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2023 **NSARB-2023-001**

Nova Scotia Aquaculture Review Board

IN THE MATTER OF: Applications made by **KELLY COVE SALMON LTD.** for a **BOUNDARY AMENDMENT** and **TWO NEW MARINE FINFISH AQUACULTURE LICENSES** and **LEASES** for the cultivation of **ATLANTIC SALMON (Salmo salar) - AQ#1205x, AQ#1432, AQ#1433** in **LIVERPOOL BAY, QUEENS COUNTY.**

Kelly Cove Salmon Ltd.

APPLICANT

-and-

Minister of Fisheries and Aquaculture

PARTY

-and-

Kwilmu'kw Maw-Klusuaqn Negotiation Office (KMKNO)

INTERVENOR

-and-

Queens Recreational Boating Association (Brooklyn Marina)

INTERVENOR

22 Fishermen of Liverpool Bay

INTERVENOR

Region of Queens Municipality

INTERVENOR

Protect Liverpool Bay Association

INTERVENOR

Affidavit of Nathaniel Feindel

I, Nathaniel Feindel, of Shelburne, Nova Scotia, affirm and give evidence as follows:

1. I am the Manager of Aquaculture Development and Marine Plant Harvesting in the provincial Department of Fisheries and Aquaculture (the Department). I started with the Department in 2015 as an aquaculture advisor. I have been in my current management role since 2017.

2. I have worked in the aquaculture industry for approximately 14 years. My resume is attached to this affidavit as **Exhibit A**.

3. I have personal knowledge of the evidence affirmed to in this affidavit except where otherwise stated to be based on information or belief.

4. I state, in this affidavit, the source of any information that is not based on my own personal knowledge, and I state my belief of the source.

History of Proceeding

5. Kelly Cove Salmon Ltd (Kelly Cove) took over the licence and lease at AQ#1205 in 2012. Since that time, Kelly Cove has successfully renewed their lease and license two times.

6. Kelly Cove's current lease for AQ#1205 is valid until April 1, 2040. The current licence for AQ#1205 is valid until April 1, 2030. Unfortunately, the Report on Outcomes of the Performance Review inadvertently inverted the lease and licence expiry dates. (NSARB Exhibit 007, p. 3)

7. The regulation of aquaculture in Nova Scotia was overhauled in 2015 with the enactment of two new regulations made pursuant to the *Fisheries and Coastal Resources Act*: the *Aquaculture Licence and Lease Regulations* and the *Aquaculture Management Regulations*.

8. In 2016, the Province identified that a portion of the infrastructure present on AQ#1205 was outside the boundaries of the issued lease space. This was a contravention of section 55(2)(b) of the *Aquaculture Licence and Lease Regulations*.

9. On April 15, 2016, Kelly Cove wrote to the Department outlining their attempts to apply for a boundary amendment since acquiring AQ#1205 and requesting confirmation that they could continue to operate on the "current footprint" until the amendment application is decided. Attached to this Affidavit as **Exhibit B** is the letter of April 15, 2016.

10. On April 20, 2016, Kelly Cove wrote a similar letter to Nova Scotia Environment (now Nova Scotia Environment and Climate Change) (NSECC). At the time NSECC was responsible for compliance and enforcement. Attached to this Affidavit as **Exhibit C** is the letter of April 20, 2016.

11. NSECC responded to Kelly Cove on May 24, 2016. Attached to this Affidavit as **Exhibit D** is the letter of May 24, 2016.

12. NSECC sent a letter to Kelly Cove, dated May 31, 2016, providing two options to bring their operation into compliance. (NSARB Exhibit 007, p. 7-9)

13. On June 3, 2016, the Department sent a letter to Kelly Cove confirming receipt of a prior boundary amendment application (dated 2013, prior to regulatory overhaul) and confirming the company could continue to operate on their current equipment footprint until a decision on the boundary amendment is adjudicated. Attached to this Affidavit as **Exhibit E** is the letter of June 3, 2016.

14. Kelly Cove opted to pursue an adjudicative amendment. Attached to this Affidavit as **Exhibit F** is a letter, dated October 31, 2016, from the Department acknowledging receipt of Kelly Cove's adjudicative amendment for AQ#1205 (among others).

15. The adjudicative amendment submitted was to expand the currently issued lease space to encompass the site infrastructure and aquacultural production currently in place. In addition, the boundary amendment was to increase the size of the lease from 3.99 hectares to allow for the addition of six new cages.

16. This adjudicative amendment application was deficient because it did not meet all the requirements for a complete application under the new application process. For example, the application did not have a Scoping Report. Attached to this Affidavit as **Exhibit G** is an email I sent to Kelly Cove staff on August 17, 2017 outlining the deficiencies of the application (among other applications).

17. On March 6, 2019, Kelly Cove resubmitted the adjudicative amendment application for AQ#1205x and submitted two new applications for marine finfish licenses and leases (AQ#1432 and AQ#1433).

Review Team

18. The licensing coordinator originally assigned to these applications initially was Megan Greenwood. Due to the time it took to assess this application, Amanda Spencer took over from Megan Greenwood. Lynn Winfield took over from Ms. Spencer and remains the licensing coordinator today.

19. The Review Team for these applications consisted of a number of people. I led the Review Team. Aquaculture Advisor, Melinda Watts, and GIS Officer, Matthew King, from my section were part of the Review Team. From the Aquatic Animal Health section, Dr. Amanda Swim and Dr. Anthony Snyder participated in the review. From the Operations section, Jessica Feindel, Danielle St. Louis, David Cook, Gretchen Wagner and Kate Richardson were also part of the Review Team.

20. The Review Team conducts the Department's internal review of the technical feasibility of the application and its ability to align with the Department's regulations. The technical review includes the assessment of information relevant to the factors the Board must consider, listed in s. 3 of the *Aquaculture Licence and Lease Regulations*. The Department's comments are summarized below and in the affidavits of Jessica Feindel and Dr. Amanda Swim. This summary includes the Departmental staff's knowledge of the industry, the advice provided to the Department from Network agencies, information supplied by Kelly Cove, and information collected by the Department.

Three Lease Sites

21. This Affidavit will address the three applications before the Nova Scotia Aquaculture Review Board (the Board) in this adjudicative hearing. Kelly Cove applied to expand its current lease AQ#1205. The expanded site is referred to as AQ#1205x. Kelly Cove has also applied for two new sites: AQ#1432 and AQ#1433. A map showing all three sites is attached to this Affidavit as **Exhibit H**.

22. The three sites are located in close proximity to each other in Liverpool Bay and have similar characteristics. As a result, my comments in this Affidavit will apply to all three sites, unless specifically stated otherwise.

Network Consultation

23. Under the *Aquaculture Lease and Licence Regulations*, when the Department receives a completed application, we are required to undertake consultations with relevant federal and provincial departments or agencies (the Network).

24. When an application is submitted to the Aquaculture Review Board, the Minister is required to submit a Report on the outcome of the Network consultation. For these applications, the Network consultation reports submitted to the Board are entitled "Report on the Outcomes of Consultation". Although a Report for each lease application was submitted to the Board, most of the Network partners provided a single response for all three sites with the result that the feedback from each partner is identical feedback for AQ #1205x, AQ #1432, and AQ #1433.

25. The only exceptions are the feedback from the Canadian Wildlife Service and Department of Fisheries and Oceans Canada, which had site specific recommendations that will be discussed below.

26. Any feedback from the Network partners that is relevant to the Board's consideration of the factors outlined in s.3 of the Aquaculture Licence and Lease Regulations is discussed further below.

Section 3(b): Contribution to Community and Provincial Economic Development

Production Plan

Infrastructure

27. My team assessed depth of nets at the proposed sites to determine whether the water depth at the proposed site locations were adequate to ensure the nets would not be damaged by dragging on the ocean floor.

28. The net depths proposed in the Application Package are:

- enclosure net – 8 metres
- predator net - 9 metres

29. The water depth at the proposed sites, where cage infrastructure would be located, are as follows:

- Coffin Island: 13-21m, with enclosure netting reaching a depth of 8m;
- Brooklyn: 14-20m, with enclosure netting reaching a depth of 8m; and
- Mersey Point: 15-20m, with enclosure netting reaching a depth of 8m.

30. These water depths were determined using data presented in the Application Package and corrected by Department staff to account for tidal ranges. These numbers are the proposed site depths at low tide. Attached to this Affidavit as **Exhibit I** are the contour depth maps generated by the Department using GIS software.

Wharf Usage

31. Liverpool Bay AQ#1205 is an existing site with the required infrastructure necessary to support the operations already in place. The addition of two new sites, AQ#1432 and AQ#1433, will expand the requirements for infrastructure.

32. Initially, Kelly Cove had planned to tie up two additional 35-foot boats at Brooklyn Government Wharf, where they would also be refueled. All other site-related activity was planned to occur at Port Mersey Commercial Park Wharf. DFO Small Craft Harbours verified with the Brooklyn Government Wharf Harbour Authority, however, that there is no room for the boats.

33. Kelly Cove has revised their plans and will not tie up at Brooklyn Government Wharf. They will either moor the boats in the Harbour or tie them up at the Port Mersey Commercial Park Wharf.

Section 3(c): Fisheries Activities in the Public Waters Surrounding the Proposed Aquacultural Operations

34. There are a number of commercial, recreational and Aboriginal fishing activities present in Liverpool Bay. The presence of these fisheries was validated through internal and network review. DFO provided a high level summary of all fishing activities in Liverpool Bay, including Food, Social, and Ceremonial (FSC) fisheries in the *DFO Maritimes Region Science Review of the Proposed Marine Finfish Aquaculture Boundary Amendment and New Sites, Liverpool Bay, Queens County, Nova Scotia*, dated September 2022 (CSAS Report). (NSARB Exhibit 004, p. 280)

35. No concerns were noted from the Department's Inland Division during network review.

36. In addition to the CSAS Report, DFO also provided a Letter of Advice to the Department regarding each of the proposed lease sites. (NSARB Exhibit 004, p. 253, 260, 267)

37. In the Letters of Advice, DFO identified the following fisheries as potentially being displaced by the proposed lease sites: American Lobster, groundfish, Sea Scallop, Atlantic Mackerel and Atlantic Herring.

38. DFO uses a risk-based approach to assessing potential impacts to fish and fish habitat. Using this precautionary approach, DFO evaluates the "residual risk" after incorporating Kelly Cove's mitigation measures and the regulatory requirements of DFO, and other federal and provincial regulators, to determine whether or not to recommend additional mitigation measures.

39. DFO concluded that the actual leased areas were small relative to the fishing grounds for each of these fished species. In addition, with respect to the two new proposed sites, DFO encouraged Kelly Cove to engage with fishing industry, rights holders and stakeholders. (NSARB Exhibit 004, p. 264 and 271)

Aquaculture Interactions with Lobster

40. The Department is aware of concerns regarding the potential impacts of finfish aquaculture on lobster. The Universite Sainte-Anne conducted a study, "Defining Lobster Fishermen Concern for Finfish Aquaculture on Lobsters and Lobster Fishing Communities in Nova Scotia: A Pilot Study". This study is attached to this Affidavit as **Exhibit J.** The Department funded this study to gain an understanding of the concerns lobster fishers have regarding finfish aquaculture. It also acts as a guide for the Department to address concerns and knowledge gaps through research. The study grouped concerns into two categories: "environmental concerns" and "social, political, and economic concerns".

41. I became aware of lobster behavioral research being conducted by DFO in New Brunswick, through the Department's participation in an aquaculture conference in 2018.

42. The same year, the Department reached out to DFO representatives to determine if there was any interest in collaborating on similar research in Nova Scotia.

Collaboration with DFO

43. A collaborative research study, between the Department and DFO, began in 2019 to study the impacts of finfish farms through a lobster telemetry and microbiome study in and around Liverpool and Port Mouton Bay, Nova Scotia.

44. Dr. Chris McKindsey and Dr. Shawn Robinson were the lead researchers. They had direct oversight of the scientific aspects of the study design, data review and analysis.

45. The fieldwork was carried out by a team from DFO and a team from the Department. I oversaw the Department's team and our involvement with the project. Other members of the Department's team were: David Cook, Gretchen Wagner, Jennifer Feehan and Todd Mosher.

46. The Department's role included:

- Contribution of equipment;
- Assistance with deployment and retrieval of receivers;
- Assistance with trapping and tagging lobster and crabs;
- Laboratory support
- Communication with industry; and
- Outreach and engagement with local lobster fishers and the Maritime Aboriginal Peoples' Council.

47. Kelly Cove was not directly involved in this study. However, I did advise the company when the study team needed to enter Kelly Cove's lease. As a result, Kelly Cove would have been aware that a study was being done, but they were not involved with the research.

48. In 2020, the Centre for Marine and Applied Research (CMAR) joined the collaboration.

49. My understanding is that the lead researchers are participating in this hearing and will testify as to the preliminary results of the study.

Section 3(e): The Other Uses of the Public Water Surrounding the Proposed Aquacultural Operation

Impacts to Wildlife

50. The Department also considers impacts to wildlife under this factor. To determine potential impacts to wildlife from the proposed operation, the Review Team relies on the proponent's application material and feedback from the Network consultation.

51. The information supplied by Kelly Cove regarding potential impacts to wildlife was reviewed by the Network partners. The Department received feedback from three network partners:

- the Nova Scotia Department of Natural Resources and Renewables (DNRR) (formerly the Department of Lands and Forestry),
- the Department of Fisheries and Oceans Canada (DFO), and
- the Canadian Wildlife Services Division of the Department of Environment and Climate Change Canada (CWS).

Response from DNRR

52. DNRR provided feedback on the proposed lease sites to the Department on September 23, 2019. (NSARB Exhibit 004, p. 629)

53. DNRR reported that all three sites are located in waters adjacent to Coffin Island, which is an important habitat area for various wild bird species, namely, herons, terns, and ducks. DNRR specifically reported that Coffin Island is an important area for the Harlequin duck, which is an endangered species in Nova Scotia.

54. DNRR recommended that before Kelly Cove's existing aquaculture operation in Liverpool Bay is expanded, a study be conducted on the number of bird interactions between wild bird species and the existing AQ#1205. In the event that such a study had already been completed, DNRR requested the opportunity to see and review that work, as well as any bird specific monitoring protocols implemented by Kelly Cove.

55. In response, in April 2022, Kelly Cove provided an updated Wildlife Interaction Plan (WIP) applicable to each proposed lease site incorporating additional control and monitoring measures for mitigating negative operational interactions with wildlife in Liverpool Bay, including birds. Kelly Cove reported that it does not record bird sightings at AQ#1205, but does record any interactions. They reported they will employ the same procedures at AQ#1432 and AQ#1433. Kelly Cove reports that they have not recorded any bird interactions at AQ#1205 to date. (NSARB Exhibit 004, p. 632)

56. On July 24, 2023, DNRR returned its second, and final, Network Agency Review of AQ#1205x, AQ#1432, and AQ#1433 to the DFA Review Team. On this occasion, DNRR indicated that it had no concerns regarding Kelly Cove's proposed lease expansion and two new lease establishments at Liverpool Bay. (NSARB Exhibit 004, p. 701)

Response from DFO

57. DFO also provided an assessment of marine species that may be impacted by the proposed lease sites. Please note that DFO's comments regarding salmon are discussed under the section of this Affidavit entitled "Section 3(g): The Sustainability of Wild Salmon".

58. DFO sent the Department three site-specific Letters of Advice pre-dating the publishing of their CSAS Report, which is a single comprehensive scientific review of all three lease sites in accordance with DFO's legislative mandate, including the federal *Fisheries Act*, *Species at Risk Act* (SARA), *Oceans Act* and applicable regulations. (NSARB Exhibit 004, p. 253, 260, 267, 280)

59. Respecting wildlife and wildlife habitat interactions around the proposed lease sites DFO concluded that: "no critical habitat or residences of SARA-listed species are likely to be found within the areas at risk of impact". (NSARB Exhibit 004, p. 254, 261, and 268).

60. With respect to eelgrass, DFO noted that there was no evidence of eelgrass beds within the areas at risk of impact. (NSARB Exhibit 004, p. 255, 262, and 269).

61. DFO's March 2022 Letters of Advice assessed and provided recommendations for increased/improved mitigation measures in 8 risk areas associated with aquaculture-wildlife interactions:

- (1) physical alteration of habitat structure,
- (2) alteration of light,
- (3) alteration of noise,
- (4) deposit of nutrients and organic material, *(this issue is addressed in the Affidavit of Jessica Feindel)*
- (5) release of aquatic invasive species,
- (6) deposit of chemicals,
- (7) release of farmed fish, and *(this issue is addressed in the sustainability of wild salmon section below)*
- (8) release of pathogens.

Ultimately, DFO did not suggest additional mitigation measures. However, DFO did include comments reminding Kelly Cove of specific sections of the relevant federal regulations.

