish packing factory was required, but it was unattainable for a small organization,” the respondent stated.

An interesting positive point raised here by several respondents was that individuals within government systems were dedicated, caring and effective in promoting or maintaining the industry, but the systems in which they functioned were not. In early national studies of aquaculture discussed in Chapter 1, innovative policy development was cited as a criterion for industry growth; it would appear aquaculturists in Nova Scotia have experienced the effects of policy development that is perhaps bureaucracy-centred rather than grower-centred. The latter would have been then, and still would be, innovative in this province and country, where decisions in aquaculture and most other fields continue to be based on political and theoretical motivations rather than grassroots input.

Growers also cite a need for government support in areas of industry promotion and product marketing; four listed industry promotion as the top requirement for government support and a fifth listed promotion as second to marketing. A sixth maintained that government’s role should be in research and in regulation, not in marketing. “Like any small business, if an operation has to rely on government to market its product, it shouldn’t be in business.” This comment was from a long-time shellfish producer who has secured his own markets, and closely guards the information.

Regulatory and financial support to individual farms was also listed as a required priority of government. “Small investments to small growers rather than to large companies,” a respondent suggested. Overall support from government was also listed as a requirement: “We need the political will to stand up to critics,” one respondent said. “There are no regulations to protect us, but everything we do is put under a microscope.” The Aquaculture Association of Nova Scotia, as well, described a need for public support motivated by strong government advocacy for the industry. “Government support is becoming stronger,” said AANS executive director Marli MacNeil, “but needs to be consistent and present in action, not just in declaration.”

When asked for needs to attain future success, all associations responded with issues of direct or indirect government action (Table 5.13).

Table 5.13 Industry needs – association perspective

	Needs for a vibrant, sustainable industry
AANS	<ul style="list-style-type: none"> - Availability of suitable lease sites - Government and public support - Access to financing
NBSGA	<ul style="list-style-type: none"> - Availability of suitable lease sites - Fair market - Regulations that enable sustainable industry growth
PEIAA	<ul style="list-style-type: none"> - Enhanced teamwork with regulators, financiers and public
MAA	<ul style="list-style-type: none"> - Regulatory stability - Protection from unfair competition - Government support

It is clear that federal and provincial government activity have a direct influence on a leaseholder’s startup, maintenance, and growth, in several facets. As discussed in

Chapter 2, federal and provincial government agencies have joint responsibility for the creation and enforcement of regulations and development policies for the industry in Canada. Grower's experiences also show that the impact of these regulations is minimized or worsened by individual agencies, or even specific employees, charged with their administration. If a leaseholder 'lucks in' to an aquaculture-friendly civil or public servant, efforts to support the aquaculture operation are enhanced; if the opposite occurs, the leaseholder encounters delays and other problems.

5.5 What is the role of individual attributes in the success of aquaculture in Nova Scotia?

Work history and experience

It is expected that individuals with a background in food production or resource-based industries will be more successful than those with little experience in these areas. It is also expected that those with more experience in the aquaculture industry will tend to be successful in greater numbers than those with little industry experience. These hypotheses generally hold true, with some exceptions.

As Table 5.14 indicates, the largest groups of respondents meeting their objectives had 1-5 years' experience and more than 20 years' experience in aquaculture. No one meeting their objective had less than a year of industry experience; two of those not meeting their objectives had five years' experience or less. Of the respondents not

meeting their objectives, none had more than 20 years' industry experience, but four of these seven respondents had 10-19 years' experience in aquaculture.

Table 5.14 Industry experience

	<1 yr	1-5 yrs	6-9 yrs	10-19 yrs	20 yrs+	Total
Meeting Objective	0	2	1	2	4	9
Not Meeting Objective	1	1	1	4	0	7
Totals	1	3	2	6	4	16

Qualitative findings may lend some insight into the above findings.

Both respondents with five or less years' experience not meeting their objectives were new to the industry – one was seeking income supplement from experimental non-finish production, and the other was seeking full-time salary from shellfish production. Both felt their operations would be successful with time. The respondent with less than five years' experience who was meeting his objective was a hobbyist who had operated his finfish site for several years as a self-declared experiment to prove that finfish farming was biologically feasible in Nova Scotia. His accomplishment of his goal, he said, factored into his decision to sell his site and “move on” with other projects of interest, while allowing another potential aquaculturist to get started in a proven lease.

Both respondents with 6-9 years' experience were shellfish producers seeking income supplement. One said he was meeting his objective; the other said he was meeting his

objective financially, but not timewise. He felt the time required for his operation exceeded the return.

Both respondents with 10-19 years' experience who were meeting their objectives were shellfish farmers seeking full-time salary. Each of the four respondents with 10-19 years' industry experience were all seeking full-time salary in finfish production, and offered unique explanations for their inability to meet their goals. One farmer is the finfish producer described earlier who was seeking full-time salary, but had his lease renewal application denied by the Nova Scotia Minister of Fisheries and Aquaculture. The second respondent was the full-time sole proprietor described earlier who sold his sites to a corporation: "It was either that or be bankrupted by them," he said. The corporation subsequently went bankrupt, leaving him with no job and no leases. The third respondent was introduced earlier in the discussion on public hearings; he withdrew his lease application after encountering what he found to be threatening and potentially violent opposition at the public hearing. The fourth producer is financially successful, saying he earns enough from his operation to be a full-time sole proprietor, but he finds the lack of security offered by his position to be lacking to the point where he still feels his objective is unmet. The findings in this section showed a clear delineation between success of full-time sole proprietors producing shellfish and those producing finfish, and while reasons for respondents not meeting success were varied, there is an indication that species choice could play a role. The number of respondents not meeting their objectives who had 10-19 years' industry experience – four of seven – indicates that this timeframe may be a key turning point for aquaculture operations. This

may be the age of the business where its operator must choose whether to expand or change objectives in response to a maturing industry or changing markets; it may also be a time when an operator's objectives are influenced by life changes, such as a shift in jobs, retirement, growing children or health. Also, two of the four respondents in this category reported influences from public opposition upon their ability to meet their objectives; the 10-19 year timeframe coincides with the province's installation of the Regional Aquaculture Development Advisory Committee (RADAC) system.

