Assessing Success in Aquaculture from the Farmer Perspective: The Case of Nova Scotia, Canada

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Abstract

This paper explores, from the farmer's perspective, perceptions of success in aquaculture ventures, and determinants of that success, drawing on a survey of farmers in Nova Scotia, Canada. The results show that measures of success for farmers extend beyond traditional financial markers, to include personal interests, core values, and quality of life elements. The farmers' perceptions of success, and the determinants of that success, vary greatly depending on whether aquaculture is being pursued as a hobby, to supplement other income sources, as a full-time activity, or within a corporate structure. The ability of farmers to meet their objectives seems to depend on (1) support from individuals within the government, (2) good community relations, (3) the regulatory and lease acquisition processes, (4) the public hearing process, and (5) species choice and farm size. The results of this research indicate considerable diversity within the Nova Scotia aquaculture industry, which needs to be matched by equally diverse regulatory and development support.

1. Introduction

During the past 30 years, increasing attention has been devoted to aquaculture world-wide. In Canada, the profile of aquaculture has grown, particularly in provinces bordering the oceans, and indeed, the federal government (Atlantic Canada Opportunities Agency, 1994) has listed aquaculture as an "expanding" sector in food production on the east coast of Canada. This paper focuses on the Atlantic Canadian province of Nova Scotia, which was among the first jurisdictions to embark on commercial aquaculture, in the 1970s. Three decades later, aquaculture in Nova Scotia continues to be perceived as a fledgling industry. For example, Nova Scotia's industry grew from $7 million in 1995 to $19 million in 2002 (DFO, 2004), yet was not mentioned in a 2003 Statistics Canada roundup of national aquaculture development. In comparison, New Brunswick, across the Bay of Fundy, developed its farmed salmon industry from one worth $40,000 in 1978 to one worth more than $200 million in 2002 (DFO, 2004); it is the second-largest farmed salmon producer in Canada (Statistics Canada, 2003). Prince Edward Island in the past 25 years has developed a cultivated mussel industry worth $28 million (DFO,

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2004), and produces 40 per cent of Canada's farmed shellfish (Statistics Canada, 2003). [Note that all figures in this paper are given in Canadian dollars.]

The above statistics shows a Nova Scotia industry lagging in economic and industrial impact, compared to its geographic neighbors. Rather than debate why, or if, such a lag exists, this paper explores the basis for such perceptions by asking the following question: do traditional measures of aquaculture performance do a disservice to the accomplishments within the Nova Scotia industry? This paper explores the various goals aquaculture may strive for, from a broad policy perspective, and the definition of 'success' in aquaculture from the perspective of the growers themselves: are they achieving what they set out to accomplish?

It is clear that a wide range of objectives can arise with respect to aquaculture development. The FAO, in its examination of small-scale aquaculture, noted "the need for greater clarity about objectives, the means for their achievement and their measurement" (FAO, 1996:33).

Traditionally, growth of the aquaculture industry has been seen in terms of tonnage, production values, and job creation. This was reflected, for example, in statements of aquaculture goals apparent in the early days of Canadian commercial aquaculture development, when 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.

However, some researchers have questioned the preoccupation with 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) This paper explores the nature of aquaculture objectives from the perspective of aquaculturists themselves.

The roots of the aquaculture industry are, of course, the farmers, 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. The voices of these front-line individuals seem rarely to be at the forefront of aquaculture discussions, even though from the growers comes a perspective rich in experience and detail that cannot be duplicated by third-party observation.

This paper presents a qualitative and quantitative analysis focused on perceptions of success in the aquaculture sector, and interactions of these perceptions with the stated goals of the farmers, as well as with a range of social, ecological, economic and regulatory issues. Specifically, in examining the social and economic factors affecting Nova Scotia's aquaculturists, a 'grass-roots' perspective is taken that is complementary to aggregated analyses of aquaculture in the region (such as econometric studies, e.g., Coffen and Charles, 1991). The multidisciplinary approach reflects the understanding that "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).