Response from CWS

62. On August 27, 2019, CWS' initial recommendations on buffer zones and protection measures was provided in three emails (one for each of the proposed sites). The emails from CWS also requested additional information regarding the proposed lease sites. CWS had various initial concerns about the impact of the proposed lease sites on various bird species and habitats in the Liverpool Bay area, including on Coffin Island, the beaches and flats at East Berlin, West Berlin, Eagle Head, Beach Meadows, Western Head, White Point, and Black Point. (NSARB Exhibit 004, p. 450, 454 and 458)

63. CWS' initial concerns addressed the risk presented by the proposed lease sites to the following bird species:

- Roseate Tern (SARA-listed endangered species),
- Harlequin Duck (SARA-listed special concern species),
- Purple Sandpipers,
- Piping Plover (SARA-listed endangered species), and
- Hudsonian Godwit (COSEWIC-listed threatened species).

64. CWS asked Kelly Cove to clarify whether grow lights would be used at the site and had concerns about the negative impact these lights can have on migratory birds if they point upwards.

65. CWS initially recommended a 300m buffer between AQ#1205x and Coffin Island. With respect to AQ#1432 and AQ#1433, CWS recommended an "adequate buffer" between

those lease sites and areas where there are concentrations of wintering Harlequin Ducks. (NSARB Exhibit 004, p. 450, 454 and 458)

66. Kelly Cove responded to CWS' concern, on May 20, 2021, as follows:

- Kelly Cove provided a map identifying the provincially-reported wintering areas of the Harlequin Duck, which encapsulates the shorelines from Eastern Head to Beach Meadows and from Black Point to Western Head near Liverpool Bay;

- Kelly Cove confirmed that the three proposed lease sites will use grow lights, but that the lights face downward to direct the light down into the cage where the fish are, as opposed to the surrounding waters where wildlife species, like birds, may be traversing;

- Kelly Cove clarified that the "short list" of four local bird species listed in its WIP as "most likely to be seen around aquaculture sites in the area" of Liverpool Bay does not represent a complete list of bird species deemed significant and at risk by the company. The list in question was originally intended for quick-reference by site managers, while the broader Kelly Cove WIP included more extensive provincial and regional lists of species at risk for personnel to be aware of. At the request of NS DNRR, in 2022 Kelly Cove also updated the WIP to include greater detail about wild bird species in the vicinity of AQ#1205x, AQ#1432, and AQ#1433. (NSARB Exhibit 004, p. 464)

67. After receiving this information from Kelly Cove, CWS sent an email on July 25, 2023 which addressed all three proposed lease sites. Ultimately, CWS indicated that it was satisfied with Kelly Cove's responses on the issues of grow lights and bird species included in the company's WIP. With respect to buffer zones and increased mitigation measures for limiting contact with the Harlequin Duck, CWS maintained its recommendation that an "adequate" buffer zone be implemented between any aquaculture sites in Liverpool Bay and all wintering areas for the Harlequin Duck. CWS said it would provide additional information, including updated maps, of Harlequin Duck overwintering habitat in the Liverpool Bay area. (NSARB Exhibit 004, p. 467)

68. On July 27, 2023, CWS sent a map which showed no current inventories of Harlequin Duck observations in the Liverpool Bay area. (NSARB Exhibit 004, p. 470)

69. However, CWS went on to state that it supports the information supplied by Kelly Cove showing a portion of Liverpool Bay, including Coffin Island, is *potential* Harlequin Duck habitat. (NSARB Exhibit 004, p. 470)

70. In summary, CWS states that significant portions of Liverpool Bay *could* be used by Harlequin Ducks as habitat, but there is no evidence from CWS that it is currently *being used* by Harlequin Ducks.

71. In their last communication, CWS does not confirm whether they are still recommending the initial buffers specified. The Department is requesting confirmation on this point from CWS.

Section 3(f): Public Right of Navigation

72. Kelly Cove has submitted an application to Transport Canada for an updated Navigable Protection Program approval for AQ#1205x, and new approvals for AQ#1432 and AQ#1433.

73. The Notice of Applications was posted on the Department's website. This notice included information on how to submit written comments to Transport Canada regarding the effect of the proposed lease sites on marine navigation. (NSARB Exhibit 004, p. 432-433)

Section 3(g): Sustainability of Wild Salmon

74. DFO provides feedback to the Department regarding potential impacts to wild salmon. The Nova Scotia Southern Upland (SU) Salmon have been assessed as Endangered by COSEWIC since 2010 and are under consideration for SARA-listing. Beginning in 2010, all rivers within Salmon Fishing Area (SFA) 21 were closed to recreational fishing for Atlantic Salmon and there have been no FSC allocations.

75. In the CSAS Report, DFO states that existing and proposed sites are both within the migration pathways and range of the SU wild Atlantic Salmon population. The nearby Mersey and Medway rivers are known to be Atlantic Salmon rivers. (NSARB Exhibit 004, p. 285-286).

76. Ultimately, in the Letters of Advice to the Department, DFO concludes that "because the risks are proportional to the number of Atlantic Salmon escapees, DFO recommends that the proponent prioritize preventing Atlantic Salmon escapees." DFO continues by stating that it recognizes "NSDFA's increasing regulatory requirements for preventing and responding to Atlantic Salmon escapees" and DFO will continue to collaborate with the Department (DFA) and industry to further improve mitigating the effects of escapees through improved prevention, early detection, tracking and response. (NSARB Exhibit 004, p. 257, 264, 271)

77. No further mitigations were recommended by DFO regarding the sustainability of wild salmon.

78. DFO's reference to the Department's "increasing regulatory requirements for preventing and responding to Atlantic Salmon escapees" is likely a reference to the Department's Containment Management Framework (described in more detail in the Affidavit of Jessica Feindel). One aspect of the Containment Management Framework is the new traceability requirements. As per the *Aquaculture Management Regulations*, Section 15 (h), a holder of a finfish aquaculture licence in a marine aquaculture site must have "a finfish marking plan". Attached to this Affidavit as **Exhibit K** is the Containment Management Framework. My team administers the traceability requirements.

79. If an escaped salmon is found, this program allows the Department to identify the operator responsible for the escape. The Department can then audit the operations from which the escaped salmon may have originated to identify a potential cause of the escape, which can then be rectified.

80. For production cycles starting in 2023, all finfish sites operated by Kelly Cove in Nova Scotia are stocked with salmon that can be identified with genetic markers as a Cooke Aquaculture salmon. This is, and will continue to be a requirement, for any salmon stocked in Nova Scotia in the future.

81. I was not physically present before Ms. Menczel-O'Neill when I affirmed this affidavit. I was linked with Ms. Menczel-O'Neill using video conferencing technology.

Affirmed before me by videoconference from Shelburne (location of affiant) to Halifax, Nova Scotia (location of lawyer taking oath) on the 22nd day of January 2024.

[redacted]

Caitlin Menczel-O'Neill
A Barrister of the Supreme Court
of Nova Scotia

[redacted]

Nathaniel Feindel

TAB A

2023 NSARB-2023-001

This is Exhibit “A” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024

[redacted]

Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

Type text here

Nathaniel Feindel

Education

2008-2010 University of New Brunswick (Fredericton) Fredericton, NB

Masters of Science. (Biology)

- Specialization in Aquaculture

2002-2006 St. Francis Xavier University Antigonish, NS

Bachelor of Science

- Double Major in Aquatic Resources and Biology

Employment Experience

Nova Scotia Department of Fisheries and Aquaculture Shelburne, NS

April 2017 - Present

Manager (EC 12)

- Managing the Development Section in the Aquaculture Division of the Nova Scotia Department of Fish and Aquaculture.
- Develops, manages, advises and administers funding programs designed to assist and foster sustainable aquaculture industry development initiatives (e.g. Nova Scotia Aquaculture Research and Development Funding Program (NSARDFP)).
- Collaborates closely with the Aquaculture Development staff, Department staff as well as other Departments (where applicable) to ensure a coordinated and consistent approach to program/process development, implementation and day to day administration.
- Implements collaborative approaches for application reviews and discussions with other government agencies and review committees to recommend funding levels and restrictions.
- Manages the review of applications, corresponding with applicants, providing feedback, and composing formal departmental response letters for senior management
- Manage the oversight of the performance of multiple industry projects, involving multiple industry stakeholders; extensive monitoring, analysis and evaluation of operational activities to ensure compliance with contractual funding agreements in conjunction with licensing requirements. Provides Sr. management with progress reports on a program/project success.
- Corresponds, collaborates and supports the Policy Department in drafting legal contracts, maintaining and managing tracking documents, and reviewing interim and final reports
- Corresponds with proponents to ensure they are conforming to contractual agreements
- Advise on and implement aquaculture lease/license application documents and processes with respect to aquaculture regulations.
- Manages staff and their detailed technical and performance reviews on requests for aquaculture options to lease, new applications, scoping reports, development plans, licence and lease renewals, amendments, assignments, and production statistics analysis to advise the Minister and Aquaculture Review Board in decisions pertaining to the allocation of public resources. Assess technical feasibility, operational performance and environmental impact or adverse risk effects the current or potential aquaculture operations could have on the marine environment and its associated fisheries.
- Working with departmental staff to ensure industry compliance and understanding of Farm Management Plan (FMP) requirements and processes to enable the incorporation of regulatory oversight by the Nova

Scotia Department of Environment, as per the Aquaculture Licencing and Aquaculture Management Regulations. Assesses sections of FMPs, which may include Fish Health and Containment Management, Farm Operations, and Environmental Monitoring.

- Manage staff on the execution of performance reviews of individual farm owner FMPs through evaluation on the utilization rates through analysis of annually submitted farm production statistics and FMP records. Makes recommendations to farmers on techniques and technology to improve operations and to use provincial leased space to its full potential.
- Manage policy, regulatory and program program development
- Provides feedback, technical advice, and insight on Aquaculture Strategy, initiatives, and industry practices on program planning strategies and approaches
- Provides advice and assistance to program/operational areas throughout implementation of policies, providing interpretation on complex policy and regulatory issues; and provides guidance in monitoring and reviewing the effectiveness of policy interventions.
- Provides scientific/specialized knowledge and evidence for the effective development, implementation and evaluation of policy/regulatory changes and recommendation of legislative proposals that are responsive to the aquaculture industry and stakeholder needs.
- Manage research and the analysis of developments including new technologies, approaches and best practices and activities occurring in other jurisdictions in the field of aquaculture.
- Makes effective recommendations on implications and alternative methods to leverage potential opportunities to address key, critical issues of strategic relevance to the department's policy and legislative requirements.
- Provision of Aquaculture Industry Development and Extension Services
- For both Government and Non-Governmental Organizations: lead, coordinate and facilitate the design and execution of a variety of complex research projects related to aquaculture that support the refinement of techniques and methods to increase production, profitability and environmental sustainability or that focus on the potential socioeconomic impacts of aquaculture.
- Manages and reviews project development, activities and performance, including the gathering, interpretation, analysis and preparation of data for studies and reports: organize steering and other committees, liaise with pertinent project partners, participants, and supports, implement corrective actions in project phases; review work and monitor, approve and control budget expenditures to ensure project deliverables are on time and within budget.
- Evaluate adverse impacts of industry development on aquatic wildlife resources, and recommend mitigation or enhancement measures to industry developers, other government departments, consultants and other key stakeholders to ensure responsible development of the aquaculture industry.
- Respond to urgent and on-going situations that are non-biological in nature such as oil spills, damage by ice or storm, etc.; conduct site visits as required to conduct situation impact analysis and recommend corrective actions.
- Manage collaboration with other federal/provincial/municipal government organizations (DFO, Canadian Food Inspection Agency, Environment Canada etc.) to facilitate integrated solutions for those issues that cut across jurisdictions and disciplines.
- Manage the preparation of requests for proposals, selecting consultants, contractors and internal program participants as necessary; negotiate contractual terms of agreement with successful bidders, set project goals, priorities, and performance criteria. Manage reviews for other Provincial and Federal funding programs and advice on aquaculture specific requests from the department's perspective.
- Manage and Intra/Inter-Departmental and Intergovernmental Coordination and Cooperation
- Lead and participate on a variety of cross-jurisdictional planning and project committees to ensure a coordinated, strategic approach for the promotion, advancement and sustainable growth of the aquaculture industry.
- Provides advice to federal and provincial departments in decision making related to the movement of aquatic organisms both intra/inter-provincially to help control the spread of disease organisms and aquatic invasive species.
- Manages the Nova Scotia Department of Fisheries and Aquaculture representation on various committees and working groups at both the regional and national level (e.g. the Atlantic Region Interdepartmental

Shellfish Committee (ARISC)). Consults on approaches to respond to issues related to aquaculture science, capacity and development (e.g. participation in research projects and papers)

- Works closely with departmental employees to develop and present educational programs, courses, materials, etc. for a variety of audiences including industry sectors, schools, colleges and universities, and the public. Facilitates and supports planning committees to develop special events (conferences, trade shows, etc.) or campaigns sponsored by the Department in order to influence industry participation and engage the public on aquaculture or related topics.

Feb 2015 – April 2017

Biologist III (PR-15)

- Providing the aquaculture industry with development and extension services.
- Managing, coordinating and facilitating aquaculture development projects
- Coordinating and implementing research and development projects and activities for Non-Governmental Organizations, stakeholders, fisheries associations participating in species enhancement, and coastal community development projects.
- Providing technical research and advice to pertinent project partners, participants and other stakeholders
- Evaluating adverse impacts of industry development on aquatic resources, and providing/recommending mitigation or enhancement measures to industry developers, government agencies, consultants and other stakeholders
- Managing, administering and coordinate provincial funding for aquaculture research and development within the province
- Developing provincial program guidelines and policies to support provincial legislation
- Collaborating with other government agencies and stakeholders on project designs and funding
- Collaborate with other government agencies on planning and project committees to ensure a coordinated, strategic approach for the promotion, advancement and sustainable growth of the aquaculture industry
- Manage and review industry project performance; analyze and evaluate to ensure contractual funding agreements are being achieved
- Provide expert advice to senior management on current projects as well as potential future projects
- Provide feedback and insight on industry practices and technical advice from a science perspective on program planning strategies and approaches that will strengthen the provinces capacity to support the aquaculture industry
- Actively seek collaborators and leverage additional funding for projects within Nova Scotia
- Develop strategic and supporting documents for the Aquaculture Division.
- Serve as a provincial representative to collaborate nationally and internationally on strategic programs to develop and strengthen the finfish aquaculture industry in Nova Scotia
- Provide relevant technical/specialized knowledge for the effective development, implementation and evaluation of policy/regulatory changes and recommendation of legislative proposals that are responsive to marine finfish industry and stakeholder needs.
- Drafting legislative language and policies to support the continued development of the aquaculture industry in an economical and environmentally acceptable manner
- Monitor, research and analyze developments in new industry approaches, technologies as well as what is happening in other jurisdictions, enabling their application in Nova Scotia
- Respond to urgent and on-going situations and provide recommendations and facilitate solutions
- Manage, coordinate and facilitate the procurement of assets to support the development of the aquaculture industry and mandate of the Department of Fisheries and Aquaculture.
- Training and developing government employees in techniques that are acceptable under provincial government standards
- Organizing regional, national and international conferences/workshops involving multiple stakeholders

Nathaniel Feindel

July 2014 – Feb 2015 | Parks Canada | Port Mouton, NS

Project Manager (PM-04)

- Managing the costal restoration project in the Kejimkujik National Park Seaside
- Conducting condition monitoring and management effectiveness monitoring within Kejimkujik National Park Seaside in both marine and terrestrial environments
- Managing human and financial resources, including external service providers, volunteers and contractors
- Working in a collaborative environment with diverse groups (e.g. cross functional, other government departments, NGO's, businesses/corporations, community groups, educational institutions rural municipalities, the general public)
- Developing and delivering documents including action plans, communication plans and messaging, project financial reports and briefing notes.
- Delivering the Parks Canada mandate, strategic and operational objectives, policies, directives and regulations
- Managing and developing staff to effectively interact with the general public to communicate Parks Canadas mandate through the implementation and facilitation of eco-tourism and educational experiences
- Developing and managing contracts
- Planning, prioritizing and implementing complex projects or programs involving cross-functional teams, contractors and multiple stakeholders with a broad range of competing or conflicting interests
- Working independently and in cross-functional teams using a multi disciplinary approach
- Evaluating complex situations and making sound decisions and/or providing authoritative advice
- Preparing reports, presentations, and briefing notes for senior Parks Canada management, collaborators and the general public

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Jun 2012 - April 2014 | Fisheries and Oceans Canada | St. Andrews, NB

Aquatic Science Biologist (BI-02)