Of the four respondents with 20-plus years' industry experience meeting their objectives, one is a multi-site finfish company operated by a corporate owner, one is a multi-site finfish leaseholder who is a full-time sole proprietor, one is a multi-site shellfish leaseholder who is a full-time sole proprietor, and one is a single-site shellfish producer seeking income supplement. This result contains examples of success from both shellfish and finfish producers; the delineation here is between multi-site full-time production and single-site income-supplement production. This supports the finding indicated in the previous chapter that species choice may play a role; the findings also indicate that number of sites in an operation may be a contributing factor to longevity and meeting an objective of full-time salary.

Table 5.15 shows the prior employment experience listed by individual respondents. The three respondents listing aquaculture as their previous experience were finfish producers. The respondent meeting his objective said he began work in the industry directly out of high school. Two were not meeting their objective: one began working in

aquaculture as a university student; the second respondent began working in the industry as a high school student. Both respondents no longer have leases due to regulatory or financial difficulties; industry experience, they feel, could not have prevented or averted their situations.

Table 5.15 Prior employment experience

	Fishing	Aquaculture	Other Resource	Trades	Academic	N/a	Total
Meeting Objective	3	1	1	1	2	1	9
Not Meeting Objective	1	2	2	2	0	0	7
Totals	4	3	3	3	2	1	16

Of the four respondents with fishing backgrounds, three were meeting their objectives; both respondents indicating academic backgrounds were meeting their objectives as well. Of the three respondents each indicating trades or other resource industries, one was meeting his objective, and two were not. Both leaseholders of resource industry background who are not meeting their objectives are new leaseholders and expect to attain success within the next two to three years

Findings here offer no clear indicators. It appears that industry background could hold some benefit, but other factors – regulations, financing, choice of objective, or choice of species, could have more significant impacts.

Choice of species

Finfish farming, compared to shellfish production, holds the potential for greater financial return, but it requires extensive equipment, feeding, monitoring and husbandry. As a result, it is expected that finfish farmers will tend to be corporate or full-time sole proprietor in nature.

In this study, all but one of individual respondents who indicated either corporate or full-time sole proprietorship as objectives are finfish farmers. The exception is the finfish farmer who declared his objective was a hobby; as described previously, he entered the industry out of interest to provide finfish production viability in Nova Scotia.

As table 5.16 shows, twice as many shellfish farmers were meeting their objectives as not. Of the six meeting their objectives, one was a hobby producer, two were seeking full-time salary, and three were seeking income supplement. Both shellfish producers seeking full-time salary were multi-site leaseholders. Of the three shellfish respondents not meeting their objectives, one is a new farm seeking income supplement by growing an experimental species, the second is seeking income supplement from a traditional species, and a third is seeking full-time salary.

Table 5.16 Objectives of finfish vs shellfish producers

	Finfish	Shellfish	Totals
Meeting Objectives	3	6	9
Not Meeting Objectives	4	3	7
Totals	7	9	16

Of finfish farmers, three were meeting their objectives – a hobbyist, the corporate respondent, and a full-time sole proprietor with several sites. As seen in the previous section, four of seven respondents not meeting their objectives were finfish farmers seeking full-time salary.

Indicators here are that species can influence success, when combined with size of operation and type of objective. Among finfish producers, success has been obtained by a hobby finfish grower, a corporate finfish producer, and a multi-site leaseholder who is a full-time sole proprietor. Success, however, has not been attained by four finfish producers – three single site, one multi-site – seeking full-time sole proprietorship. The latter case was the result of the leaseholder selling his sites to a corporation which then declared bankruptcy; his survival strategy (“it was either do that or go bankrupt myself.”) did not earn him a successful outcome.

Among shellfish producers, success has been attained by a hobbyist, as well as three seeking income supplement and two seeking full-time salary. Both of those attaining full-time salary are multi-site leaseholders. An indication here is that shellfish success, as well as finfish success for full-time salary, may be facilitated by multi-site operations. A second indication is that shellfish production can allow for successful income supplement; finfish may not have such an allowance.

Outlook for farm and industry

In asking individual leaseholders of their future plans, this study distinguishes between what a respondent wants to do in the future, and what the respondent feels he will actually be doing. In many cases the answers in both situations will be the same. An example of a varying response may be in a case where a respondent has invested heavily in his lease, or has no other job prospects; he may say he will be farming in the future, even though that may not be what he wants to do. In a second example, a respondent currently not farming may feel that he will not be able to find a suitable lease or afford the costs of startup; he may respond that he wants to be farming in the future, but will not be.

It is anticipated that outlook, defined as belief in future success of individual operations and the industry, can be an indicator for prospects of attaining that success. In other words, if one believes his or her operation is bound for success, and the industry in which it functions will be successful, there will be greater tendency to attaining that success (Cunningham et al, 1985).

Table 5.17A Farm Outlooks

	Farm Poor	Farm Fair	Farm Good	No response
Meeting Objective	1	1	6	1
Not meeting Objective	2	3	1	1
Total	3	4	7	2

Outlook for the provincial industry (Table 5.17B) was slightly better – one said poor, four said fair and two said good.

Table 5.17B Industry Outlooks

	NS Poor	NS Fair	NS Good
Meeting Objective	1	1	7
Not Meeting Objective	1	4	2
Total	2	5	9

Table 5.18 shows seven of 16 respondents said they would be fish farming in five years' time, whether they wanted to be or not; seven said they wanted to be farming in five years' time. Reasons for staying included a desire to be one's own boss, to work near home, to work close to nature, as well as more practical reasons such as major time and money investment tied up in the operation. Feelings about the industry range from satisfaction, excitement and belief in the future to frustration, exhaustion and fear of financial and personal collapse.

Table 5.18 Farm future for those meeting objectives

	Yes	Uncertain	No
Will be farming in 5 years	7	0	2
Want to be farming in 5 years	7	1	1

Two-thirds of respondents meeting their objectives described their farm outlook as good – one respondent each took the liberty of adding ‘very good’ and ‘excellent’ to the selection. Nine of the 16 respondents described the future outlook as ‘good’ or better as the future outlook for the provincial industry. A total of 12 respondents indicated they wanted to be farming in five years, and the same respondents indicated they felt they would be. A love of the work and lifestyle and an asset for the next generation are among motivations cited. Feelings range from excitement, passion and fulfillment to frustration were listed.