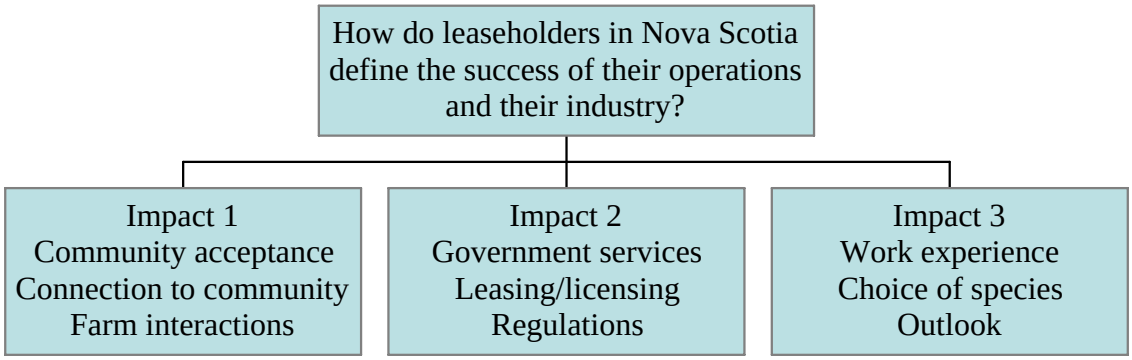
2. Methods

A custom questionnaire for individual respondents was built upon previous work of national and international aquaculture research organizations, including the FAO (1996) and Fisheries Research Board of Canada (Pritchard, 1976), and adapted with the results of a literature review focused on definitions of success. Administration of the survey was in person or by phone, fax, or e-mail, to a random sample of individual leaseholders past and present, drawn from the Nova Scotia Department of Fisheries and Aquaculture database (Department of Fisheries and Aquaculture, personal communication, July 2000).

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 covering five major regions of the province: Cape Breton Island, northern Nova Scotia, Eastern Shore, Annapolis Valley and South Shore. Species represented include oysters, Atlantic salmon, trout, halibut, quahaugs, sea scallops and eels. Two respondents were owners of land-based sites. Involvement with their current aquaculture operations ranged from two to more than 30 years. Respondents were not asked their age, and information is not reported by gender in the results, since that could endanger the confidentiality of respondents, as few of the group, and few in the industry in Nova Scotia generally, are female.

Information for this study was gathered, compiled, and analyzed for insights into the following major research question and three sub-questions (summarized in Chart 1).

Chart 1: Key Research Questions



The key elements carried throughout the analysis are (1) the stated objective of the farmer, falling into four livelihood-related categories, and (2) the farmer's perceived success of the aquaculture operation, defined as whether they feel they are meeting the stated objective. These two elements are examined in relation to one another, and to a set of individual attributes (such as level of experience, species farmed, etc.) and perceptions of the farmer on various fronts (community acceptance of aquaculture, regulatory effectiveness and fairness, etc.).

3. Results

3.1 How do leaseholders perceive success of their operations and their industry?

Quantitative results
Farmers were asked to specify their principal objective in entering the aquaculture field, as one of four options: hobby, income supplement, full-time sole proprietorship, and corporate profit. The first three of these, at least, may be seen as arrayed in increasing order of reliance on aquaculture income for one's livelihood. Of the 16 respondents in the random sample, two listed their objective as 'hobby', six as income supplement, seven as full-time sole proprietorship and one as corporate profit (Table 1).

Table 1. Objectives of individual respondents

Objective	**Meeting objective: Yes**	**Meeting objective: No**	**Total**
Hobby	2	0	2
Income suppl't	3	3	6
Full-time salary	3	4	7
Corporate profit	1	0	1
TOTAL	***9***	***7***	***16***

Farmers were also asked whether they felt that they are meeting the specified objective: nine respondents indicated they are meeting their self-declared objectives; seven said they are not. The breakdown of these is shown in Table 1.

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. 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 numerous quality of life indicators, in addition to financial measurements, seem to influence the self-declared objectives provided by individual respondents, and whether they feel they are meeting these objectives. The distinction between the objective of the hobbyist and of those seeking an 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.

Some illustrative cases
Qualitative data can provide some insight into the above quantitative results.

1. Consider first those respondents with the objective of income supplement. Two of the three *not* meeting that objective – a finfish producer and a shellfish producer– 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 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.”

2. Turning to those with the objective of a full-time salary, the four respondents *not* meeting this objective are 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.

3. An example of a grower seeking a full-time salary, and *meeting* that objective is a long-time finfish producer. The success of this grower 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. In addition, the grower 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.

4. A second case of a grower seeking a full-time salary, and *meeting* that objective is a long-time producer, in shellfish, who 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. His goal is to continue quietly with his secured markets, to gain full-time salary now, and perhaps pass the business to his children when he retires.

The above cases illustrate the variety of objectives being pursued by aquaculturists. The need to be financially viable was not lost on respondents, and clearly 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.