- Managing, implementing and facilitating an Aquaculture Collaborative Research and Development (ACRDP) project
- Managing the field testing of "green-technology" sea lice traps and further documentation of on-site dynamics of sea lice early life history
- Managing the deploy prototype traps on farms to evaluate the equipment performance in at-sea conditions.
- Compare the variation in larval sea lice, on salmon sites, captured between traps in the same cage as well as between different cages and different depths in the water column.
- Supporting a research scientist on experiments relating to sea lice in the marine environment.
- Designing and plumbing in various systems in wet lab facility from quarantine lab to a sea lice hatchery system and various types and sizes of tanks
- Producing sea lice larvae in an experimental hatchery from egg strings collected from naturally infected salmon on local farms
- Collecting sediment samples for larval hatching experiments on various sediment types
- Deploying mesocosms for sea lice larval hatching experiments
- Deploying oceanographic equipment, CTDs, LISST-100, Cyclops Submersible samplers, ph and temperature sondes, sediment collection tubes and collecting water samples with Niskin Bottle
- Maintaining the sea lice hatchery system and conducting routine maintenance
- Continue with the testing of the relative efficiency of the prototype sea lice traps developed in phase 1 and 2 of this project measured by selective efficiency
- Develop and minimize the energy requirements of the traps
- Developing and conducting experiments on sea lice, in and around salmon aquaculture sea cages in the Bay of Fundy and Nova Scotia
- Operating and maintaining Rossborough boats in and around salmon sites and the Bay of Fundy
- Conducting experiments off of Coast Guard vessels in and around salmon sites and the Bay of Fundy

Nathaniel Feindel

- Loading and offloading research equipment and trawl gear on/off research vessels with overhead crane
- Liaising with industry partners and collaborators to conduct experiments on private aquaculture leases
- Writing, reporting and presenting findings of experiments being conducted to senior DFO management and industry partners
- Presenting results at national conferences
- Chairing conference sessions and general meetings
- Working with NB Department of Agriculture, Aquaculture and Fisheries on chemotherapeutant treatments for salmon
- Making recommendations to senior scientists on logistics and design of future projects
- Managing/training technicians and summer students
- Managing a budget
- On-call after hours for emergency response to the wet-lab, broodstock facility and quarantine lab

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Apr 2012 - Jun 2012 Fisheries and Oceans Canada St. Andrews, NB

Aquatic Science Biologist (Bi-02)

- Managing, compiling and drafting the publication of a specialized chapter in a Canadian Manuscript of Fisheries and Aquatic Sciences for the Aquatic Climate Change Adaptation Services Program (ACCASP)

Shackell, N.L., B.W. Greenan, P. Pepin, D. Chabot and A. Warburton (Editors). 2013. Climate Change Impacts, Vulnerabilities and Opportunities (IVO) Analysis of the Marine Atlantic Basin. Can. Manuscr. Rep. Fish. Aquat. Sci. 3012: xvi + 366 p.

Chapter 6: Feindel et al.,"Climate Change and Marine Aquaculture in Atlantic Canada and Quebec."

- On-call after hours for emergency response to the wet-lab, broodstock facility and quarantine lab

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Jan 2011 - Mar 2012 Fisheries and Oceans Canada St. Andrews, NB

Aquatic Science Technician (EG-04)

- Designing, managing and conducting scientific studies on American lobsters in both lab and field settings
- Managing the coordination of industry stakeholders to conduct experiments and deployment scientific equipment in the marine environment
- Deploying divers with mesocosms and scientific equipment to conduct studies in the field relating to chemical chemotherapeutants
- Conducting chemtherapeutant experiments on adult, juvenile and larval lobsters
- Conducting climate change studies on larval lobsters
- Writing manuscripts from experiments that were conducted and presenting data at national and international conferences and to senior DFO management
- Maintaining lobsters in the holding facility at the biological station
- Maintaining the holding facility and carrying out routine maintenance
- Developing standard operating procedures to be used by conservation and protection officers in the field for specific infractions of the *Fisheries Act*
- Managing a lab and a budget
- Providing scientific support and advice on various studies being conducted by multiple divisions at the biological station, industry stakeholders and conservation officers
- Spawning Atlantic salmon, Atlantic cod, Arctic charr, Atlantic halibut and American lobster
- Hatchery production of Atlantic salmon, Atlantic cod, Arctic charr and American lobster
- Training technicians, students and interns in animal husbandry and standard operating procedures to conduct scientific studies
- Entering, extracting and analyzing data using Oracle/SQL, SPSS, R, Minitab and Excel
- Supporting other technicians in the group with experiments they are conducting
- Loading and offloading research equipment and trawl gear on/off research vessels with overhead crane

- On-call for after hours emergency response to the wet-lab facility, broodstock facility and quarantine lab

---

Oct 2010 - Jan 2011 | Fisheries and Oceans Canada | St. Andrews, NB

Aquatic Science Technician (EG-02)

- Providing technical support as part of an animal care/scientific support team
- Designing and conducting various scientific studies on finfish and crustaceans
- Mixing and producing vitamins to supply various finfish programs
- Spawning Atlantic salmon, Atlantic cod, Arctic charr, Atlantic halibut and American lobster
- Hatchery production of Atlantic salmon, Atlantic cod, Arctic charr and American lobster
- Operating computer controlled systems for aquatic science labs
- General maintenance to filtration and dechlorination systems
- Collecting oceanographic data on population ecology survey using CTD and Rosette samplers
- Assisting in monitoring and collecting Scanmar and Marport data on trawl gear
- Entering data in to GSE database
- Loading and offloading research equipment and trawl gear on/off research vessels with overhead crane
- Placing temperature and depth probes on ground fish and lobster trawling gear
- Uploading data from different types of probes and equipment to spreadsheets and analyzing data
- On-call after hours for emergency response to the wet-lab, broodstock facility and quarantine lab

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Aug 2010 - Oct 2010 | Fisheries and Oceans Canada/University of New Brunswick | St. Andrews, NB

Marine Biologist

- Providing scientific and practical advice on finfish, invertebrate, plant and crustacean aquaculture management issues to senior management and industry stakeholders
- Writing reports for senior management in the DFO, industry and university research scientists
- Managing and conducting research on Integrated Multi-Trophic Aquaculture (IMTA) development
- Culturing and harvesting kelp for commercial applications and to maintain sea urchins
- Conducting research on sea lice controls by mechanical and filtration methods
- Designing, conducting and analyzing scientific studies on finfish and invertebrates
- Designing and constructing sampling/field equipment
- Deploying oceanographic equipment such as; CTD, LISST, pH sondes, chlorophyll and current meters in the field
- Assisting in the use of an acrobat used to profile the water column around aquaculture sites
- Collecting grab samples, sediment cores
- Loading and offloading equipment on/off research vessels with overhead crane
- Designing and constructing infrastructure for deployment in harsh ocean environments
- Deploying and retrieving infrastructure containing expensive scientific equipment in/from harsh environments

Nathaniel Feindel

Apr 2010 - Jul 2010 Fisheries and Oceans Canada/Genome Atlantic St. Andrews, NB

Lab Manager

- Managing technicians and students in DFO research lab
- Designed and conducted an Atlantic cod spermatozoa cryopreservation experiment.
- Collected and analyzed data
- Compiled and edited a manuscript for publication in Aquaculture Research. "Cryopreservation of Atlantic cod (Gadus morhua) sperm in large volume straws: applications for commercial production and gene banking". 2011, Volume 42, pages 1714-1722.

2007 - 2009 Centre for Aquatic Health Science, St. Andrew/St. George,
Casual Employment Atlantic Veterinary College NB

Field Fish Health Technician

- Aided in data collection and sampling of cultured Atlantic salmon involved in vaccination trials

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2007 - 2010 Contract Work Fisheries and Oceans Canada St. Andrews, NB

At-Sea Lobster Sampler

- Arranging sampling trips with lobster fishermen
- Managing the collection of lobster stock assessment data for senior biologist
- Collecting samples for various biological analysis
- Compiling data in database
- Extracting data from database and compiling report on fish activity
- Training biologists, technicians and students in at-sea sampling protocols

May 2007 - Sept 2007 Maple Leaf Foods Canada St. Andrews, NB

Research Facility Manager

- Managing an Atlantic salmon research facility
- Coordinating and conducting a nutrition experiment on various stages of Atlantic salmon (creating and executing numerous standard operating procedures)
- Compiling data for senior scientist
- Conducting routine fish husbandry and facility maintenance
- Designing, installing and expanding the existing tank field and facility
- Obtaining contractors and sub-contractors to expand wet lab facility

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May 2006 - May 2007 Cooke Aquaculture Aspotogan, NS

Saltwater Technician

- Feeding fish (two farms totaling 30 cages)

Nathaniel Feindel

- Monitoring water quality parameters
- Sampling and harvesting fish
- Assisting veterinarians
- Conducting site maintenance

Summer 2005 JAVI-Tech Yarmouth, NS

At-Sea Scotia-Fundy Fisheries Observer

- Monitoring and recording all activity aboard various types of fishing vessels to ensure compliance with fish regulations (e.g., scallop, tuna, lobster, ground fish, etc.)
- Recording and sampling catches aboard fishing vessels for scientific purposes
- Conducting experimental surveys for the Department of Fisheries and Oceans Canada

Research Experience

- M.Sc. Biology (Aquaculture specialization): Triploidy induction of Atlantic cod (Gadus morhua)
  - Developing an optimized protocol for the induction and commercial scale production of triploid Atlantic cod.
  - Studying the reproductive potential and spawning capacity of triploid Atlantic cod
  - Co-supervisors: Dr. Tillmann Benfey (UNBF), Dr. Edward Trippel (DFO SABS)

- Experiments/Studies conducted during employment and education experiences: Therapeutant Exposures, Development of Chemical Exposure Test Kits, Gonadal MaturityAssessment (macro/microscopic), Fertilization Success, Sperm Motility, Sperm Morphological Assessment (Micro and macroscopic), Sperm Cryopreservation Experiment, Competitive Spawning, Triploidy Pressure Induction, Deformity Assessment, Photoperiod Manipulation, Stress Response, Tagging Studies, Observational Studies using Video Equipment, Sea Lice Filtration (mechanical and bio-filtration), Particle Size Analysis, Toxicological, Compensatory Growth, Larval Hatching Success, Growth, Larval Survival, Vaccination Trials, Hypoxia Challenges, Parasitic Infection, Viral Challenges, Sedimentation Studies, Parasitic Bath Treatment

Cultured Organisms Handled

Atlantic Cod, American Lobster, Atlantic Salmon, Blue Mussels, American Oyster, Atlantic Halibut, Kelp, Sea Lice, Atlantic Sea Scallops, Turbot/Greenland Halibut, Sea Cucumber, Arctic Charr, Sea Urchins, Atlantic Sturgeon, Rotifers, Shortnose Sturgeon, Artemia, Haddock, Sea Lice, Pollack, Zebra Fish, Rainbow Trout, Polychaetes, Sable Fish, Striped Bass, Bloodworms

Additional Assets

- Ability to manage various types of projects ranging from scientific to construction projects
- Ability to train biologists, conservation and environmental compliance officers, technicians, students, interns and the general public in fish husbandry, standard operating procedures and scientific techniques
- Capacity to design and execute various types of experiments
- Write and present clear and concise reports
- Capacity to design and construct field equipment for harsh environments
- Strong public speaker and presenter
- Comfortable liaising with industry stakeholders and government officials
- Ability to operate various types of boats and oceanographic equipment
- Knowledge of statistical analysis software packages (Oracle/SQL, Minitab, SPSS, NCSS)

Nathaniel Feindel

- Computer Software Knowledge
  -Microsoft Office Suite
  -Image ProPlus
  -Nikon NIS-Elements BR
  -Image Q
  -Image J
  -Integrated Semen Analysis Software (ISAS)
  -ArcGIS

Publications

Primary Publications:

- Waddy, S.L., Feindel, N.J., Hamilton-Gibson, N., Aiken, D.E., Merrit, V., and Leavitt, N. 2017. Reproductive Cycles and Mating Capacity in Male American Lobsters (*Homarus americanus*). Fisheries Research, 186:358-366.

- Trippel, E.A., Butts, I.A.E., Babin, A., Neil, S.R.E., Feindel, N.J., and Benfey, T.J. 2014. Effects of Reproduction on Growth and Survival in Atlantic Cod, Gadus morhua Assessed by Comparison to Triploids. Experimental Marine Biology and Ecology. 451: 35-43

- Shackell, N.L., B.W. Greenan, P. Pepin, D. Chabot and A. Warburton (Editors). 2013. Climate Change Impacts, Vulnerabilities and Opportunities (IVO) Analysis of the Marine Atlantic Basin. Can. Manuscr. Rep. Fish. Aquat. Sci. 3012: xvi + 366 p.
  - Chapter 6: Feindel, N.J., Cooper, L., Trippel, E.A., and Blair, T."Climate Change and Marine Aquaculture in Atlantic Canada and Quebec." pages 195-240

- Benfey, T.J., Feindel, N.J., Lin, S., Whitehead, J.A., Martin-Robichaud, D.J., Trippel, E.A., and Duffy, M. 2012. The production of single-sex and sterile populations of Atlantic cod (Gadus morhua) for aquaculture: fish health considerations with focus on Loma morhua. Aquaculture Association of Canada Bulletin 109-1.

- Feindel, N.J., Benfey, T.J., and Trippel, E.A. 2011. Gonadal Development of Triploid Atlantic Cod (Gadus morhua)". Journal of Fish Biology. Volume 76, pages 1756-1761

- Butts, I.A.E., Feindel, N.J., Neil, S.N., Kovács, É., Urbányi, B., and Trippel, E.A. 2011. Cryopreservation of Atlantic cod (Gadus morhua) sperm in large volume straws: applications for commercial production and gene banking. Aquaculture Research. Volume 42, pages 1714-1722.

- Feindel, N.J., Benfey, T.J., and Trippel, E.A. 2010. Competitive Spawning Success and Fertility of Triploid Male Atlantic Cod (Gadus morhua). Aquaculture Environment Interactions Volume 1, pages 47-55.

Conference Proceedings:

- Aquaculture Association of Canada. 2013. "Field Testing of a "Green-Technology" Sea Lice (*Lepeophtheirus salmonis*) Trap:Performance, Larval Dynamics and Trap By-Catch Around atlantic Salmon (*Salmo Salar*) Aquaculture Farms in the Bay of Fundy." Feindel, N., Robinson, S.M.C., and Ang, K.P.

- World Aquaculture Society. 2013. "Spatial Distribution Patterns of Sea Lice (*Lepeoptheirus salmonis*) Larvae around Salmon (*Salmo salar*) Aquaculture Farms in the Bay of Fundy, Canada." Robinson, S.M.C., Bartsch, A., Luitkus, M., Feindel, N., Robertson, P., Ang, P.A., Cleaves, D., and Lander, T.L.

Nathaniel Feindel

- World Aquaculture Society. 2013. "Multi-Year Growth and Reproductive Patterns of Diploid and Triploid Atlantic Cod (*Gadus morhua*)." Trippel, E.A., Butts, I.A., Babin, A., Neil, S.R.E., Feindel, N.J., and Benfey, T.J.

- Aquaculture Association of Canada Conference Proceedings, 2009. "Spawning capacity of triploid Atlantic cod males and the early life history performance of their offspring".

- Conference Proceedings for ICES ASC, 2009. "Competitive Spawning of Male Triploid Atlantic Cod (Gadus morhua) and the Early Life History Performance of their Offspring".

Certificates / Training

- Oracle/SQL
- The Experimental Fish (Animal Care Protocol Certification)
- Government Security Clearance (Reliability Status)
- Workplace Hazardous Materials Information Systems (WHMIS) Certificate
- Passport to Safety Certificate
- Marine Emergency Duties (MED A1) Training
- Restricted Operators Certificate Maritime Commercial
- Marine First Aid
- Small Vessel Operator Proficiency Training Course (SVOP)
- Pleasure Craft Boaters License
- PADI Certified Open Water Scuba Diver
- Firearms Possession Acquisition License
- Conservation Education Certification
- Overhead Crane Training
- Advanced Wilderness First Aid Training
- Introductory ROV Training
- Introductory to Simulated Electronic Navigation
- Nova Scotia Provincial ATV Training

TAB B

2023 NSARB-2023-001

This is Exhibit “B” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024

Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

April 15th, 2016

Province of Nova Scotia
Department of Fisheries and Aquaculture
1575 Lake Road
Shelburne, Nova Scotia
B0T 1W0

Attention: Bruce Hancock, Director of Aquaculture

Dear Mr. Hancock,

Re: NS Aquaculture Lease and License 1205

In 2011, Kelly Cove Salmon Ltd. purchased site 1205 in Liverpool Bay (the "**Site**") from another operator. We subsequently realized there had been an issue with the boundaries and the Province requested that we submit a boundary amendment with respect to the Site. In late 2011, we started the process to correct the boundaries of the Site. This process included gathering a significant amount of oceanographic and environmental data to determine the best placement of the boundaries. Once this was completed, we had surveyors draw up development plans.