Table 5.19 Farm future for those not meeting objectives

	Yes	Uncertain	No
Will be farming in 5 years	3	4	0
Want to be farming in 5 years	5	1	1

Table 5.19 shows that three of seven respondents not meeting their objectives indicated a willingness to be farming in five years and four expressed uncertainty. None of the respondents not meeting their objectives said they would not be farming in five years, and one respondent said he did not want to be farming in five years. This shows a deep commitment to the industry, even when success is currently unattained or challenged. Motivations for both groups – feelings of satisfaction and excitement, for example – are similar. There is also frustration in both groups – about the inability to access perceived potential, the potential thwarting of success by the challenges listed previously, the amount of effort required for payoff. It seems that success for some respondents does

not ease the fear of struggles that lie ahead. Yet, the majority of respondents indicate they will stick with it, just as the majority of respondents not meeting their objectives will remain in the industry.

In general, associations are optimistic about the future, but cautious as to predicting when change enabling industry sustainability and growth will occur. As Table 5.20 shows, associations are in agreement in outlook, some needs, and future prospects for having those needs met.

Table 5.20 Industry future

	Outlook	Needs for a sustainable industry	Prospects of achieving
AANS	Good	<ul style="list-style-type: none"> - Availability of suitable lease sites - Government and public support - Access to financing 	Fair for all
NBSGA	-	<ul style="list-style-type: none"> - Availability of suitable lease sites - Fair market - Regulations enabling sustainable growth 	Fair for all
PEIAA	Good	<ul style="list-style-type: none"> - Enhanced teamwork with regulators, financiers and public 	Fair to Good for all
MAA	Good	<ul style="list-style-type: none"> - Regulatory stability - Protection from unfair competition - Government support 	Fair

PEIAA described its future outlook for the industry as good; as for industry satisfaction, it categorized mussel producers as positive and listed concerns in the oyster and finfish industries over investment costs and market returns. MAA described future industry outlook as good, but said level of satisfaction among growers at present is best described as “very frustrated” due to lack of government support and public misinformation about

the industry. MAA listed regulatory stability and fair markets (ie protection from subsidized markets) as crucial to success, and opined that prospects were fair for achievement of same. PEIAA states that teamwork among regulators, financiers and communities is crucial to success, and says progress is being made, but there is a long way to go. NBSGA lists access to sites, fair market and enabling government regulations as vital to future success, with prospects fair for all three.

An interesting finding is the lack of correlation between outlook and objectives; that is, a positive outlook is not necessarily based upon meeting objectives. The respondent who, after more than 20 years in the industry, is now unemployed after selling his operation to a larger corporation that subsequently went bankrupt, would still like to work in aquaculture, and believes the Nova Scotia industry has potential for success. Conversely, a long-time shellfish producer whose operations gross \$250,000 annually and is currently meeting his objective of full-time salary believes in his business, but not in the provincial industry, due to unresolved environmental issues that put his operation at a disadvantage. He will continue to farm; "perhaps not here ... but I will go where I can do it." All associations categorized industry outlook as good, but described prospects for attaining assistance and issue resolutions necessary to future prosperity as mostly fair. Maine, in particular, indicated high grower optimism, even though frustration is also a key emotion in dealing with industry critics and a perceived lack of government support.

Another finding shows the connection between outlook and the fulfillment of an element for industry sustainability – committed, skilled human resources. Outlook is an attractor and a retainer for the industry. In one example of attraction, a positive outlook for a nearby available lease, and for the Nova Scotia industry, prompted a trades person to invest in the industry firstly as a supplementary income, with the prospect of it providing a full-time salary. In an example of retention, the “good people” the industry needs to succeed come from their positive industry outlook, a long-time producer said. “Most are not in it on a whim, which is good for long-term growth.”

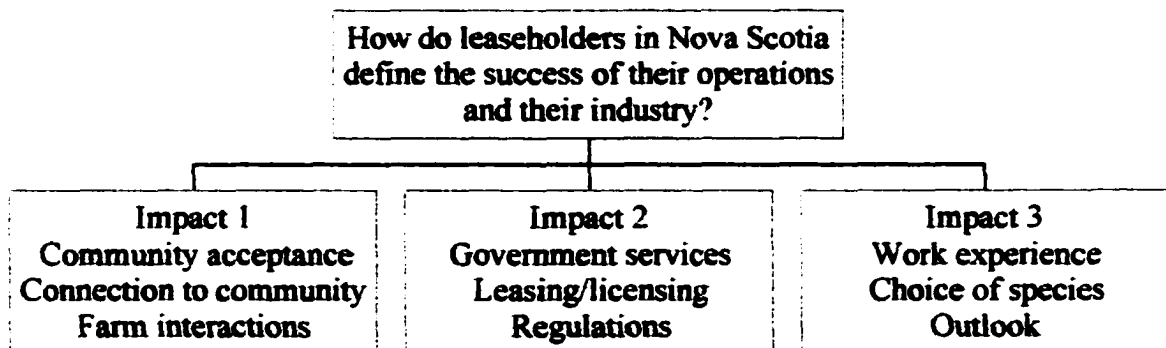
An overall view of these results, and a closer examination of emerging themes, will be included in Chapter 6.

Chapter 6

Conclusion

This thesis was designed to explore, from the growers' perspective, perceptions of success in individual aquaculture ventures and the aquaculture industry in Nova Scotia. The picture of aquaculture development past, present and future was constructed from four main sources – a review of published information on definitions of success in societal, corporate, and personal arenas; a review of published sources of aquaculture industry development globally, nationally and provincially; an examination of development in related regions; and, the observations and experiences of individual growers and industry associations. The latter category is the most important to this thesis in terms of uniqueness and quality of information. This study seeks to introduce grassroots information not solely as anecdotes or “colour”, but as factual data that can potentially assist in determining viability and direction of industry development in Nova Scotia. The information was informed by a number of key research questions (chart 1).

Chart 1: Key Research Questions



In the previous chapter, data gleaned from random surveys of individual leaseholders in Nova Scotia and association surveys in Nova Scotia and comparison areas was compiled, and certain trends revealed. This has served to highlight key differences among regions, as well as shared attributes and shared challenges.