3.2 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 framework and be subject to the impacts of beliefs and actions within that framework (Phyne, 1999; Bailey et al, 1996). Reflecting this reality is the result of this study showing a tendency of leaseholders who felt they were meeting their objectives also to view the communities in which they live as having good acceptance of aquaculture. Seven of nine respondents meeting their objectives are in communities they feel have good acceptance of aquaculture. However, four of the seven respondents not meeting their objectives are also in communities they feel have a good acceptance of aquaculture. Thus, while the above two ratios (7/9 or 78%, and 4/7 or 57%) certainly differ somewhat, this study cannot claim to demonstrate a clear relationship between the perceived success of an individual lease, and the acceptance of aquaculture displayed by the host community (Table 2).

Table 2. Community acceptance versus 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.

A community's acceptance of aquaculture also did not seem to be clearly influenced by farm size, community traditions, or connection of the leaseholder to the community. For example, the corporate respondent, producing finfish in communities throughout the province, described community acceptance of his company's operations as good, while a hobby finfish farmer operating one site described his community's acceptance of aquaculture as poor (although he 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. 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 not to follow formal guidelines, such as ISO 14000 or similarly-recognized standards, but had a range of self-managed guidelines. These guidelines helped them to meet regulatory requirements while reducing environmental impact, promoting good water quality, and enhancing their relations with neighbors and other community members. Individual 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 beneficial for leaseholder and community.

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 the 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, while leaseholders not meeting their objectives spend or spent an average of one-third of their gross income on salaries. Respondents meeting their objectives buy an estimated 60-100 % of their goods and services in Nova Scotia, while the equivalent figure ranges from 25-100% for those not meeting their objective. These results suggest that those meeting objectives tend to be somewhat more labor intensive (or to pay higher salaries) – particularly in the case of finfish farmers, who face inherently more capital intensive production than do shellfish farmers. Results may also suggest a pattern in which those meeting their objectives more consistently 'buy locally', thereby contributing to the community. (It should be noted, however, that this generation of economic activity did not necessarily correspond to local support for the aquaculture activity.)

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 3, 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. 'Poor' acceptance arose only with respect to finfish farms.

Table 3. Community acceptance of aquaculture versus species farmed

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

3.3 What role do 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 eight provincial acts also regulating the industry in Nova Scotia (OCAD, 2001). As a result, it is expected that government decisions and actions impact on aquaculture success, as the industry is dependent on state support as well as social and ecological conditions (Phyne, 1999). What emerged from this analysis in terms of government impact on aquaculture in Nova Scotia (mirrored as well in our survey results from neighboring regions of Atlantic Canada) was a similarity in the range of needs and issues expressed for both those achieving success and those not meeting their goals. In particular, 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.

Examples of positive impacts were people-centred; that is, respondents often described the supportive actions of an individual in government, even 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.

Leasing and Licensing

The survey pointed to two major concerns of growers regarding the leasing and licensing system in Nova Scotia: the variable length of time for application approval, and the public hearing process.

All aquaculturists in Nova Scotia are required to have from the provincial Department of Agriculture and Fisheries a lease and license for marine-based sites or a license for land-based operations. It might be expected *a priori* that those with positive leasing and licensing experiences would be more likely to consider themselves as meeting their objectives.

However, such an expectation is not apparent in our results. First, in terms of farmer experiences at the time of startup, five of the seven not meeting their objectives indicated a good or fair experience at startup, which is similar to the result (six of nine) for those meeting their objectives. For perceptions of the *current* experience with government, of those not meeting their objective, five of seven have a good or fair experience with government now, while of those meeting their objectives, seven of nine have a good or fair experience now.

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 – on the other hand, 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.

Public hearings

An interesting finding here is a clear connection between farmers' experiences with public hearings and their perceptions of success in meeting objectives. Six respondents went through the full public hearing process. The remaining respondents did not have a full public hearing because no individual or group came forth to speak: in other words, no one showed up, and the lease was approved.

Of the six respondents whose applications went through a public hearing, 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 with the hearings on the basis of the eventual outcome (i.e. their sense of success with their farm). However, it could also be interpreted that the public hearing process either had an impact, or is clearly felt by the leaseholders to have had an impact, upon their operations' success.

Those who have experienced 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. Another respondent added that the public hearing process became a catalyst for conflict. "It fuels animosity between groups." 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 role of 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. The other respondent had a lease renewal examined by a RADAC. The process, this respondent said, "excluded those with knowledge of the industry."

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.