This process was completed in late 2012. We were asked by the Province to delay submission of the request for the boundary amendment until the fall of 2013. In the spring of 2013, the Province announced a regulatory review and it was announced that no new leases would be issued until this was complete. We submitted our amendment package on October 8th, 2013. Following this submission, we were informed that our amendment package would not be evaluated until the regulatory review was complete.

In recent conversations with your department, we understand that the department will soon start accepting applications for boundary amendments.

We therefore request the following:

- the boundary amendment for the Site be given priority by your department; and

- that we be allowed to operate on the current footprint that we occupy at the Site until the amendment is either approved or rejected. The cages have been at this location for the last 12 years.

In meetings we have had with Navigable Waters Protection Program staff, they have indicated the above would be an acceptable short-term solution enroute to a long-term solution.

Please contact the undersigned if you wish to discuss this matter further.

Yours truly,
KELLY COVE SALMON LTD.

[redacted]

Jeff Nickerson
NS Production Manager

Cc. Michael Szemerda, VP Saltwater, Cooke Aquaculture Inc.
Cc. Janet MacKinnon, District Manager, NSDE

TAB C

2023 NSARB-2023-001

This is Exhibit “C” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024

Sig
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

April 20th, 2016

Province of Nova Scotia
Department of Environment
Halifax, Nova Scotia
B0T 1W0

Attention: Janet MacKinnon, Director of Inspection, Compliance and Enforcement

Dear Ms. MacKinnon,

Re: NS Aquaculture Lease and License 1205

In 2011, Kelly Cove Salmon Ltd. purchased site 1205 in Liverpool Bay (the "**Site**") from another operator. We subsequently realized there is an issue with the Site's boundaries and the Province requested that we submit a boundary amendment application with respect to the Site. In late 2011, we started the process to correct the boundaries of the Site. This process included gathering a significant amount of oceanographic and environmental data to determine the best placement of the revised boundaries. Once this was completed, we had surveyors draw up development plans.

This process was completed in late 2012. We were asked by the Province to delay submission of the request for the boundary amendment until the fall of 2013. In the spring of 2013, the Province announced a regulatory review and it was announced that no new leases would be issued until this was complete. We submitted our amendment package on October 8th, 2013. Following this submission, we were informed that our amendment package would not be evaluated until the regulatory review was complete.

In recent conversations with the Department of Fisheries and Aquaculture, we understand that the department will soon start accepting applications for boundary amendments.

We therefore submit the following steps, for your approval, to bring the Site into compliance with the applicable regulatory framework:

- Within thirty (30) days, we will provide to the Department of Environment a map showing current lease boundaries and the location of our equipment. This will be compiled by an independent third party.

- When the Department of Fisheries and Aquaculture opens their process to accept boundary amendments, we will work with them to submit an amendment application with respect to the Site's boundaries.

- We will continue to operate (with the Department of Environment's approval) on the current footprint that we occupy at the Site until the amendment is either approved or rejected by the Department of Fisheries and Aquaculture.

- We will ensure that the Site is marked in accordance with applicable provincial regulations during this interim period.

In meetings we have had with Navigable Waters Protection Program staff they have indicated the above would be an acceptable short-term solution enroute to a long-term solution.

Please contact the undersigned if you wish to discuss this matter further.

Yours truly,
KELLY COVE SALMON LTD.

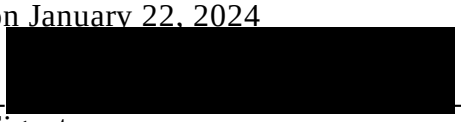
Jeff Nickerson
NS Production Manager

Cc. Michael Szemerda, VP Saltwater, Cooke Aquaculture Inc.
Cc. Bruce Hancock, Director of Aquaculture, NS DFA

TAB D

2023 NSARB-2023-001

This is Exhibit “D” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024



Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

NOVA SCOTIA
Environment

PO Box 442
Halifax, Nova Scotia
Canada B3J 2P8

(902) 424-2547 T.
(902) 424-0501 F.
www.novascotia.ca/nse

Inspection, Compliance and Enforcement Division

Our File No.:

Janet MacKinnon
Director
Regional Integration of Compliance and Operations

May 24, 2016

Kelly Cove Salmon Ltd.
669 Main Street
Blacks Harbour NB
E5H 1K1

Dear Mr. Nickerson:

Re: Aquaculture Lease and License 1205 issued by the Department of Fisheries and Aquaculture

I am writing in response to your letter dated April 20, 2016 regarding the above referenced lease and license. You note in your correspondence that Kelly Cove Salmon Ltd. began the boundary amendment application for the Liverpool Bay site with the Department of Fisheries and Aquaculture (DFA) in 2011, shortly after purchasing the site from another operator. However due to the regulatory review your application was not processed.

As you are aware, as of July 1, 2015, Nova Scotia Environment (NSE) has the mandate for the enforcement of aquaculture legislation.

With respect to your identification that the Liverpool Bay site is in non-compliance in your April letter and the steps you propose to take to bring the site into compliance, I have forwarded the specific issue to the attention of the Fisheries Inspector, Wade Fehr.

I will make you aware that the Department will enforce a deadline of October 26th, 2016 for lease and licence holders in the province to submit *either* a scheduled re-alignment plan for the approval of NSE or to submit an application for an adjudicative or administrative amendment to DFA should they be aware of boundary issues with their site.

With respect to your third bullet re continuing to operate at that location, as the Department of Fisheries and Aquaculture issues the lease and licensing, staff at that department are best positioned to respond to this request. I see that you have copied Bruce Hancock, Director of Aquaculture on your correspondence to me.

Should you wish to discuss my response, I can be reached at 424-2547.

Kind regards,

[redacted]

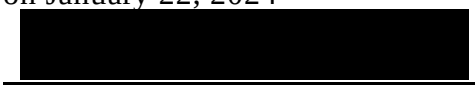
Janet MacKinnon
Director
Regional Integration of Compliance and Operations

cc. K. Miller
Wade Fehr

TAB E

2023 NSARB-2023-001

This is Exhibit “E” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024



Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

NOVA SCOTIA

Fisheries and Aquaculture
1575 Lake Road
Shelburne, Nova Scotia
B0T 1W0

novascotia.ca

June 3, 2016

Kelly Cove Salmon Ltd.
669 Main Street
Blacks Harbour, NB
E5H 1K1

Dear Mr. Nickerson:

RE: Aquaculture Lease and License #1205

I am writing in response to your letters of April 15, 2016 and April 20, 2016 addressed to our Department of Fisheries and Aquaculture (NSDFA) and Nova Scotia Environment respectively, regarding a site boundary amendment for the above referenced lease and license.

I can confirm that Kelly Cove Salmon Ltd. submitted a boundary amendment application to NSDFA for lease and license #1205 in the fall of 2013 and that NSDFA was not in a position to process that application due to the ongoing regulatory review. Now that the regulatory review is complete and the new regulations are in place, the Department will very soon be again accepting boundary amendment applications.

With respect to Kelly Cove Salmon Ltd.'s specific request that they be allowed to operate on their current equipment footprint until their amendment application is either approved or rejected, NSDFA agrees to that course of action provided that the company:

- submits a map to NSDFA compiled by an independent third party within 30 days of the date of this letter, that shows the current lease boundaries and the location of your equipment;
- submits a complete boundary amendment application to NSDFA prior to October 26, 2016;
- marks the site according to provincial requirements; and
- does not further extend its current footprint.

If you have any questions or wish to discuss the matter further, please do not hesitate to contact me at (902) 875-7842.

Best regards,

[redacted]

Bruce Hancock
Director of Aquaculture

TAB F

2023 NSARB-2023-001

This is Exhibit “F” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024

[redacted]

Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

NOVA SCOTIA
Fisheries and Aquaculture
1575 Lake Road
Shelburne, Nova Scotia
B0T 1W0
novascotia.ca

AQ#0742, 1006, 1039, 1040 & 1205
Amendment Applications

October 31, 2016

Kelly Cove Salmon Ltd.
ATTN: Mr. Jeff Nickerson
PO Box 1546
Shelburne, NS
B0T 1W0

Dear Jeff:

Re: Aquaculture Licence/Lease Nos. 0742, 1006, 1039, 1040 & 1205 - Amendments

This letter acknowledges receipt of Amendment Plans with supporting documents, Transport Canada Notice of Works forms and Amendment fees received on October 28, 2016 for the amendments of Aquaculture Licence/Lease Nos. 0742, 1006, 1039, 1040 and 1205. Your amendment applications will now proceed to the review stage of the amendment process.

It should be noted that following the review of your amendment applications, if any additional information is required you will be provided with a deadline to submit this information. Please be advised that I will be in communication with updates on the progress of the review of your applications.

Please contact me at your convenience if you have any questions 902-875-7440 or Lynn.Winfield@novascotia.ca .

Sincerely,

[redacted]

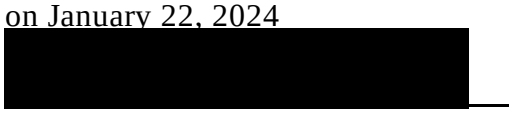
Lynn Winfield,
Licensing Coordinator

c. Dr. Vicki Swan, Manager of Aquaculture Development
Nathaniel Feindel, Biologist
Matthew King, GIS Analyst
Joe Hanrahan & Jennifer Mosley, Coastal Resource Coordinator
Bob Sweeney, Sweeney International

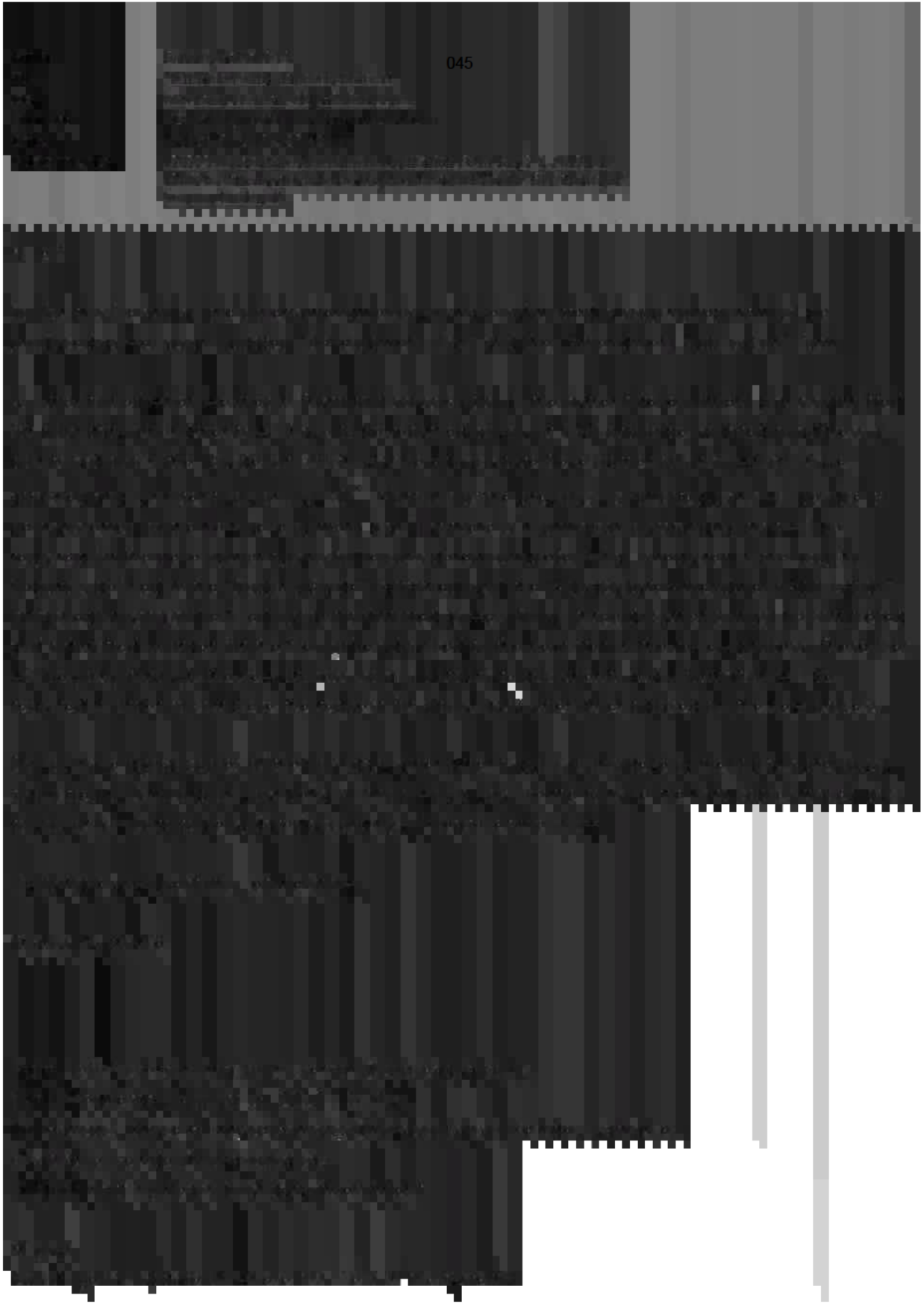
TAB G

2023 NSARB-2023-001

This is Exhibit “G” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024



Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia



TAB H

2023 NSARB-2023-001

This is Exhibit “H” referred to in the
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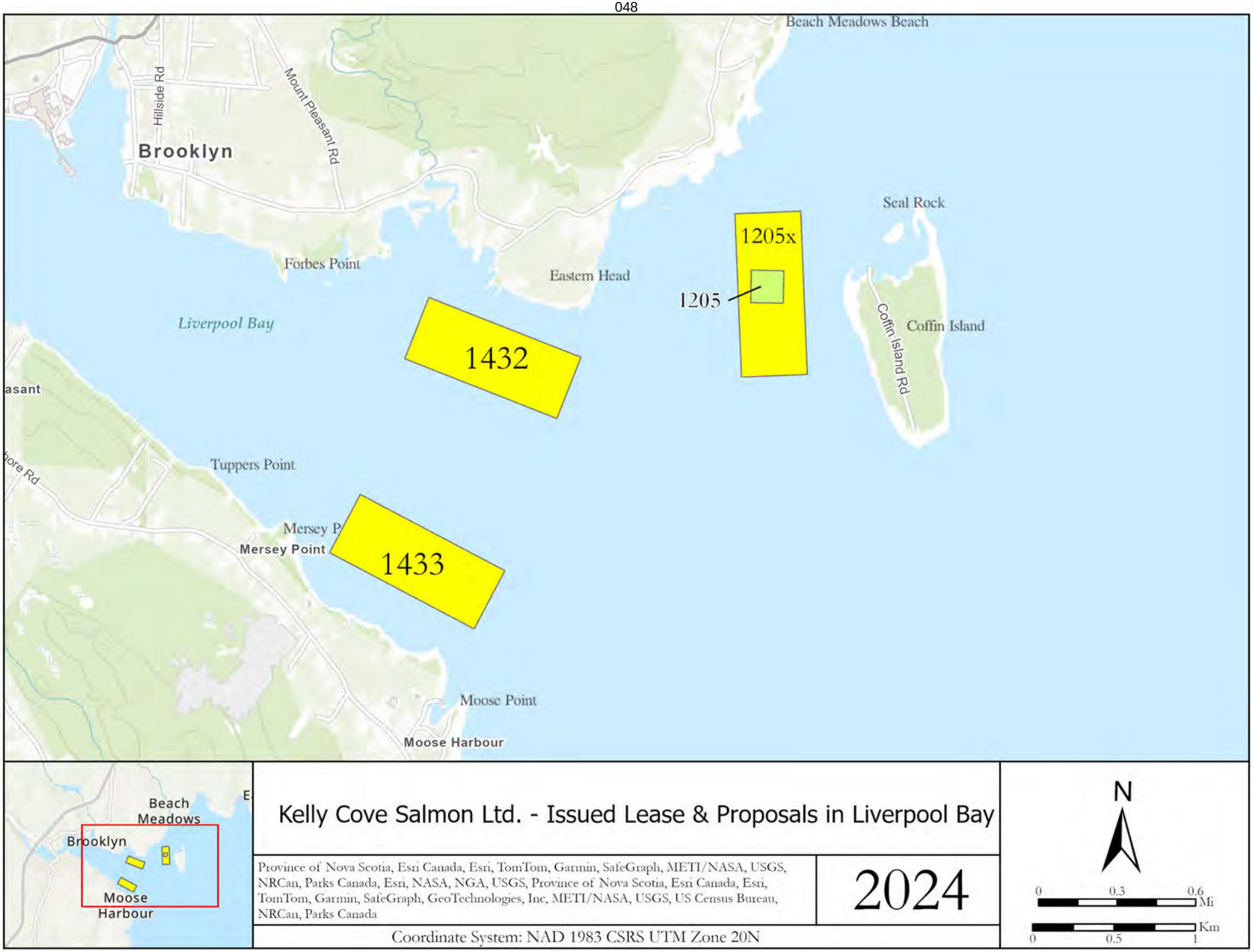
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Moose Point
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Moose Harbour
Kelly Cove Salmon Ltd. - Issued Lease & Proposals in Liverpool Bay
Province of Nova Scotia, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, NRCan, Parks Canada, Esri, NASA, NGA, USGS, Province of Nova Scotia, Esri Canada, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, US Census Bureau, NRCan, Parks Canada
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Coordinate System: NAD 1983 CSRS UTM Zone 20N
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TAB I