As well, this project was designed to highlight areas worthy of more in-depth research. It illustrates the importance of socio-economic impacts – such as culture, family/community ties, job creation and local spending – upon aquaculture development, and how these factors must be taken into account as well as biology when planning, developing and supporting the industry.

6.1 Overview of findings

How do leaseholders in Nova Scotia perceive success of their operations and their industry?

Objectives of leaseholders for their farms vary from hobby to full-time sole proprietorship to corporate profit. It is recognized that income-generation of some form is required for an aquaculture operation's survival (Ridler, 1995; Science Council of Canada, 1985), but self-declared objectives provided by individual respondents, and whether they feel they are meeting these objectives, includes numerous quality of life indicators in addition to financial measurements. Distinction between hobbyist and income supplement, for example, was based not on production volume or income, but on the operator's motivation. In two cases, operators were financially meeting their

objectives, but felt their sacrificed quality of life prevented them from fully meeting their objectives.

Industry association responses in neighboring regions reflected an alignment of membership objectives between Nova Scotia and Maine, where the majority of association members were full-time sole proprietors, followed by corporate members and those pursuing income supplement. New Brunswick associations, in contrast, had memberships dominated by corporate or full-time sole proprietors; there were no income-supplement members in New Brunswick, and no hobbyists in any of the responding associations. This may indicate that Nova Scotia and Maine can learn much from each other, if continuing this mix of operations is desired. New Brunswick could provide valuable lessons if a more focused or corporate approach is desired.

The need to be financially viable was not lost on individual or association respondents, and as a result, traditional markers of success – production volumes and gate prices – can be useful. However, contained within the study was an active income-supplement and hobbyist sample; these individuals consider their operations to be important contributors to self, industry, and community, yet their objectives do not align with traditional measurement and development markers. This study indicates that Nova Scotia's industry may be too diverse to be able to fully respond to traditional financial markers and motivators. If industry growth is to maintain this diversity, traditional markers of success may have to be expanded and supported.

What role does the community play in the success of aquaculture in Nova Scotia?

This study indicated that community acceptance of aquaculture could be related to individual leaseholders' success, but there was no clear relationship between success of an individual lease, and the acceptance of aquaculture displayed by the host community. Leaseholders meeting their objectives tended to describe their communities' acceptance of aquaculture as good. However, the majority of those not meeting their goals were also in communities where aquaculture acceptance was good. There were also examples of leaseholders meeting their objectives in communities where acceptance was described as fair or poor.

A community's acceptance of aquaculture also did not seem to be clearly influenced by species grown, farm size, community traditions, or connection of the leaseholder to the community. The corporate respondent, producing finfish in communities throughout the province, described community acceptance of his company's operations as good. A hobby finfish farmer operating one site described his community's acceptance of aquaculture as poor, but claimed to still run his farm successfully. Many communities described in the survey were of a fishing or resource industry background; acceptance of aquaculture tended to be good, but was not conclusively so.

An influencing factor upon community acceptance appears to be seasonal landowners and who some respondents describe as 'new' residents – those who have moved into the community recently, often several years after the leaseholder. The study yielded

examples of communities that in the past had good acceptance of aquaculture, but that have changed to fair or poor acceptance with an increase in new residents or seasonal dwellers. Industry associations in Nova Scotia and Maine also describe opposition to aquaculture operations posed by new waterfront residents or seasonal dwellers. This opposition is rooted in aesthetics, environmental concerns, or fundamental protest against what is perceived as artificial or commercial food production.

Environmental concerns, in fact, were indicated in the study as sources of opposition, but also as sources of gaining positive community response to aquaculture operations. Formal regulations for large-scale operations are being adopted for efficiency and regulatory demands, but are also described as ways to make operations more palatable to neighboring residents. Single-site finfish producers and shellfish producers tended to not follow formal regulations, but had a range of self-managed guidelines designed to minimize environmental impact, promote good water quality, and enhance relations among neighbors and other community members. Individual and association respondents concurred that aquaculture is held to a very high standard by regulators and observers, with the latter group often more difficult to please. Meeting these standards are no guarantee of acceptance, or of success, but seem to indicate tools mutual benefit for leaseholder and community.

Also, responses by industry associations in New Brunswick and Prince Edward Island show that community acceptance can also be influenced by industry 'legitimacy'. Both provinces have extensive aquaculture development in areas that are also renowned for

exclusive waterfront real estate and recreational use. New Brunswick's concentration of Atlantic salmon farms, however, is also in an area with a strong commercial tie to the sea and an area that suffered from high unemployment prior to aquaculture development (Irving, 1992). New Brunswick's industry development has been opposed, but that opposition to date has served to guide development rather than halt it completely, and industry associations in the area describe community acceptance of the industry as good. In Prince Edward Island, aquaculture zones were established preceding its large-scale industry development; a representative industry association also describes community acceptance as good. In both provinces, the aquaculture industry is a visible economic generator, as well as a visible part of the region's way of life. It appears they have established a new tradition – that of aquaculture.

What role do the federal and provincial governments play in the success of aquaculture in Nova Scotia?

Federal and provincial government departments are the regulators and developers of the aquaculture industry in Canada and in the neighboring State of Maine. Examples of positive impacts were people-centred; that is, respondents often described the supportive actions of an individual, while describing the system as a whole as ineffective or detrimental. Negative impacts were often specific regulations; as well, actions of some individuals within the system were also described.

Indicators pointed to two major impacts of the leasing and licensing system in Nova Scotia: the variable length of time for application approval, and the public hearing process. Application approval times ranged from a few weeks to several years; blame for such delays was assigned to a variety of federal and provincial agencies. As expected, those respondents not meeting their objectives described the public hearing experience as poor; however, four of seven respondents not meeting their objectives had no formal public hearing. Of those three respondents who had a hearing, only one attributed the process directly to his lack of success. The public hearing process in itself was not determined to be a major detrimental impact upon leaseholder success, but it did give indications of being a potentially good system in need of adjustment to ensure proponents are in an objective rather than a defensive position, and to ensure the process remains above the reach of specific agendas unrelated to the lease application in question.