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 fair and objective evaluation.

Other elements
An interesting positive point raised by several respondents was that individuals dealing with aquaculture within government systems were dedicated, caring and effective in promoting or maintaining the industry, but the systems in which they functioned were not.

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 corresponding market information.

Another theme to emerge in terms of governmental impact was the perceived unresponsiveness of the regulatory system to small aquaculture operations. Individual leaseholders in Nova Scotia 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 is to be maintained, it would appear that regulations must reflect that diversity.

Challenges identified qualitatively both by those meeting their objectives and those not meeting their objectives were ineffective regulations, 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 indeed were identified long ago by both the Department of Fisheries and Oceans (1986, 1988, 1995) and the Science Council of Canada (1984, 1985), in their plans for future aquaculture development on a national scale.

Grower's experiences also show that the impact of these regulations varies among individual agencies, or even specific employees, charged with their administration. If a leaseholder 'lucks in' to an aquaculture-friendly individual in the public service, efforts to support the aquaculture operation are enhanced; if the opposite occurs, the leaseholder encounters delays and other problems.

3.4 What is the role of individual attributes in the success of aquaculture?

Farmers were asked for information on their industry experience, their work history, their species choice and the size of their operations. Individual responses to these questions showed no conclusive correlation of industry experience or work history with the perception of individual success. However, the results indicated that species choice and size of operations do seem to interact with the perception of success.

Species farmed
In this study, all but one of the finfish farmers indicated either corporate or full-time sole proprietorship as their objective. The exception was the finfish farmer who declared his objective to be 'hobby' – as described previously, he entered the industry out of an interest in demonstrating finfish production viability in Nova Scotia.

Table 4. Objectives of finfish versus shellfish producers

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

As Table 4 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.

Of the seven finfish farmers, three were meeting their objectives – a hobbyist, the corporate respondent, and a full-time sole proprietor with several sites. The remaining four finfish farmers were not meeting their objectives and all of these were seeking full-time salary.

The indication here is that a connection exists between the species farmed and the perception of success, and that this is also impacted by the 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 lack of success for the multi-site 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 farming may not provide such an option.

Future Outlook
Examination of the farmers' outlook for the future, and the relation of that outlook to the perception of success, also yielded useful insights.

Table 5 shows that 7 of 9 respondents who felt they were meeting their objectives said they *would be* fish farming in five years' time and the same fraction (seven of nine) 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 a 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. Farm outlook 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.

Table 6 shows that three of seven respondents not meeting their objectives indicated they thought they would be farming in five years, and four expressed uncertainty about this. This indicates a less positive outlook for the future of the farms than for those currently meeting their objective.

Table 6. Farm outlook 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

Impressively, however, of this group that are *not* meeting their objectives, five of the seven *wanted to be* farming in five years. This is a similar ratio to the seven of nine respondents currently meeting their objectives who said they wanted to be farming in five years' time. This shows a deep commitment to the industry, even when success is currently unattained or challenged.

Thus, even if there is an ambivalent sense of the future outlook for individual farms, among those not meeting their objectives, there seems to be a strong bond with the industry as a whole for those who become involved in it, and even those with a fair or poor outlook have not discouraged easily. This could prove positive in terms of the industry's ability to retain experienced workers which, as one respondent said, "is good for long-term growth."

A love of the work and lifestyle, and providing an asset for the next generation, are among motivations cited. Feelings ranging from excitement, passion and fulfillment to frustration were listed. Motivations for both those meeting objectives and those not – 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, and 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.

4. Conclusion

In Nova Scotia, a reliance on traditional measures of success – namely product value, product volume, and profit – have led to a sense of the province's aquaculture industry as consistently failing to meet its 'potential', a sense 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 is sometimes viewed as a failure. From the point of view of those working, or those who have worked, in aquaculture in Nova Scotia, the view is not so harsh. In fact, according to this analysis, a significant fraction of individual aquaculturists are not only attaining their self-declared objectives, they also believe that 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 own ventures, but also by those who do 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 and technical 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 are also crucial to the success of the aquaculture industry. There remains a need to emphasize an integrated, 'systems' approach to aquaculture, as to other resource-based systems (cf. Charles, 2001).

In addition to exploring the determinants of success in aquaculture, from the grower's perspective, and addressing related research questions, this study has shown that individual aquaculture leaseholders, both past and present, possess a wide range of relevant industry information. It is hoped that this study has helped to open the door to that large library of information, and that it will serve to invite future visitors for more in-depth searches.

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