2023 NSARB-2023-001

This is Exhibit “I” referred to in the
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[redacted]

Signature
CAITLIN MENCZEL-O’NEILL
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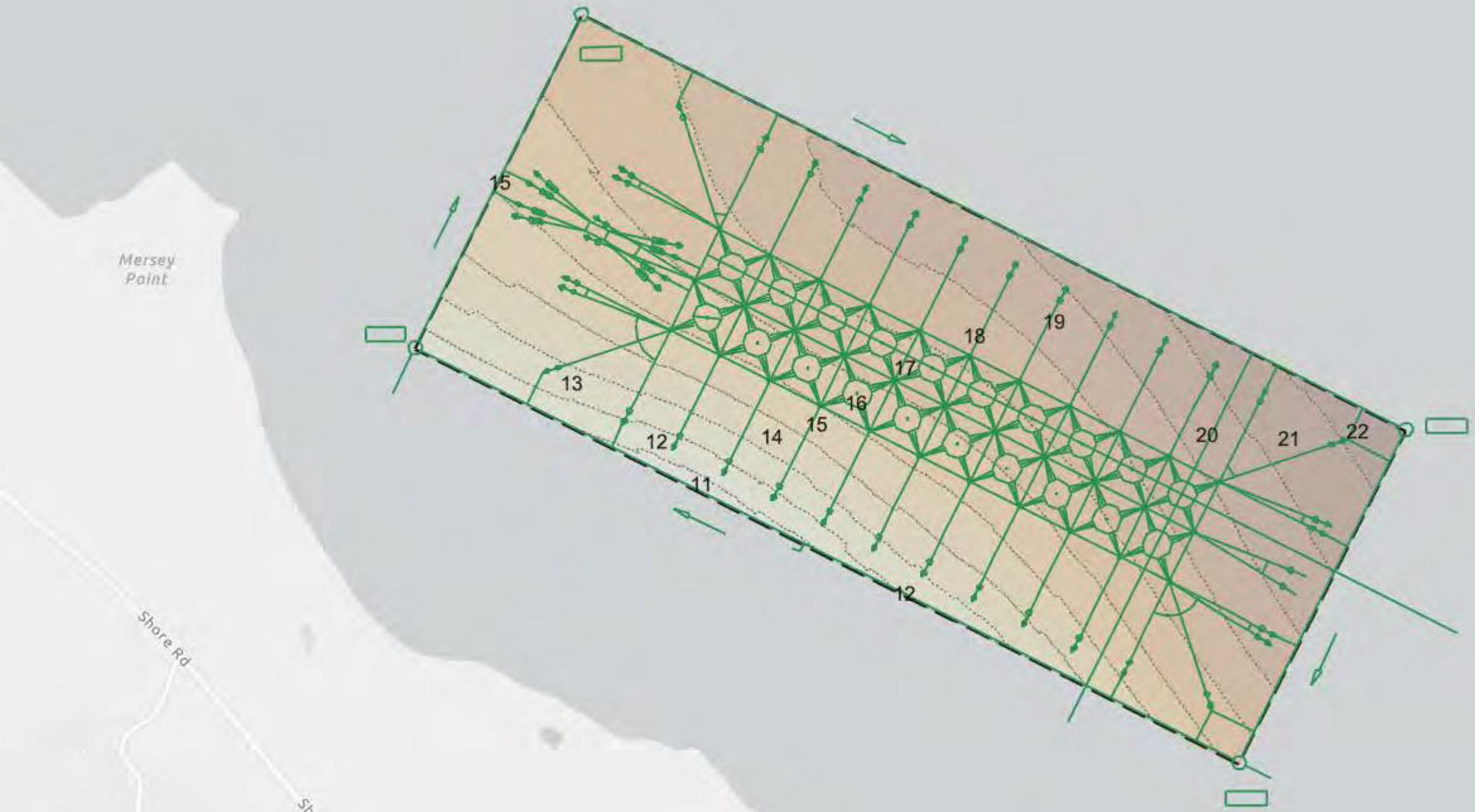
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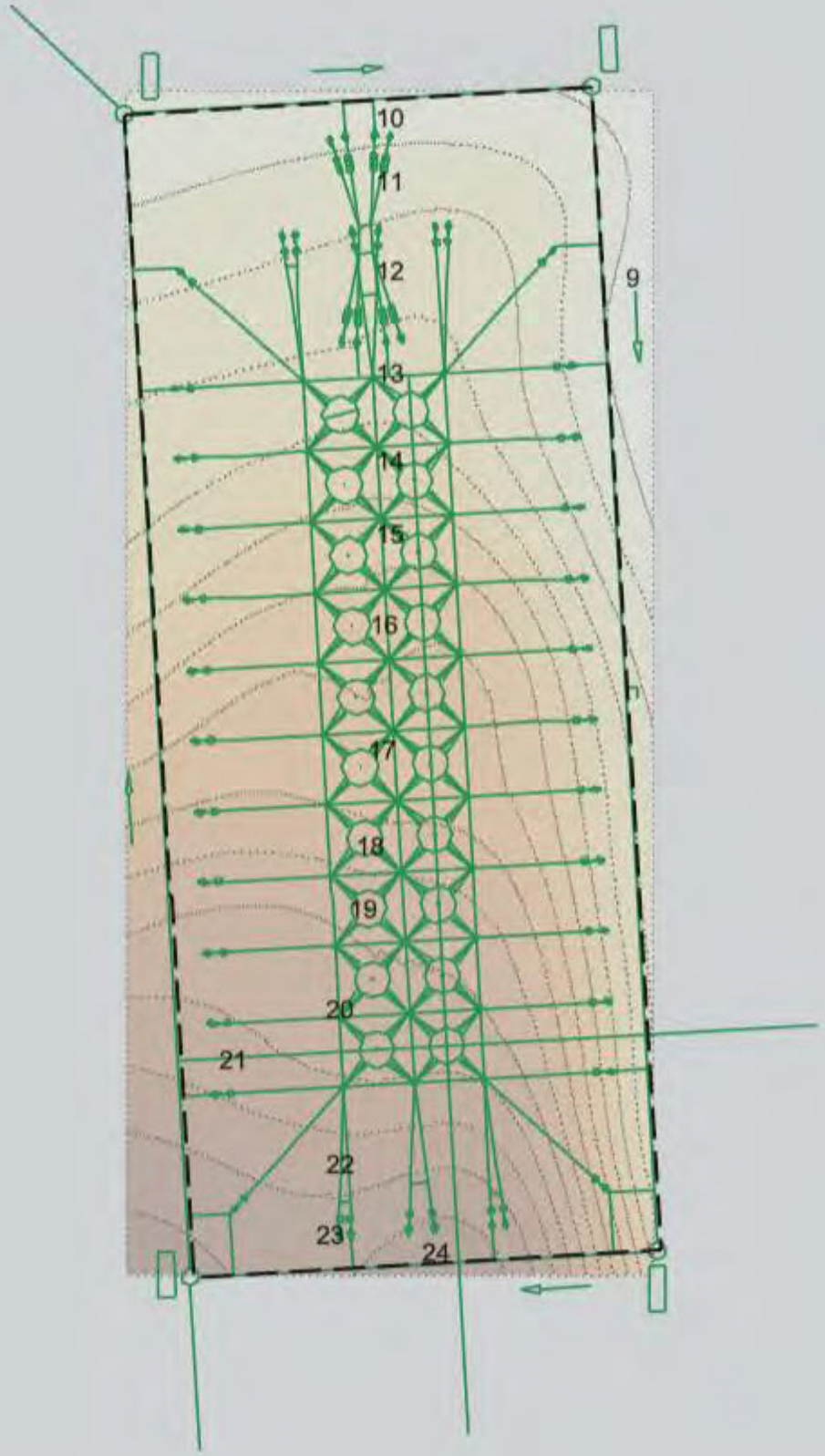
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TAB J

2023 NSARB-2023-001

This is Exhibit “J” referred to in the
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on January 22, 2024

[redacted]

Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

Defining Lobster Fishermen Concern for Finfish Aquaculture on Lobsters and Lobster Fishing Communities in Nova Scotia: A Pilot Study

Laboratory of Innovation in Science and Industry

Université Sainte-Anne

September 30, 2015

Université Sainte Anne

This study was funded by
Nova Scotia Fisheries and Aquaculture

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Contents

Acknowledgements

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Université Sainte-Anne faculty members and students were also important contributors to this report. We especially thank:

» Jonathan Bédard, Research Assistant
» Gilles Maillet, M.A. Research Assistant
» Nicole Ring, Research Assistant
» Brian Gibson, Associate Professor, Revisions
» Liam Hanks, Graphic Design

Executive summary

This report provides a scientific assessment of lobster fishermen's concerns about marine finfish aquaculture[1]. The findings herein are intended to serve as a governing tool for the systematic and scientific study of the impact of finfish aquaculture on lobsters and lobster fishing in Nova Scotia.

After individual, face-to-face interviews and focus groups with thirty-three lobster fishermen and community stakeholders, we were able to document five environmental concerns and five social, political, and economic concerns:

Environmental concerns	Social, political and economic concerns
Feed, feces and dead water	Big Industry
Pest, pesticides and antifouling agents	Government monitoring
Benthic impact and recovery	Job creation (myth)
Equipment as pollution	Ignored lobster industry
Compatibility	Research

These concerns were shared by all five southern counties of Nova Scotia: Queens (LFA 33), Shelburne (LFA 33), Yarmouth (LFA 34), Digby (LFA 34), and Annapolis (LFA 35). The interviews and focus groups were conducted until we attained a satisfactory saturation point or until we attained "a point of diminishing return, where increasing the sample size no longer contributes to the evidence"[2], as recommended by the experts in the field of qualitative studies[3].

In response to these concerns, three research programs were generated:

- Impact of farm discharges, including organic waste (uneaten feed and faeces), inorganic waste (dissolved nutrients), pesticides and heavy metals on the benthic habitat, lobster populations, and other organisms. Specific areas of concern included:
  - Impact of heavy metals and antifouling agents (i.e. copper, zinc, cadmium) contained in feed on benthic invertebrates.

1 Please note that other reports and scientific articles may use "open-net pens" as an equivalent to "marine finfish aquaculture". Fishermen may also use the term "open pens". Our decision to use "marine finfish aquaculture" as a universal qualifier throughout this text is simply an editing decision.

2 M. Mason (2010), "Sample Size and Saturation in PhD Studies Using Qualitative Interviews," *Forum Qualitative Sozialforschung [Forum: Qualitative Social Research]*, 11(3), Art. 8, accessed at http://nbn-resolving.de/urn:nbn:de:0114-fqs100387.

3 *Ibid*. Also see Greg Guest, Arwen Bunce & Laura Johnson (2006), "How many interviews are enough? An experiment with data saturation and variability", Field Methods, 18(1), 59-82.

- » Impact of pesticides used for treatment of sea lice on benthic invertebrate;

- » reproductive ability and health of adult and larval lobster near salmon farms;
  - » pesticide accumulation in lobsters and other non-target organisms;
  - » wild salmon reproduction and mortality in rivers adjacent to salmon net-pen farms;
  - » proliferation of fish and shellfish as well as human pathogens in the aquatic environment.
- » Impact of organic waste (uneaten feed and faeces) on the benthic environment beneath and surrounding the farm site.
- » The impact of nutrient enrichment (i.e. eutrophication) due to heavy loading of organic and inorganic farm waste (i.e. ammonia, nitrate, phosphate, dissolved organic carbon) on the marine environment, specifically with respect to the occurrence of algal blooms and low oxygen levels.

» An evaluation of standard operating procedures for site management with respect to fishermens concerns (e.g. tagging of pens, noise reduction).

» An evaluation of the socio-economic effects of aquaculture in Nova Scotia.

While some studies on these subjects have already been conducted, research gaps still exist. As Doelle and Lahey state, "[t]he ultimate effectiveness of the regulation of aquaculture in Nova Scotia will depend on research being done to address such gaps"[4]. Studies to come out of this report are to be designed with long-term measurements in mind; multiple studies, conducted in multiple locations, over long periods, are the best way to ensure that regulation is working, that new and existing sites are being properly monitored, and that Nova Scotia becomes a leader in the creation of a sustainable finfish aquaculture industry. These outcomes are essential if the lobster industry, a historic, vital sector of Nova Scotia's economy, is to remain recognized and protected, as the province aims to achieve its *One Nova Scotia Commission* goal of doubling the value of exports from fisheries (including aquaculture)[5].

4 M. Doelle and W. Lahey (2014), "A New Regulatory Framework for Low-Impact/High-Value Aquaculture in Nova Scotia," *The Final Report of the Independent Aquaculture Regulatory Review for Nova Scotia [The Doelle-Lahey Panel]*, p. X. [Accessed September 18, 2015 at: http://novascotia.ca/fish/documents/Aquaculture_Regulatory_Framework_Final_04Dec14.pdf.]

5 Ray Ivany et al. (2014). *Now or Never: An Urgent Call to Action for Nova Scotians – Final Report*, One Nova Scotia Commission, p. 49. [Accessed September 18, 2015 at: http://onens.ca/wp-content/uploads/Now_or_never_short.pdf.]

Introduction

In 2014, the Nova Scotia government received the final report from the Nova Scotia Commission on Building Our New Economy. In this report titled *Now or Never: An Urgent Call to Action for Nova Scotians* is a suggestion to sustainably double the "value of exports from the fisheries (including aquaculture) and the agriculture sectors"[6]. But the aquaculture industry in Nova Scotia faces a number of economic, environmental, and socio-economic challenges. One of the most significant challenges is public concern about the potential impact of finfish aquaculture operations on the marine environment and on the traditional fisheries in coastal Nova Scotia.

These concerns have led to much media and public attention in several Nova Scotia communities. In their recent review of the aquaculture industry, Doelle and Lahey state that the salmon-farming industry in Nova Scotia has a significant social licence problem which needs to be addressed for the industry to be able to continue to grow[7]. Marine finfish farms are perceived as "significant polluters of the marine environment and [as] using practices that are not sustainable for ecosystems or the health of the fish that are farmed, or the wild fish or other aquatic life that comes into proximity with open-net pens"[8].

The lobster industry, vital to the NS economy, has been adamant in voicing its concerns about net-pen farming of salmon, especially with regard to the impact of such finfish aquaculture on lobster. As stated in the Doelle and Lahey report, "concerns range from displacement of individual fishers from their traditional lobster fishing grounds to contamination of lobster through feed, medication, pest-control products and chemicals used in aquaculture operations, and to the effect of benthic contamination on the abundance of lobster in a given area"[9]. This same report also highlights the lack of scientific information on the subject and stresses the need for further research: "Participants in the February 10, 2014,[*sic*] Knowledge Roster generally agreed that little research has been conducted about the interaction of finfish aquaculture and lobster"[10].

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6 *Ibid.*, p. 49.

7 M. Doelle and W. Lahey (2014). *op. cit.*, p. 22. A 2010 report, "Socio-Economic Impact of Aquaculture in Canada," published by Fisheries and Aquaculture Management of Fisheries and Ocean Canada, addresses the same issue (see http://www.dfo-mpo.gc.ca/aquaculture/ref/aqua-es2009-eng.pdf, p. 39). Finally, this situation is also echoed in the *Final Report*, One Nova Scotia Commission, p. 7.

8 *Ibid.*, p. 22.

9 *Ibid.*, p. 27.

10 *Ibid.*, p. 27.

The pilot study proposed herein has, as its primary objectives, two responses to this lack of research:

- » developing a clear and concise articulation of the NS lobster industry's most pressing concerns about finfish aquaculture;
- » addressing these concerns in research programs that will involve further studies.

These research programs are to form the backbone of systematic, scientific answers to lobster fishermen's concerns about the impact of finfish aquaculture on lobster.

Method and participant description

Throughout this project, we have worked directly with individual communities where salmon farming is being done. As noted earlier, the objective of this work was to identify individuals' issues with and concerns about the potential impact of finfish aquaculture on lobster fishing and lobsters' health. This information can now be used to develop targeted, customized research programs to investigate the impact of finfish aquaculture on communities (socio-economically), on the marine environment, and on traditional fisheries in NS, most notably with regard to lobster fishing.