Another theme to emerge from governmental impact was the perceived unresponsiveness of regulations to small operations. Individual leaseholders in Nova Scotia, as well as industry associations in Nova Scotia, Maine, and New Brunswick, described regulations that were too costly, complex, or unnecessary for small-scale producers to meet and maintain. Regulations seem to be designed with a 'one-size fits all' mindset; if the diversity of the industry shown by the random sample and industry associations is to be maintained, it would appear that regulations must reflect that diversity.

What role do individual attributes, namely work history and industry experience, choice of species, and outlook for the future of individual operations and the industry, play in the success of aquaculture in Nova Scotia?

Individual responses to these questions showed no conclusive impact of industry experience or work history on individual success. However, indicators were that species choice and size of operations, could be of significant impact. All four respondents with more than 20 years' experience in the industry indicated they were meeting their objectives: three were multi-site operators, and the fourth was a shellfish producer seeking income supplement. Of those with 10-19 years' experience, the two meeting their objectives were shellfish farmers seeking full-time salary; the four not meeting their objectives were also seeking full-time salary, but in finfish production. Overall, six shellfish producers were meeting their objectives and three were not; three finfish producers were meeting their objectives – a hobbyist, a corporation, and a multi-site full-time sole proprietor – and four were not, all of whom were seeking full-time sole proprietorship. Indicators are that finfish production may require full-time sole proprietorship, and there may be an advantage to multi-site operation. This advantage could also extend to shellfish production, but shellfish also may be produced successfully by income supplement or hobby.

Examination of outlook also yielded a potential impact upon success. Optimism was generally high, even among respondents not meeting their objectives. Seven of nine respondents meeting their objectives and five of seven respondents not meeting their objectives said they wanted to be farming in five years' time. Industry associations listed

similar optimism, but expressed the outlook for attaining necessary regulatory and public support as generally fair.

This study found no direct correlation between negative outlook and not meeting objectives; it seemed that respondents not meeting their objectives shared similar optimism about either their farm's future, their industry's future, or both, compared to those meeting their objectives. There seems to be a strong belief in the industry by those who become involved in it, and even those with a fair or poor outlook have not discouraged easily. This could speak to the industry's ability to retain experienced workers which, as one respondent said, "is good for long-term growth."

6.2 Recommendations

The recommendations are listed under two categories – Areas for Further Study, and Areas for Action.

Areas of Further Study

Survey methodologies

The system of individual data collection is worthy of closer examination and refinement. This will not be an easy task. Nova Scotia's industry has growers of all capacities and species in locations from Yarmouth to northern Cape Breton. Growers are busy, with schedules rarely meeting those of "regular" office hours. Some are eager to share the love of their work; others are unwilling to share information for fear of losing a

competitive edge and still others are too busy with other activities to spend much time with “surveys and such.” Some growers feel surveyed “to death”, others feel ignored and betrayed by their neighbors and province, and many feel each day is a struggle to keep their businesses running and ahead of rising costs, growing public opposition, predators and bill collectors. They have been misrepresented in the media, overlooked by politicians and taken for granted by many of the areas in which they create jobs and product. Effective information gathering requires a level of respect and trust to be built between subject and collector; in some cases, that is easily done but in others, extra attention in the form of farm visits, transparent agendas and follow up support is needed. The information that can be gained, however, is a treasure. First-hand accounts of the impacts of regulations, government action or inaction, public mood and environmental concerns show clearly the areas in need of attention, why this effort should be made and the benefits to be had. This project shows how grower-centred research may actually be a route of major benefit for those seeking to know more about supporting the aquaculture industry.

Economic Impacts

A recent report (CAIA, 2000) addressed aquaculture economic impact as a three-pronged effect – impact of regulations upon aquaculture operations, direct and indirect contributions of aquaculture to local economies, and labour/capital inputs and purchases from other industries. The latter impact was identified as an area requiring further study; the direct and indirect contributions were cited as values impossible to quantify in detail, due to inability or unwillingness to record detailed operations in financial context. The

report made clear, however, the need for such information, as did industry associations when approached for such data.

This study concurs. Spending decisions in aquaculture today, in both the public and private sectors, are based on financial models showing positive return on investment. There is a lack of information in this area, whether due to unwillingness on the part of individuals to share or inability of associations to carry out the required studies, yet data on the economic impact of aquaculture development needs to be recorded. To date there are industry estimates of employment and production values based on general statistics, but there is no clear picture of the impact of operations – small or large – on the communities and the province in which they operate. This study showed cases of a sole proprietorship capable of contributing thousands of dollars annually in salaries, goods and services into rural communities that continue to suffer from chronic unemployment and outmigration. Effort should be spent to quantify this financial contribution. The data can then be used to advocate for development funds and to clarify directions for development action plans.

Regulatory impacts

Many studies have been done on the regulatory framework and how various agencies share responsibility for aquaculture management. However, global impacts of this complex web of regulations on producers, particularly small operations, has never been formally examined. There has been examination from a legal perspective (OCAD, 2001) and from a financial perspective (CALA, 2000). There is need to examine impacts from

a grower-centred perspective. Requirements of corporate-centred aquaculture, for example, and community-centred farming, are different (Ridler, 1995; Drinnan, 1995; Cunningham et al, 1985; Jentoft, 1993), and the need for clear direction of policy development has been affirmed in previous studies (Science Council of Canada, 1985; MacLeod, 1987; OCAD, 2001) and by individual respondents in this study, who have encountered regulations unsuited for small operations, and little focus for development in Nova Scotia. The need for innovative policy development was identified early in the commercialization of the Canadian aquaculture industry (Pritchard, 1976), and seems by responses gained in this study to be needed to ensure future growth.

Areas for Action

Clear delineation of governmental responsibilities

Interagency rivalry has been documented by researchers (Drinnan, 1994; Freeman, 1993), and individual respondents who have faced lease delays, information gaps, and other serious hindrances to their aquaculture operations as a result. A solution is the clear delineation of responsibilities and accountabilities of government agencies involved in aquaculture, beyond the general categorization of 'lead agency for aquaculture' which in Nova Scotia rests with the Department of Agriculture and Fisheries (formerly the Department of Fisheries and Aquaculture). This solution would not eliminate negative fallout of decades-old agency feuds or individual bias by those representing these agencies, but it would give recourse to those encountering the harmful effects listed above by delineating not only specific responsibilities of each

agency, but also accountabilities – as in who is answerable to whom – and contact points for further action.