Table 1: List of southern Nova Scotia communities included in the public consultation/outreach process

Target Area	County	Location of farm sites
1	Queens	Liverpool bay
2	Queens	Port Mouton
3	Shelburne	Jordan bay
4	Shelburne	Shelburne Hbr
5	Shelburne	Barrington Passage
6	Shelburne	Upper Woods Hbr
7	Yarmouth	Pubnico Harbour
8	Yarmouth	Lobster bay
9	Digby	St. Mary's bay
10	Annapolis	Annapolis Basin

At present, finfish aquaculture is being practiced in ten communities in five southern Nova Scotia counties: Queens, Shelburne, Yarmouth, Digby, and Annapolis (see Table 1 for the list of communities). Table 2 provides a further profile of each county (the community information was gathered from Statistics Canada's 2011 Census Profile and from Fisheries and Ocean Canada[11]).

These small population centres cover three Lobster Fishing Areas (LFAs): 33, 34, and 35, as shown in Figure 1. These Fishing Areas are, for the most part, considered healthy, as there is an abundance of landings, a good catch rate, and a good trawl- survey catch rate[12].

11 Statistics Canada (2012) and DFO (2014). Full citation in the References section.

12 DFO (2014). Full citation in the References section.

Table 2: Summary of community profiles

Queens

Total population:	10,960	Population 20-59 years: 5,455	
Language		LFA 33 - information	
English:	10,570	Total No. of licenses: 707	
French:	80	Annual lobster landings: 3,377 (2009-10)	
Non-Official:	150	Healthy zone: Yes	

Shelburne

Total population:	14,496	Population 20-59 years: 6,430	
Language		LFA 33 - information	
English:	14,050	Total No. of licenses: 707	
French:	155	Annual lobster landings: 3,377 (2009-10)	
Non-Official:	110	Healthy zone: Yes	

Yarmouth

Total population:	25,725	Population 20-59 years: 13,045	
Language		LFA 34 - information	
English:	19,325	Total No. of licenses: 985	
French:	5,065	Annual lobster landings: 19,749 (2009-10)	
Non-Official:	260	Healthy zone: Yes	

Digby

Total population:	18,036	Population 20-59 years: 9,115	
Language		LFA 34 - information	
English:	11,850	Total No. of licenses: 985	
French:	5,430	Annual lobster landings: 19,749 (2009-10)	
Non-official:	190	Healthy zone: Yes	

Annapolis

Total population:	20,756	Population 20-59 years: 10,080	
Language		LFA 35 - information	
English:	19,555	Total No. of licenses: 97	
French:	450	Annual lobster landings: 1,898 (2009-10)	
Non-official:	385	Healthy zone: Yes	

Healthy zone are based on three abundance indicators (landings, commercial catch rate and trawl survey catch rate)

According to the Aquaculture Site Mapping Tool[13], there are twenty-four Marine Finfish Aquaculture sites in these areas (Figure 2 shows the different site locations). Shelburne County has the greatest number of sites (9), while Queens County has the least (2). The interactions between finfish sites and lobster fishing for each county are rather diverse. For example, the marine finfish farms in the Annapolis County are found within the Annapolis Basin, an area that is greatly affected by tide changes. Digby County has sites at the tip of Long Island, a body of land that, in part, divides Sainte-Mary's Bay from the Bay of Fundy. Yarmouth County has its concentration of finfish farms around such islands as Pumpkin Island or Big Gooseberry Island. Shelburne County has some sites on the southernmost tip of Nova Scotia but also has sites deep within its bay, as far northeast as near Paddy's Cove. Queens County has one site near Port Mouton and another near Coffin Island. We were concerned that these differences might impact our results and therefore included all of them in our sample.

This project involved extensive community outreach in these areas and solicited input from a broad and diverse group of participants. Perceptions were to be drawn from both proponents and opponents of finfish aquaculture operations, particularly with regard to the impact on lobsters' health, population, and habitat, and on the lobster fishery. But of the more than 80 respondents approached, most of those willing to participate were, in the main, opposed to finfish aquaculture operations. It is important to note that community stakeholders who helped with the recruitment of participants confirmed that the situation would be as such, for our study focused specifically on lobster fishermen, a group that has had a tense relationship with marine finfish aquaculture. Furthermore, our observation of opposition confirms Doelle and Lahey's statement, as well as other reports, about the significant social licence problem that the salmon farming industry has had in Nova Scotia[14].

Responses were obtained in face-to-face interviews and focus groups targeting stakeholders in each of the ten communities. These two methods of data collection were preferred to large sample quantitative surveys for three reasons. First, large sample quantitative surveys are better for the verification of a hypothesis and often ill-suited to exploratory research interested in measuring experience and meaning[15] (as required here). Second, responses tend to be more

13 http://novascotia.ca/fish/aquaculture/site-mapping-tool/

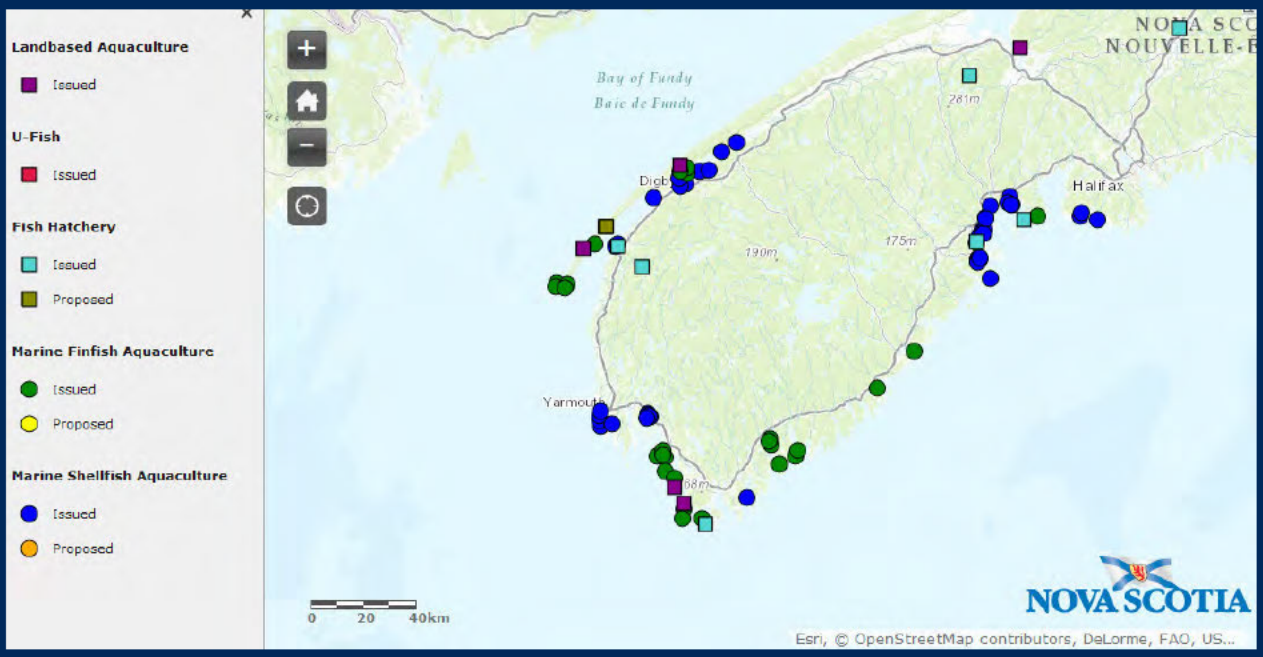
14 See Introduction (p. 7).

15 J. M. Corbin and A. Strauss (2015), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, SAGE Publications, Thousand Oaks, p. 5; Marc Charron and Simon Laflamme (2008), "Chapitre 2: Les méthodes en sociologie," *Initiation thématique à la sociologie*, ed. Jean Lafontant et Simon Laflamme, Prise de Parole, Sudbury, p. 46; Lorraine Savoie-Zajc (2003), "L'entrevue semi-dirigée," *Recherche sociale: De la problématique à la collecte des données*, dir. Benoît Gauthier, Presse de l'Université du Québec, Saint-Nicolas, p. 294.

Figure 1: Lobster Fishing Areas (LFA)

http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/ifmp-gmp/maritimes/insholob-2011-eng.htm

Figure 2: Aquaculture operation in Southern Nova Scotia



http://novascotia.ca/fish/aquaculture/site-mapping-tool/

elaborate and complex when using qualitative data-collecting tools[16]. Finally, qualitative research facilitates information sharing when a subject is politically and emotionally charged[17], as was the case here.

We were also able to draw on some important advantages of combining individual interviews with focus groups. For example, the individual, face-to-face interviews served as a pre-test for our survey tools. We were able to evaluate the effectiveness of our questions with single participants before gathering larger groups of people together. Had we noticed any problem with our survey tools during these face-to-face interviews, we could have corrected the problem with little loss of time, money, and data. Individual, face-to-face interviews also reduce any outside influence during the data collection process. Social psychology has confirmed that group meetings tend to polarize responses instead of enticing diversity. (If, for example, a group leader is quickly acknowledged by the other participating members, it is possible that they toe the line, as they do not want to incite any controversy[18]). It was, therefore, important to allow some participants to share information without fear of being judged by fellow lobster fishermen. These individual interviews would also serve as "respondents" to our focus groups — in other words, if the one-on-one meetings produced different results from our group sessions, we could have concluded that group leaders influenced the other participants and further data collection was necessary. What we observed instead was that those concerns expressed during the focus groups were in line with those presented during individual, face-to-face interviews with key community stakeholders. This, in turn, may mean one of two things: if diverse opinions on the subject do exist within our selected communities, proponents 1) either do not wish to say so, even in confidence, or 2) are not among lobster fishermen and community stakeholders. Regardless, our data collection did not, from the onset, intend to prove whether finfish aquaculture is good or bad. Our mission was to document concerns about marine finfish aquaculture on lobsters. And, as we observed, these concerns were the same for all participants. Finally, individual interviews are one of the most expensive ways of collecting data, as they require a highly specialized interviewer (or interviewers) conduct a large number of interviews, incurring hefty travel costs[19]. By combining both methods, we were able to reduce some of the research cost. For a reasonable price, participants — some alone, some in groups — were given the

16 J. M. Corbin et A. Strauss (2015), *op. cit.*, p. 5.

17 A. Tremblay (1991), *Sondages, histoire, pratique et analyse*, Gaëtan Morin, Montréal, p. 112.

18 M. J. Brauer and V. Jacquelin (2001). "The communication of social stereotypes: The effects of group discussion and information distribution on stereotypic appraisals," *Journal of Personality and Social Psychology*, 68, pp. 1014-1029; M. J. Brauer and M. D. Gliner (1995), "The effects of repeated expressions on attitude polarization during group discussion," *Journal of Personality and Social Psychology*, 8, pp. 463-475; D. M. Mackie (1986), "Social identification effects in group polarization," *Journal of Personality and Social Psychology*, 50, pp. 720-728.

19 A. Tremblay (1991), *op. cit.*, p. 113.

opportunity to present their concerns in an informal environment to university researchers, who acted as an independent third party.

To further reduce outside influence, we used a "recursive style" question at the beginning of our survey. While little literature can be found on this type of open ended question, we have used it in the past with great results[20]. The participants were asked to write on a piece of paper what words come to mind when we say "Salmon farming" or "Finfish aquaculture". The interviewer would then go over each of these words, allowing the participant to fully elaborate their thoughts and responses. The first question only ended once everyone's words had been shared and commented on. By structuring our first question as such, we were certain to not entice the participants beforehand, encouraging neither a positive nor negative perception of the subject. Participants were as free as possible to direct their responses according to their initial perception of salmon farming or finfish aquaculture. During the individual interviews, it was most apparent that no cues from the researcher or from another participant could have encouraged a specific response. And, as noted above, since the individual interviews aligned squarely with what was observed during the focus groups, we are confident that the concerns collected at the beginning of each meeting were not those of the research team or of a dominant group leader. The rest of the survey followed a more semi-directed style of interview, prompting responses based on literature and on our desire to compare positive and negative perceptions of finfish aquaculture. These secondary questions also allowed us to cross-reference responses if an individual or group did not touch on a specific subject. The survey tools are presented in Appendix 1.

Interviews and focus groups were conducted until we attained a satisfactory saturation point, or until we attained "a point of diminishing return, where increasing the sample size no longer contributes to the evidence"[21]. In 2010, Mark Mason examined five hundred and sixty qualitative studies and observed that 31 participants was the mean sample[22]. While this number is not considered a requirement in qualitative research, as some researchers have attained saturation within the first five interviews[23], we felt that it was a suitable number if our categories were to be properly verified. Even after we achieved a point of relative saturation early on, a point where we were able to create 85% of the categories that are found in the results, we continued until 33 participants had voiced their concerns.

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20 S. Laflamme et S. Mainville (2003), *L'Amateur de théâtre en Ontario français: différenciation et indifférenciation (Étude de marché réalisée auprès des abonnés, des acheteurs à billet simple et des non-abonnés des régions de Sudbury)*, Ottawa et Toronto, Ottawa/Sudbury, Théâtre action/ Institut Franco-Ontarien.

21 M. Mason (2010), "Sample Size and Saturation in PhD Studies Using Qualitative Interviews," *Forum Qualitative Sozialforschung [Forum: Qualitative Social Research]*, 11(3), Art. 8, accessed at http://nbn-resolving.de/urn:nbn:de:0114-fqs100387.

22 M. Mason (2010), *op. cit.*

23 M. Mason (2010), *op. cit.*

Results

After the five individual, face-to-face interviews were conducted with community stakeholders, more than eighty lobster fishermen were approached for the focus groups. Of these eighty, thirty-three accepted and met with our Senior Research Associate.

From the transcripts, ten categories were created: five pertaining to the environment and five pertaining to political, social and economic concerns. It is critical to note that these categories arose from interviewees' perceptions and experience; it was quite common for participants to state that they were only expressing their views on the subject matter, gained through hearsay and mostly through experience, and that they were not scientists. They also made it clear that they were aware that much research on the subject already existed. In certain areas, participants submitted some of these articles and they have been listed in Appendix 2.

1. Environmental concerns

Almost every interview or focus group started with expressed concerns about the environment. Pollution, caused by feed, feces or pesticide, was at the forefront of cited fears. Unsurprisingly, though, as we interviewed lobster fishermen, the effect of these pollutants on the ocean bottom was the most recurrent concern. If further research in this area is to be conducted in Nova Scotia, the benthic impact of marine finfish aquaculture must be given priority. Table 3 summarizes these results.

Table 3: Recurrent categories pertaining to environmental concerns

	Port Mouton	Shelburne	Yarmouth	Digby	Annapolis	Stakeholder 1	Stakeholder 2	Stakeholder 3	Stakeholder 4	Stakeholder 5
Feed, feces and dead water	•	•	•	•	•	•	•	•	•	•
Pest, pesticides and antifouling agents	•	•	•	•	•			•	•	•
Benthic impact and recovery*	•	•	•	•	•	•	•	•	•	•
Equipment as pollution		•	•	•	•		•	•	•	•
Compatibility	•	•	•	•		•	•	•	•	•

N.B. Bullets represent concerns identified by participants.

**While benthic is the scientific termed used for the ocean bottom, lobster fishermen preferred the terms "fishing bottom", "ocean bottom", "lobster bottoms" or "bottom".*

1.1 Feed and feces

The practice of grouping a dense population of finfish in such small enclosed often sheltered bays is considered the primary cause of the pollution problem. Every interviewee or focus group mentioned, without prompting, that they believe that the floor bottoms were in very poor condition, and not just immediately around the marine finfish farms, but for kilometres around them. It is widely believed that this is a direct result of the high concentration of feed and feces that fall to the bottom of the ocean and yet are not being carried away by the strong tides. The nutrient-rich feed and feces increase algae build-up, which in turn prevents plant life from properly developing on the ocean bottom. It is for this reason that a substantial number of participants suggested a transfer from marine finfish farms to land-based sites. How are lobsters supposed to feed, reproduce, or even breathe in these environments that become inhospitable habitats? asked many participants. The term "dead water" was also used when referring to oxygen-poor waters surrounding marine finfish farms. Concerns about sulfur and sulfite levels, as well as zinc levels, were also touched upon.

1.2 Pests, pesticide, and antifouling agents

Another problem related to the dense population of finfish aquaculture is sea lice. Participants reported that these small parasitic crustaceans are very troublesome for farmed salmon in marine finfish farms, as they can easily propagate, feeding on the large number of fish skins. While sea lice do not naturally pose any kind of threat to lobsters, the pesticide used to control these parasites is considered, by the participants, to be a problem: both creatures are in the shellfish family and so the products used to kill one almost certainly affects the other. It was also noted that, as sea lice become more resistant to previously used pesticides, the aquaculture industry is forced to use larger doses of more lethal kinds of pesticides. Reports of lobster shells becoming fragile, some even turning into a jelly like substance, were documented during our interviews and focus-group sessions.

Concerns about antifouling agents were also raised by some of the individuals and groups. In order to control the natural accumulation of organisms (e.g., algae or bacteria) on underwater equipment, such as marine finfish aquaculture equipment and wooden lobster traps, antifouling agents are used. These agents are designed to remove or prevent bio-fouling and the participants wondered how increases in their use, because of salmon farming equipment, might further impact the current ecosystem? Copper residues, as a by-product of the marine finfish aquaculture equipment and antifouling agents, were mentioned.