Regulatory adaptation

There seems to be a benefit to viewing aquaculture as an agricultural rather than a capture industry (Drinnan, 1994); Nova Scotia has made some educational efforts and initial governmental restructuring to that effect, but aquaculture remains under the auspices of fisheries rather than agriculture. Some survey respondents indicated that they still considered themselves fishermen, but added that the terminology was not as important as an efficient governing and support system. In addition, environmental regulations must not only have words but the power to punish those who by improper waterway use jeopardize aquaculturists' livelihood. Production, export and environmental impact regulations should be conducive to small producers as well as corporations; in Nova Scotia, the former group make up the majority of leaseholders and therefore the province cannot afford to summarily dismiss them in favour of 'big business.' Likewise, small producers should be held accountable, but should not be held to the same quantitative standards as major producers.

Overall, regulations have to lay ground for a relationship between aquaculturists and other water users that is inclusive, rather than exclusive. To date, the regulations have pitted one against the other; diffusing the opposition and building the industry requires regulations that ensure co-operation and respect. New Brunswick and Prince Edward Island dealt with user-conflict potential early in their industries' development by

instituting designated areas for aquaculture (CAIA, 2000). Both provinces also instituted regulations that avoided potentially adversarial exercises like the public hearing process. Nova Scotia is now piloting a coastal zone management system in a rural county of the province; previously, it had designated no-aquaculture zones, but no “aquaculture-first” zones. The system remains to date one where aquaculture is permitted if no other activities wish to use the area. Because aquaculture requires specific water conditions and accessibility, areas unwanted by other users were not always suitable for aquaculture development. The public hearing process in Nova Scotia has been shown to be a flashpoint for that conflict. Maine, as well, lists user conflict as a major impediment to industry development. The State, too, has no regulations to clarify aquaculture’s right to water use, and in what areas development should be given priority.

Support

There needs to be programs in place, and funds to operate them, to provide the education to growers and support staff, fish health services, financing and research and development needed to keep Nova Scotia producers competitive in the global marketplace and sustainable at home. The industries in New Brunswick and Prince Edward Island received this support early in their industries’ evolution, and have now grown to a size able to secure and maintain the attention and action of private and public servants. Nova Scotia, however, has not grown to a size to be able to outrank or outlobby more established industries, which is a detriment in a government environment that has for several years been downsizing, eliminating and privatizing services. Support is needed for the industry to not only play catch-up on the world scale, but to gain the

attention and support of public and private service providers in its home province. This attention and support will assist in the industry's maturation and self-sufficiency, as well as in meeting its needs for the viability and sustainability desired from all employment, environmental and economic systems.

6.3 Finale

Success has been shown to come in many forms. In Nova Scotia, traditional corporate methods of success measurement – namely product value and product volume – have placed the province's aquaculture industry consistently in the 'potential' arena, stating that it has far to go to attain the status of a full-fledged industry. Compared to neighboring regions such as New Brunswick and Prince Edward Island, Nova Scotia's industry could be termed a failure. From the point of view of those working, or who have worked, in aquaculture in Nova Scotia, the view is not so harsh. In fact, several individual aquaculturists are not only attaining their self-declared objectives, they are enhancing the economic, ecological, and social well-being of the communities in which they operate. There is a belief that the industry is sustainable and beneficial for coastal communities and the province; in an interesting finding, this belief is shared not only by those who feel they are successful in their ventures, but by those who are not. Optimism is not rooted in current success, nor are definitions of success determined by existing conditions.

Grower-centred research is challenging in its administration and analysis, and in its apparent newness in the arena of aquaculture studies. Biological factors continue to dominate in aquaculture research and development, but as social researchers like Bailey et al (1996), Phyne (1996, 1999) and Millar and Aiken (1995) have stated, social and cultural conditions must also be conducive to nurture and sustain the aquaculture industry.

In addition to addressing the key research question and related subquestions, this study has shown that individual leaseholders, both past and present, possess internal libraries of industry information that is not only relevant, but in context to the front line of industry development. It is hoped this study has opened the door to that library, and serves to invite future visitors for more in-depth searches.

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Appendix A

Questionnaire for aquaculturists

General Information:

Sample # (assigned by me in place of name):

Total number of leases:

Number of active leases:

If there are leases inactive, expired, refused, or withdrawn, state reasons for each:

Species Grown:

Farm Location:

Date of Startup:

Today's Date:

Physical Environment

Please check all that apply, and place two checkmarks by the most important one.

1. Why did you put your farm in this location?

- ☐ Site characteristics
- ☐ Lease availability
- ☐ Wanted to stay in this community
- ☐ Wanted to move to this community
- ☐ Other (please list)

2. In general, what factors influence site selection in your area? Check all that apply.

- ☐ Biological (temperature, salinity, etc.)
- ☐ Physical (depth, currents etc.)
- ☐ Accessibility (ie near a wharf)
- ☐ Availability (ie an existing lease)
- ☐ Other (please list)

Institutional Environment - At time of startup

Please answer the following questions based on your experience during the startup of your farm.

3. Please rate **access** to each of the following, in your experience, as either Poor, Fair, Good or No Opinion:

Fish Health Services

Other Extension Services

Education and Training

Financing

4. Please rate **effectiveness** of each of the following, in your experience, as either Poor, Fair, Good or No Opinion

Fish Health Services

Other Extension Services

Education and Training

Financing

5. Please rate **access to information** on each of the following, in your experience, as either Poor, Fair, Good or No Opinion.

Government regulations

Development policies

Industry-related issues, including markets, competition, safety issues

New technologies

Educational opportunities

6. Please list the regulations, policies and programs that had a **positive** impact on your farm.

7. Please list the regulations, policies and programs that had a **negative** impact on your farm.

8. Please rate your experience with the leasing and licencing system as either Poor, Fair or Good.

How long did it take you to get your lease?

9. Were you able to get your site of first choice? (Yes or No)

If No, list the reason(s) why not:

What concessions, if any, were needed for you to get your current lease
(examples: change in location, change in lease size, etc.)

10. Did your application go through a public hearing process? (Yes or No)

If Yes, please rate your experience as Poor, Fair or Good.

Institutional Environment - Present Day ...

Please answer the following questions based on your experience today.