Questions about the detrimental impact of pesticides and antifouling agents on the lobster larvae were also raised, especially as lobster larvae are very vulnerable and float on the surface.

Although not directly related to the question presented by our researcher, a few participants asked if the increase in sea lice, caused by salmon farming, might affect wild salmon.

1.3 Benthic impact and recovery

The benthic effect of marine finfish aquaculture does not seem to simply be a short-term concern. According to testimonies gathered during our meetings, researchers and divers state that the "fallowing" or the temporary cessation of aquaculture operations does not seem to lead to a rapid recovery of the ocean bottom. Some respondents cited testimonies and different scientific articles reporting that it is taking longer than anticipated for the seabed beneath and around marine finfish farms to recover; some mentioned more than 3 to 5 years, while others mentioned more than 6 to 7. This unexpected and unpredictable recovery time is especially worrisome to respondents because they believed existing sites may be causing irreversible damage to the seabed. It was also noted that this benthic impact can be felt as far as "hundreds of yards away from salmon farms".

1.4 Equipment as pollution

Netting and broken cage parts were cited as other inconvenient elements related to marine finfish aquaculture. While some of the pens have become tangled up with lobster cages, torn netting or broken tubing have also been observed floating around, causing problems with lobster cages or washing ashore. "Unlike lobster cages, salmon farms are not properly identified" (participants 106b). "The [aquaculture] companies should be required to have identifiable cages as this would help enforce proper maintenance, regulation, and clean-up of polluting equipment" (participant 108d).

Noise pollution by equipment was also mentioned fairly often in communities where marine finfish farms are close to populated shores. The sound of the machinery responsible for feeding the fish at regular intervals was considered bothersome.

For some, the sight of the equipment detracts from the visual beauty of Nova Scotia's shores. While this opinion was not raised during each encounter or was not shared by everyone during the focus groups, it was recurrent enough to warrant mention here.

1.5 Compatibility

The subject of compatibility was addressed by one of our semi-directed questions. We asked participants, "How might shell-fish aquaculture interfere with or disrupt the activities of other users of coastal waters?" The objective of this question was to help us compare finfish aquaculture with another kind of operation. As this was a prompted question, everyone offered a response, none of which deviated from the general notion that shell-fish aquaculture is greener, less invasive, less threatening than is finfish aquaculture.

When discussing the compatibility of different types of aquaculture, it was common for participants to state that marine finfish aquaculture equipment could work if used correctly. As noted above, land-based sites were often cited as the preferred solution to marine-based farms, but, on a few occasions, the question did produce another interesting piece of anecdotal information: there were some reports of good practices in other communities, especially, and most notably in the Annapolis Basin. It is possible that, in this community, dialogue between its residents and the industry has been better than in other communities and that the community's expressed wishes about cage placement were respected. Furthermore, it is possible that, as a result of community input, the sites in Annapolis Basin are less troublesome as they are better located and so the worst of the bio-waste is properly flushed out[24]. We stress that such statements were, however, too few to be generalized. What we can say is that future research should consider comparing any findings gathered in one region with those found in the Annapolis Basin, at least until these statements have been verified empirically.

2. Political, social, and economic concerns

Table 4 summarizes discussion elements that were not directly related to the environment. All of the terms found in Table 4 present a much stronger inherent internal cohesion than was observed with the ideas pertaining to the environment. Whether a participant mentioned government monitoring or Big Industry or job creation, these other ideas were not far behind. These concepts, like the previous list, were also mostly a consequence of the "recursive question", meaning that they were mentioned without any prompting by the Senior Research Associate.

24 According to respondents who reported on this subject, the aquaculture industry was forced into dialogue by community residents – had this not been the case, it is not clear that the situation would be as such. It is important to note that we did not verify these statements as it was not part of our research objectives. The statement about proper tidal flushing was also not verified for this same reason.

Table 4: List of recurrent categories pertaining to political, social, and economic concerns

	Port mouton	Shelburne	Yarmouth	Digby	Annapolis	Stakeholder 1	Stakeholder 2	Stakeholder 3	Stakeholder 4	Stakeholder 5
Big Industry	•	•	•	•	•	•	•	•	•	•
Government monitoring*	•	•	•	•	•	•	•	•	•	•
Job creation (myth)	•	•	•	•	•	•	•	•	•	•
Ignored lobster industry	•	•	•	•	•	•	•	•	•	•
Research*	•		•			•	•		•	•

N.B. Bullets represent concerns identified by participants.

**Sometimes prompted because of literature review.*

2.1 Big Industry

Whenever asked, "What comes to mind when we say salmon farming or finfish aquaculture?", if the respondents did not start with environmental concerns, they discussed their relationship with and perception of the aquaculture industry. There is a very strong sense, by participants, that the industry is only interested in profit, it is polluting the pristine waters off coastal areas, and it is tearing up communities without offering much in return. Accountability was also mentioned often when discussing the aquaculture industry. The strong feeling of mistrust that emerged whenever the industry was mentioned is not an easy political or social reality to contend with. Even when prompted, participants did not have much good to say in favour of the industry. This was especially obvious when we compared finfish aquaculture with other types of operations, such as shellfish aquaculture. As noted above, the consensus was that shellfish aquaculture is much more enviro-friendly and much less of a threat to lobster fishing.

2.2 Government monitoring

Among stakeholders, this concept was not always presented during the "recursive question". Inspired by the Doelle and Lahey report, it was sometimes prompted by our Senior Research Associate. The general sentiment, from both individual interviewees and focus groups, is that governing bodies do not have the resources required to properly enforce rules and regulation and, even if this were to change, that the aquaculture industry is not regulated as are the lobster and farming industries. These concerns go beyond the labelling of fishing equipment mentioned above (see *1.4. Equipment as*

pollution). Respondents felt that the aquaculture industry, in its striving for profits, gets away with all kinds of dangerous or unsavoury practices, such as claiming compensation for lost salmon that simply died because of freezing, using banned pesticides, blaming lobster fishermen for entangled traps, and dividing communities to gain political support. The general feeling was that the government cannot or will not do anything about these immoral or illegal practices; frustrations are accentuated by the continued financial support granted to the industry by the government. Many respondents called this support "government bail-outs".

2.3 Job creation (myth)

One of the main reasons that communities accept aquaculture installations is because they create jobs. Participants report that, with every salmon farm, new jobs are promised by both the government and the industry. These jobs are beneficial for the unemployed, for retaining people who would otherwise move out west for work, and they stimulate local economies, as expressed by participants. Jobs in aquaculture could be promising community development projects. It was very common for the respondents to state that job creation is an important political project and that it must be encouraged. What is bothersome for most, if not all participants, is that these promises remain promises; there is a lack of tangible evidence that jobs are created in Nova Scotia at the local level as promised. Even after many years of operation, the promise of jobs does not seem to translate into real jobs within the communities. How is it possible that provincial and local government subsidize such an industry when so little return can be observed?, asked a number of participants.

It should be noted that this topic came up during the initial recursive question, without prompt, as well as when our Senior Research Associate asked about the positive elements of finfish aquaculture. Jobs are respondents' refrain when talking about the positive spinoffs of aquaculture operations. A desire to see tangible results could be extremely powerful.

2.4 Ignored lobster industry

When another industry arrives in a community, existing businesses can feel pressured to change their regular operations. This is definitely the case for the lobster fishermen we talked to about the finfish aquaculture industry. Some mentioned an increase in marine traffic that can be cumbersome. In areas where marine finfish farms are near traditional fishing grounds, some displacement was reported. But most of the responses in this category of questions mostly offered a sense that governing bodies and the finfish aquaculture industry disregard the historical, social, and economic

contributions of the lobster industry. The impact of pollutants related to finfish aquaculture operations is felt to have a direct, negative impact on the lobster industry. The treatment of sea lice with pesticides designed to harm crustaceans is felt to indirectly threaten lobsters' health and longevity. It is hard, too, for lobster fishermen not to feel personally threatened by marine finfish aquaculture. The mere placement of marine finfish farms in their communities can immediately spark resentment. But combined with this issue are many other stressors. For example, lobster fishermen have a sense of not being listened to even if they are often consulted. They also commented on rumours and news reports that the salmon farming industry receives certain subsidies—for a loss of equipment or for a loss in production—that lobster fishermen do not receive. And so a clearer understanding of the participants' sentiments emerges: lobster fishermen feel underappreciated and they feel that their historical and ongoing contribution to community wealth and stability goes unrecognized.

2.5 Research

We decided to make this a separate category because it was just as often mentioned when people refused to participate in the project as when we asked them the last question of our survey. The question reads: "Keeping all that we have discussed in mind, where might we focus our studies to best respond to concerns about finfish aquaculture?" There is a general sense that a lot of research exists on the interaction between lobster and finfish aquaculture, but that this research is not being fairly considered by the industry and by governing bodies. The argument normally ties feelings of distrust and frustration to those of fatigue and apathy: some participants and non-participants admitted to having worked directly with the scientific community in participatory action research, or they helped gathered information by actively participating in focus groups or in community meetings, yet there was not a sense that these contributions improved the situation. (We chose not to argue with participants and non-participants here, as our mandate was simply to gather and record their concerns.)

There was a definite sense that more research needed to be done, as specified in the Doelle and Lahey report[25]. But there was also an expressed frustration that much good research seems to be disregarded. Appendix 2 presents a number of the studies alluded to or expressively named during the interviews and focus groups. This list is not an exhaustive literature review; it presents but a small picture of the research that participants are aware of and serves to suggest why, when invited to participate or when prompted to talk about research, they feel frustrated.

25 "The ultimate effectiveness of the regulation of aquaculture in Nova Scotia will depend on [the] research being done to address such gaps" (Doelle and Lahey, *op. cit.*, p. x).

3. Where might we focus our studies to best respond to concerns about finfish aquaculture?

When asked directly about where studies should focus to best respond to concerns about finfish aquaculture, responses ranged wildly. We believe this to be normal, as the question was not presented ahead of time; participants did not have time to prepare a structured response. The question had to be asked, though, to ensure that we were not misinterpreting concerns presented elsewhere during the study. What we present in Table 5 is therefore a combination of information gathered from sections one and two of this report as well as what was stated by lobster fishermen when asked directly about future research. If participants find that some information is missing, please remember that the wording may have changed (a result of our categorization). And if readers notice that some information has not been presented in the previous sections, please remember that this absence is the result of new ideas stimulated by this last and very direct question about focused research. Finally, we note that research on these many subjects already exists in one form or another. As specified by The Doelle and Lahey report, while it is important to implement good regulations, it is only through continued research that we can evaluate and correct bad practices, as well as develop and sustain good practices.

Table 5: Recommended Research Programs Based on Lobster Fishermen's and Key Community Stakeholders' Concerns about and Perceptions of Net-Pen Finfish Aquaculture *(Presented in no particular order)*

Impact of farm discharges, including organic waste (uneaten feed and faeces), inorganic waste (dissolved nutrients), pesticides and heavy metals on the benthic habitat, lobster populations, and other organisms. Specific areas of concern included:

- » Impact of heavy metals and antifouling agents (i.e. copper, zinc, cadmium) contained in feed on benthic invertebrates.
- » Impact of pesticides used for treatment of sea lice on benthic invertebrate:
- » reproductive ability and health of adult and larval lobster near salmon farms;
  - » pesticide accumulation in lobsters and other non-target organisms;
  - » wild salmon reproduction and mortality in rivers adjacent to salmon net-pen farms;
  - » proliferation of fish and shellfish as well as human pathogens in the aquatic environment.
- » Impact of organic waste (uneaten feed and faeces) on the benthic environment beneath and surrounding the farm site.
- » The impact of nutrient enrichment (i.e. eutrophication) due to heavy loading of organic and inorganic farm waste (i.e. ammonia, nitrate, phosphate, dissolved organic carbon) on the marine environment, specifically with respect to the occurrence of algal blooms and low oxygen levels.

An evaluation of standard operating procedures for site management with respect to fishermens concerns (e.g. tagging of pens, noise reduction).

An evaluation of the socio-economic effects of aquaculture in Nova Scotia.

Conclusion

By addressing some of the major concerns in Southern Nova Scotia's lobster-fishing communities about equipment used for marine finfish aquaculture, this report presents a clear and concise articulation of the worries that remain most pressing for the Nova Scotia lobster industry. After an open and transparent process involving 33 individuals who participated in one of five face-to-face interviews or one of five focus groups, we have summarized these concerns by grouping them into two meta-categories and ten subcategories. Under **Environmental concerns**, we note "*Feed, feces and dead water*", "*Pest, pesticide, and antifouling agents*", "*Benthic impact and recovery*", "*Equipment as pollution*", and "*Compatibility*" as key issues to be looked into further. We also grouped, under the meta-category of **Political, social, and economic concerns**, the following: "*Big Industry*", "*Government monitoring*", "*Job creation (myth)*", "*Ignored lobster industry*" and "*Research*". These categories, with the help of one final question regarding future research, produced three possible research programs, as listed in Table 5. Addressing these concerns in subsequent studies and research programs should sharpen the focus on issues with finfish aquaculture that are clearly important to lobster fishermen and should also ensure a long and sustainable future for Nova Scotia's inshore fishing industries.

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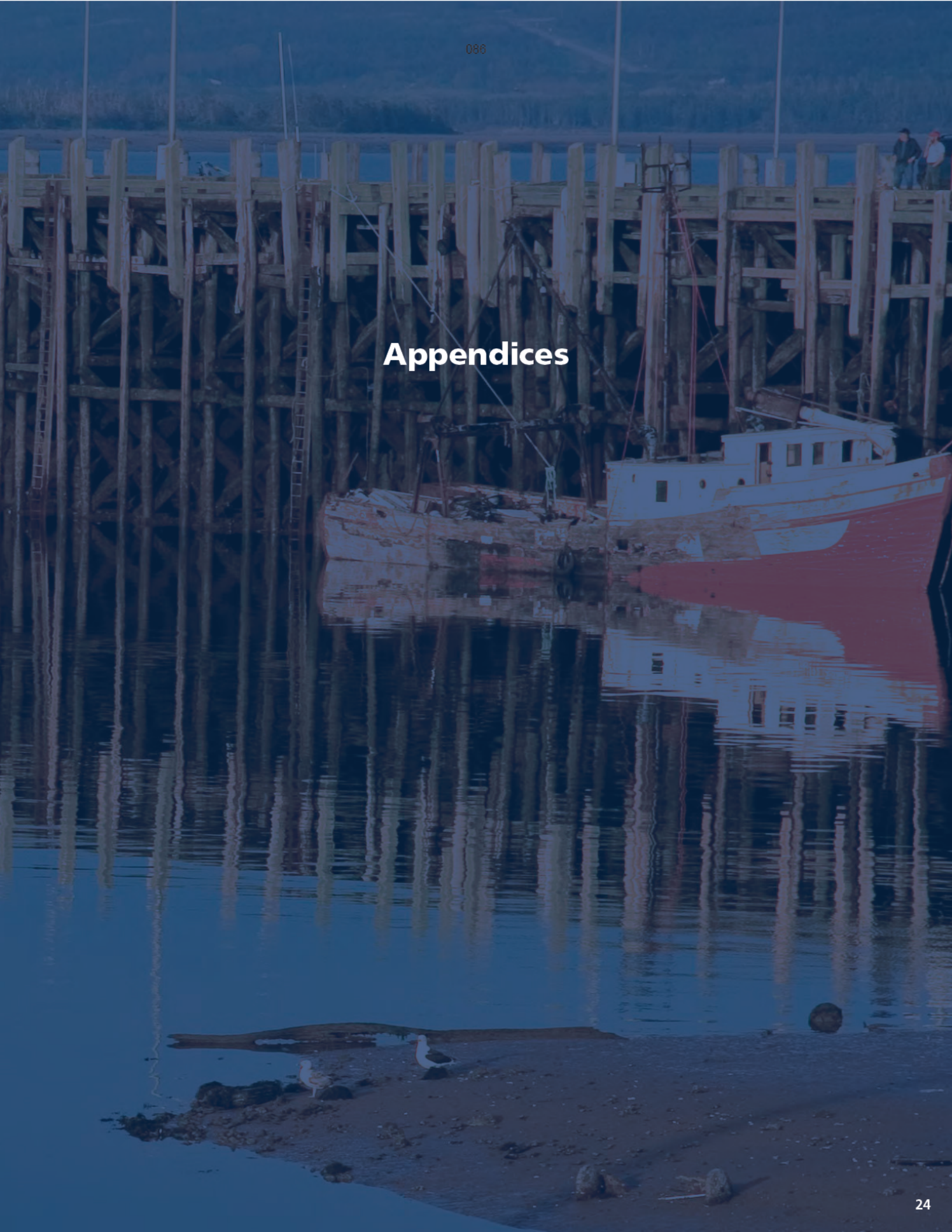

Appendices

Appendix 1: Survey Tools

DEFINING PUBLIC CONCERN ABOUT THE IMPACT OF FINFISH AQUACULTURE ON LOBSTERS AND LOBSTER FISHING COMMUNITIES IN NOVA SCOTIA: A PILOT STUDY

A collaborative research project by

Université Sainte-Anne and

Nova Scotia Fisheries and Aquaculture

Information Letter for Focus Groups

This pilot study has two objectives. The first is to develop a clear and concise understanding of what concerns are most pressing for the NS lobster industry with regard to finfish aquaculture. The second is to help set the foundation for future studies according to these concerns. Your participation in this study is strictly voluntary. You have the right to refuse to participate without fear that your relationship with people and agencies that you are working with may be affected.