11. Please rate **access** to each of the following, in your experience, as either Poor, Fair, Good or No Opinion:

Fish Health Services

Other Extension Services

Education and Training

Financing

12. Please rate **effectiveness** of each of the following, in your experience, as either Poor, Fair, Good or No Opinion

Fish Health Services

Other Extension Services

Education and Training

Financing

13. Please rate **access to information** on each of the following, in your experience, as either Poor, Fair, Good or No Opinion.

Government regulations

Development policies

Industry-related issues, including markets, competition, safety issues

New technologies

Educational opportunities

14. Please list the regulations, policies and programs that have had a **positive** impact on your farm.

15. Please list the regulations, policies and programs that have had a **negative** impact on your farm.

16. Please rate your experience with the leasing and licencing system as either Poor, Fair or Good.

List your **most positive experiences** with the leasing and licensing system, if any:

List your **most negative experiences** with the leasing and licensing system, if any:

17. If your lease has undergone the public hearing process:

List your **most positive experiences** with the public hearing process, if any.

List your **most negative experiences** with the public hearing process, if any:

18. What do you feel government spending priorities for aquaculture have been to date? Please rate the following options, with 1 being the top priority, 2 being the second priority, etc.

- Regulatory development
- Regulatory enforcement
- Research
- Marketing
- Promotion
- Education and training of aquaculturists
- Education and training of government aquaculture specialists
- Support of industry associations
- Other (please list)

19. What do you feel government spending priorities for aquaculture should be?

Social Environment

20. Before aquaculture, what was your primary occupation? Check all that apply.

- ☐ Fishing
- ☐ Other resource industry (such as forestry, mining, etc.)
- ☐ Trades
- ☐ Business
- ☐ Student
- ☐ Profession (teacher, lawyer, etc.)
- ☐ Other (please list)

21. Are you still employed in your primary occupation? (Yes or No)

If Yes, please list your occupation.

22. Do you employ yourself on your farm (Yes or No)

If Yes, are you employed on the farm full-time or part-time? (Choose one)

23. Are you currently employed in any other occupations

(If Yes, please specify)

24. What is your connection to the community where your farm is located?

Check all that apply.

- ☐ Born there
- ☐ Grew up there
- ☐ Relatives live(d) there
- ☐ Took vacations there
- ☐ Other (please list)

25. Do you live in the community where your farm is located? (Yes or No).

If Yes, how long did you live there prior to starting your farm?

- ☐ 10 or more years
- ☐ 5-10 years
- ☐ 1-5 years
- ☐ less than a year

26. What is/was your community's traditional employer? Check all that apply, and put two checks by the most important.

- ☐ Fishery
- ☐ Other marine industries
- ☐ Other resource industries
- ☐ Manufacturing
- ☐ Service
- ☐ Other (please list)

27. Please rate your community's acceptance of aquaculture as either Poor, Fair or Good.

28. Was your farm the first in your community? (Yes or No)

If No, how many were there before you?

- ☐ 1-2
- ☐ 3-4
- ☐ 5 or more

How many have arrived after you?

- ☐ 0
- ☐ 1-2
- ☐ 3-4
- ☐ 5 or more

29. List the top three things you have found to be effective in working with your community:

30. List top three reasons for community opposition, if any:

31. Please rate the following services in your community as either Poor, Fair, Good or No Opinion:

- ☐ Roads
- ☐ Alternate transportation routes (rail, water, air)
- ☐ Telephone
- ☐ Cellular phone
- ☐ Internet

Ecological Impacts

32. List up to three of the most important things you do on your farm to minimize environmental impact:

33. Do you have an Environmental Management Plan, such as Codes of Practice or an EMS? (Yes or No)

If No, do you plan to implement one in the near future?(Yes or No)

If Yes, how long have you had it?

- ☐ less than a year
- ☐ 1-2 years
- ☐ more than 2 years

34. What was your primary motivation for implementing this plan? Check all that apply, and put two checks by the most important.

- ☐ Impending regulations
- ☐ Community opposition
- ☐ Farm efficiency improvement
- ☐ Other (please list)

Socio-Economic Impacts

35. How many full and part time workers do you employ in the course of a production cycle? ____

36. What is the average salary for non-management farm employees?

☐ minimum wage - \$10/hr

☐ \$10-\$15/hr

☐ \$15/hr-+

37. Do any of the following influence pay scale? Please check all that apply, and put two checks by the most important:

☐ Experience

☐ Education

☐ Attitude

☐ Returning employee

☐ Job duties

38. What is the estimated per centage of your farm's gross income spent on salaries? _

39. What percentage of your employees come from:

- the community itself

- neighboring communities

- away

40. Estimate the per centage of your farm's gross income on goods and services:

Estimate the per centage of your goods and services bought:

- Outside Canada

- Within Canada

- Within Nova Scotia

- Within your county

- Within your community

41. Are any of the goods/services you purchase outside of Nova Scotia available in the province? (Yes or No)

If Yes, please list them:

Please list the reason(s) for purchasing them out-of-province:

42. What goods/services, if any, would you like to see available in the province?

43. What goods/services, if any, would you like to see available in your community?

Personal

44. What was your objective(s) when you started your farm? Example: full-time job, income supplement, hobby, etc.

45. Why did you choose aquaculture? (ie needed a job, wanted to be self-employed, wanted to work on the water)

46. Has your objective changed? If yes, what is it now?

47. Are you meeting your current objective? (Yes or No)

48. What are your motivations for remaining in aquaculture? (ie only or main source of income, major investment, enjoy the work)

49. Do you own or are you a partner in another business? (Yes or No).

If Yes, which do you consider your main business?

If Yes, do any of these businesses relate to aquaculture? (Yes or No)

50. What was your production in year one? What is it now?

51. What was your gross income in year one of your farm:

- ☐ \$0 to \$5,000
- ☐ \$5,000 to \$50,000
- ☐ \$50,000 to \$500,000
- ☐ \$500,000 to \$1 million
- ☐ \$1 million-plus

What is it now?

- ☐ \$0 to \$5,000
- ☐ \$5,000 to \$50,000
- ☐ \$50,000 to \$500,000
- ☐ \$500,000 to \$1 million
- ☐ \$1 million-plus

52. How does being an aquaculturist make you feel?

General

53. List what you feel are the top five emerging issues facing the aquaculture industry in general, where 1 is the most important and 5 is the fifth most important.

- ☐ Environmental impact
- ☐ Genetically modified food
- ☐ Disease management
- ☐ Market value
- ☐ World food production
- ☐ Public perception
- ☐ Government regulations
- ☐ Consolidation
- ☐ Access to financing
- ☐ Trained work force
- ☐ Competition
- ☐ Other (please list)

54. List the top challenges you as a farmer expect to face now or in the near future:

List the top challenges you expect the industry in Nova Scotia to face now or in the future:

**55. Describe your future outlook for your farm as either Poor, Fair or Good.
Describe your future outlook for the industry as either Poor, Fair or Good.**

56. List the top things you feel your farm has going for it:

List the top things you feel the industry in Nova Scotia has going for it:

57. Do you expect to be fish farming in the next five years? (Yes, No or Uncertain)

Do you want to be fish farming five years from now? (Yes, No or Uncertain)

58. List the top things you as a farmer need to attain your objective, or maintain your objective:

List the top things you feel the Nova Scotia industry needs to be successful:

Appendix B

Questionnaire for aquaculture associations

General Information:

Name of Association

Number of Members

Percent of Target Industry Represented

Species Grown

Geographic Area Represented

Date of Organization Startup

Today's Date

Physical Environment

Please check all that apply, and place two checkmarks by the most important one.

1. In general, and to the best of your knowledge, what factors influence site selection in your region?

- ☐ Site characteristics
- ☐ Lease availability
- ☐ Farmers wanted to stay in a specific community
- ☐ Farmers wanted to move to a certain community
- ☐ Other (please list)

Institutional Environment

2. Please rate access to each of the following, in your experience, as either Poor, Fair, Good or No Opinion:

Extension Services, including fish health services

Education and Training

Financing

3. Please rate access to information on each of the following, in your experience, as either Poor, Fair, Good or No Opinion.

Government regulations

Development policies

4. Please list the government regulations, policies and programs that have or had a positive impact on farms.

5. Please list the government regulations, policies and programs that have or had a negative impact on farms.

6. Please rate your overall experience with the leasing and licencing system as either Poor, Fair or Good.

List up to three positive experiences with the leasing and licensing system, if any.

List up to three negative experiences with the leasing and licensing system, if any.

7. Do your applications go through a public hearing process? (Yes or No)

If Yes, please rate your experience as Poor, Fair or Good.

List up to three positive experiences with the public hearing process, if any.

List up to three negative experiences with the public hearing process, if any.

Social Environment

8. Before aquaculture, what were the primary occupations of your members?
Check all that apply.

- ☐ Fishing
- ☐ Other resource industry (such as forestry, mining, etc.)
- ☐ Trades
- ☐ Business
- ☐ Student
- ☐ Profession (teacher, lawyer, etc.)
- ☐ Other (please list)

9. To the best of your knowledge, what is their connection to the communities where their farms are located? Check all that apply.

- ☐ Born there
- ☐ Grew up there
- ☐ Relatives live(d) there
- ☐ Took vacations there
- ☐ Other (please list)

10. What percentage live in the community where their farm is located?

11. In locations of major industry growth, what is/was the community's traditional employer? Check all that apply, and put two checks by the most important.

- ☐ Fishery
- ☐ Other marine industries
- ☐ Other resource industries
- ☐ Manufacturing
- ☐ Service
- ☐ Other (please list)

12. Please rate your region's acceptance of aquaculture as either Poor, Fair or Good.

13. List the top three things you have found to be effective in working with communities:

14. List top three reasons for community opposition, if any:

15. Please rate the following services in communities of major industry growth as either Poor, Fair, Good or No Opinion:

- ☐ Roads
- ☐ Alternate transportation routes (rail, water, air)
- ☐ Telephone
- ☐ Cellular phone
- ☐ Internet

Ecological Impacts

16. List up to three of the most important things done on farms to minimize environmental impact:

17. Do members have an Environmental Management Plan, such as Codes of Practice or an EMS? (Yes or No)

18. If Yes, what was the primary motivation for implementing this plan? Check all that apply, and put two checks by the most important.

- ☐ Impending regulations
- ☐ Community opposition
- ☐ Farm efficiency improvement
- ☐ Other (please list)

19. If No, are there plans to implement one in the near future?(Yes or No)

Social Impacts

20. How many full and part time workers do your members employ in the course of a production cycle? ____

21. What is the average salary for non-management farm employees?

☐ minimum wage - \$10/hr

☐ \$10-\$15/hr

☐ \$15/hr--

22. Do any of the following influence pay scale? Please check all that apply, and put two checks by the most important:

☐ Experience

☐ Education

☐ Attitude

☐ Returning employee

☐ Job duties

23. What is the estimated annual dollar amount spent on salaries?

24. What percentage of farm employees come from:

- the community itself

- neighboring communities

- away

25. Estimate the number of indirect jobs supported in whole or in part by your members:

26. Estimate the amount spent annually on goods and services:

27. Estimate the per centage of goods and services bought :

- out-of-country

- in the country

- in your province or region

General

28. What are the main objectives for your members? Please number in order of importance, with 1 being the most important:

- _ corporate profit
- _ sole proprietorship, with full-time salary
- _ income supplement
- _ hobby
- _ other (please specify)

29. What was total production volume for your members at association startup?
What is it today?

30. What was the net worth of members' companies at association startup?
What is it today?

31. How would you categorize the level of satisfaction about the industry among members?

What factor(s) impact on their level of satisfaction?

32. List what members feel are the top five emerging issues facing the aquaculture industry, where 1 is the most important and 5 is the fifth most important.

- _ Environmental impact**
- _ Genetically modified food**
- _ Disease management**
- _ Market value**
- _ World food production**
- _ Public perception**
- _ Government regulations**
- _ Consolidation**
- _ Access to financing**
- _ Trained work force**
- _ Competition**
- _ Other (please list)**

33. Please list the top three challenges your members expect to face now or in the near future:

34. Describe your future outlook for the industry as either Poor, Fair or Good. What factor(s) influence your answer?

35. Please list the top three things your members need to ensure success:

36. Which are they receiving at present? Are the prospects Poor, Fair or Good that there will be changes to enable them to receive what they need?