If you decide to participate, it will take about two hours of your time. Please answer questions as honestly and as best as possible, but know that this is not a test. You are not required to have the "right answers" to participate and you are not required to answer any question that displeases you. You may also stop the process at any time without fear that your decision to do so may affect your relationship with people and agencies that you are working with.

During each meeting, the researcher will ask to use an audio recorder and will take notes. Recording the conversation will allow the researcher to listen to your story and comments more effectively. All signed consent forms, notes, and recordings will be securely locked in a filing cabinet at Université Sainte-Anne.

Your identity will not be revealed at any time throughout the research activities or reports. Please be aware, though, that any comments about the lobster industry or finfish aquaculture that you may have shared in public may allow others to identify you. As you have already shared these comments in public, we understand that you are probably comfortable with them. That said, it is important for us that you be aware of any such risk.

The results of the study will be provided to the Nova Scotia Fisheries and Aquaculture.

If you have any questions or concerns about the study or about being a participant, please call Roger Gervais, Ph.D., project coordinator (902-769-2114 ext. 7324), or Kenneth Deveau, Ph.D., V. P. Academic (902-769-2114 ext. 7307), at Université Sainte-Anne. You can also call the Research and Ethics Committee President, Marc Lavoie (902-769-2114 ext. 7174), if you have any concerns about the conduct of the study.

Université Sainte-Anne

DEFINING PUBLIC CONCERN FOR FINFISH AQUACULTURE ON LOBSTERS AND LOBSTER FISHING COMMUNITIES IN NOVA SCOTIA: A PILOT STUDY

A collaborative research project by

Université Sainte-Anne and

Nova Scotia Fisheries and Aquaculture

Consent Form for Focus Groups

This pilot study has two objectives. The first is to develop a clear and concise understanding of what concerns are most pressing for the NS lobster industry related to finfish aquaculture. The second is to help set the foundation for future studies in regards to these concerns.

I understand that:

- My participation in this study is strictly voluntary.
- A refusal to participate will not affect my work with others or with any agency.
- If I decide to participate, it will take about two hours of my time.
- I am not required to have the right answers to participate in this study.
- I am not required to answer any question that displeases me.
- I may stop the process at any time without fear that my decision to do so might affect my relationship with people and agencies that I am working with.
- The interview will be recorded.
- All signed consent forms, notes and recordings will be securely locked in a filing cabinet at Université Sainte-Anne and destroyed at the end of the project.
- My identity will not be revealed at any time through the research activities or reports.
- All individual information I provide will be used only for research and will be held strictly confidential.
- I have been informed that any comments about the lobster industry or finfish aquaculture that I may have shared in public, may allow others to identify me.

I am aware that the results of the study will be provided to the Nova Scotia Fisheries and Aquaculture.

I accept to participate in this study and I am keeping one of the two signed copies of this letter.

Signature of Participant _____ Date _____

Université Sainte-Anne

DEFINING PUBLIC CONCERN ABOUT THE IMPACT OF FINFISH AQUACULTURE ON LOBSTERS AND LOBSTER FISHING COMMUNITIES IN NOVA SCOTIA: A PILOT STUDY

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Questionnaire

Section 1 : Recursive interview

1. What words come to mind when we say “Salmon farming” or “Finfish Aquaculture”?

Section 2 : Semi-Structured interview

1. What are some of the negative long-term consequences of salmon farming that we may not have covered in the previous question?

2. What are some of the positive long-term consequences of salmon farming that we may not have covered in the previous question?

3. How might salmon farming interfere with or disrupt the activities of other users of coastal waters?

4. How might shell-fish aquaculture interfere with or disrupt the activities of other users of coastal waters?

5. What are some of the potential benefits and advantages of salmon farming that we may not have covered in the previous questions?

6. A report produced for the NSFA in Halifax underlined concerns about the inability of regulation, even of good regulations effectively enforced, to address problems. Is this also a concern here? In what way?

7. Keeping all that we have discussed in mind, where might we focus our studies to best respond to concerns about finfish aquaculture?

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Background information

1. **Gender:** _____

2. **Date of birth:** _____ _____ _____

   D M Y

3. **Do you mind indicating the initials of your first, middle and last name?:**

   _____ _____ _____

   F M L

4. **What is your cultural background?**

   [Please circle the number that corresponds to the right answer.]

   Anglophone 1

   Francophone/ Acadian 2

   First Nation 3

   Other: (please specify) _____

5. **What education level have you reached?**

   [Please circle the number that corresponds to the right answer.]

   A few years of elementary school 1

   A few years of secondary school 2

   A secondary school diploma 3

   A college diploma 4

   A university degree (B.A., B.Sc., B.Ed., etc.) 5

   A postgraduate degree (M.A. Ph.D., etc.) 6

6. **Which category of lobster fishing best describes you?**

   [Please check off all applicable categories]

   Lobster fisherman.....1

   Avid Anglers 2

   Other: (please specify):_____

Appendix 2: List of cited research

Ernst W, Jackman P, Doe K, Julien G, MacKay K and Sutherland T (2001). "Dispersion and toxicity to non-target aquatic organisms of pesticides used to treat sea-lice on salmon in net pen enclosures". *Marine Pollution Bulletin*, 42, pp. 32–443.

Pesticides are used extensively in the finfish aquaculture industry to control sea lice infestations on farmed salmon. The most prevalent method of use is to enclose a net pen with an impervious tarpaulin and mix a pesticide solution within that enclosure. After treatment for short periods (1 h) the pesticide solution is released to the environment. Concerns have been raised that there is a potential risk to non-target aquatic organisms from those releases. The fate of dispersing pesticide solutions was measured after six simulated treatments in the Lower Bay of Fundy, New Brunswick. Three simulated treatments were done with azamethiphos and three with cypermethrin. Rhodamine dye was added to all pesticide solutions in order to facilitate tracking of the dispersing plume through real-time measurements of dye concentrations by a flow-through fluorometer coupled with a differential global positioning system (DGPS). Water samples were obtained from within the plumes at various times after release and analysed for pesticide content and toxicity to a benthic amphipod Eohaustorius estuaris. Dye concentrations were detectable for time periods after release which varied from 2 to 5.5 h. Distances travelled by the dye patches ranged from 900 to 3000 m and the dye concentrations at the final sampling period were generally 1/200–1/3000 the pre-release concentrations and cypermethrin concentrations were generally 1/1000–1/2000 the pre-release concentrations. Cypermethrin concentrations in water samples were closely correlated with dye concentrations, indicating that dye analyses were an accurate surrogate for cypermethrin concentrations. Most samples taken after the releases of azamethiphos were not toxic to test organisms in 48 h exposures and none were beyond 20 min post-release. By contrast, almost all samples taken after the release of cypermethrin, even up to 5-h post-release, were toxic. Data indicate the potential to cause toxic effects over areas of hectares from a single release of cypermethrin.

Grant, J. (2010). "Coastal communities, participatory research, and far-field effects of aquaculture". *Aquaculture Environment Interactions*, 1, pp. 85-93.

Marine aquaculture is controversial in coastal communities for a variety of reasons, including environmental and aesthetic concerns. Shellfish and especially finfish farming have the potential to cause eutrophication effects on the bottom, and reduce oxygen levels in the water column. Active participation of citizens in data gathering before and after development provides a mechanism of engagement in the science used for development decisions. I examine how participatory science can solve 2 problems: insight into far-field impacts of aquaculture, and entrainment of coastal stakeholders into the decision process. Working with a community group, I suggest sediment profile imaging as a method that could be employed by coastal residents, including participation in image analysis of the apparent redox potential discontinuity, a validated visual indicator of coastal benthic conditions. The implementation of rigorous science, with applicability to ecosystem health and capacity for public participation is key in ecosystem-based management.

Grant J, Bacher C, Cranford PJ, Guyondet T, Carreau M (2008). « A spatially explicit model of seston depletion in dense mussel culture". *Journal of Marine Systems*, 73, pp.155–168.

A fully-coupled biological–physical–chemical model of a coastal ecosystem was constructed to examine the impact of suspended mussel culture on phytoplankton biomass in Tracadie Bay, Prince Edward Island, Canada. Due to the extent of mussel culture there, we hypothesised that shellfish filtration would control the concentration and distribution of phytoplankton and other suspended particles in the bay. Circulation was delineated with a tidally-driven 2D numerical model and used to drive an ecosystem model with a focus on pelagic components including phytoplankton production, nutrients, detritus, and mussels. The benthos were treated as a sink. Nutrients and seston were forced by tidal exchange and river input, with phytoplankton additionally forced by light. Boundary conditions of seston and

nutrients were derived from field studies with an emphasis on the contrast between spring (high river nutrients, low temperature) and summer (low river inputs and high temperatures). Model output was used to map phytoplankton carbon over the bay for each season and in the presence of mussels and river nutrient input. Results indicate severe depletion effects of mussel culture on overall phytoplankton biomass, but no spatial pattern that can be attributed to grazing alone. Primary production generated by nutrient-rich river water created a mid-bay spike in phytoplankton that dominated the spatial pattern of chlorophyll-based carbon. Model results were validated with surveys from a towed sensor array (Acrobat) that confirmed the river influence and indicated bay-wide depletion of 29% between high and low water. Our model results indicate that the farm-scale depletion emphasised in previous studies cannot simply be extrapolated to seston limitation at the ecosystem level.

Hargrave BT (2005). *Environmental effects of marine finfish aquaculture*. Springer-Verlag, Berlin.

Environmental risks associated with large-scale marine finfish cage aquaculture have led to claims that the long-term sustainability of the industry is in doubt. Methods and models currently used to measure near and far-field environmental effects of finfish mariculture and to assess their implications for management are presented in 20 chapters arranged in four sections (Eutrophication, Sedimentation and Benthic Impacts, Changes in Trophic Structure and Function, and Managing Environmental Risks). Case studies show how models may be used to predict environmental changes and provide management tools to minimize potentially adverse environmental risks. The volume is of interest to those working towards sustainable development of mariculture, including environmental managers and decision-makers with regulatory responsibilities.

Hargrave, B.T. et al. (1997). "Assessing benthic impacts of organic enrichment from marine aquaculture". *Water, Air and Soil Pollution*, 99, pp. 641–650.

Benthic observations were carried out at 22 stations in the Western Isles region of the Bay of Fundy on the east coast of Canada to evaluate impacts at salmon aquaculture sites. Eleven sites were located under salmon net-pens and 11 sites (reference or control locations) were at distances > 50 m from net-pens. Total S- and redox potential (Eh) in surface sediment and benthic O2 uptake and CO2 release were sensitive indicators of benthic organic enrichment. High variability between replicate measurements of sediment gas exchange could reflect spatial patchiness in sedimentation of fecal waste and food pellets under fish pens. Biomass of deposit feeders was significantly increased at cage sites but total macrofauna biomass was similar at cage and reference locations. Surface sediment water content, modal grain size, pore water salinity and sulfate, and total biomass of macrofauna were the least sensitive indicators of enrichment.

Hargrave, B.T., Duplisea, D.E., Pfeiffer, E., Wildish, D.J., (1993). "Seasonal changes in benthic fluxes of dissolved oxygen and ammonium associated with marine cultured Atlantic salmon". *Marine Ecology Progress Series*, 96, pp. 249–257.

Benthic fluxes of dissolved oxygen and ammonium were measured at bi-weekly to monthly intervals during 1990-91 proximate to and under an array of pens holding Atlantic salmon Salmo salar Linn. in L'Etang Inlet, a macrotidal embayment in the Bay of Fundy, Canada. Hierarchical clustering of data indicated that the 7 stations could be divided into 3 groups (3 stations under the pen array, 2 at the perimeter of the array and 2 away from pens). Average rates of oxygen uptake and ammonium release for the 3 stations under the pens were 4 and 27 times higher, respectively, than values at the 2 stations distant from the cages. Maximum average rates of ammonium release (38 mmol m-2 d-1) in late July and oxygen uptake (99 mmol m-2 d-1) in early September for stations under the pens coincided with maximum water temperatures and sediment sulfide accumulation, respectively. Negative redox (Eh) potentials (< 0 mV) and reduced numbers of benthic polychaetes Capitella spp. also occurred in

sediments under pens between mid-July and September. Values of > 100 mM S= in sediment pore water during September could have been toxic to benthic fauna as well as to heterotrophic bacteria that produce substrates utilized by sulfate-reducing bacteria

Loucks, R. H., Ruth E. Smith, and E. B. Fisher (2014). "Interactions between finfish aquaculture and lobster catches in a sheltered bay". *Marine Pollution Bulletin*, 88, pp. 255-259.

Interactions between open-net pen finfish aquaculture and lobster catches in a sheltered bay in Nova Scotia, Canada, were investigated using fishermen's participatory research in annual lobster trap surveys over seven years.

Fishermen recorded lobster catches during the last two weeks of May from 2007 to 2013. Catches for each trap haul were recorded separately for ovigerous and market-sized lobsters. Catch trends within the bay were compared to regional trends. Results of correlation analyses indicated that ovigerous catch trends were strongly affected by the fish farm's feeding/fallow periods. There was no significant correlation between trends for bay and LFA lobster landings.

Patterns of lobster catch per unit effort extending over considerable distance in Port Mouton Bay appear to be influenced by proximity to the fish farm regardless of year-to-year variation in water temperatures and weather conditions. Odours and habitat changes surrounding open-net pen finfish operations are potential factors affecting lobster displacement.

Loucks, R.H., Smith, R.E., Fisher, C.V., Brian Fisher, E. (2012). "Copper in the sediment and sea surface microlayer near a fallowed, open-net fish farm". *Marine Pollution Bulletin*, 64, 1970–1973.

Sediment and sea surface microlayer samples near an open-net salmon farm in Nova Scotia, were analysed for copper. Copper is a constituent of the feed and is an active ingredient of anti-foulants. The salmon farm was placed in fallow after 15 years of production. Sampling was pursued over 27 months. Elevated copper concentrations in the sediments indicated the farm site as a source. Bubble flotation due to gas-emitting sediments from eutrophication is a likely process for accumulating copper in the sea surface microlayer at enriched concentrations. Elevated and enriched concentrations in the sea surface microlayer over distance from the farm site led, as a result of wind-drift, to an enlarged farm footprint. The levels of copper in both sediments and sea surface microlayer exceeded guidelines for protection of marine life. Over the 27 months period, copper levels persisted in the sediments and decreased gradually in the sea surface microlayer.

Wiber, M., Wilson, L., Young, S. (2012). "Impact of aquaculture on commercial fisheries: fishermen's local ecological knowledge". *Human Ecology*, 40 (1), pp. 29–40.

The Bay of Fundy along the southwest coast of New Brunswick, Canada is one of the most densely stocked finfish aquaculture areas in the world. An inshore multispecies fishery that dates back to the earliest European settlement shares these waters, and has been the economic mainstay of coastal communities. These inshore fishermen are increasingly displaced by the expanding aquaculture industry. A recent study conducted among fishermen in Southwest New Brunswick recorded their observations about the environmental impact of finfish aquaculture and the consequences for their commercial fishery. Fishermen all reported significant environmental degradation around aquaculture sites. Within 2 years of an operation being established, fishermen reported that gravid female lobsters as well as herring avoid the area, scallop and sea urchin shells become brittle, scallop meat and sea urchin roe becomes discolored. The use of chemicals to control sea lice on farmed salmon has also caused lobster, crab and shrimp kills. These and other concerns suggest that more comprehensive and detailed studies are required to establish the environmental and economic interactions of aquaculture and the inshore fishery, as well as on the stocks on which that fishery rely. The study also points to the need for more

effective use of fishermen's knowledge in designing such studies.

Wiber, M., Young, S., Wilson, L. (2011). *Aquaculture – Traditional Fishery Interactions in South West New Brunswick: Implications for Further Research*, vol. 1. OCN –Canada Policy Briefs.

In the winter of 2009, many lobsters were once again found dead from pesticide poisoning in several locations in Southwest New Brunswick (SWNB). Subsequent testing determined that a pesticide (Cypermethrin) that was not approved for marine use, but could be used to control sea lice in salmon aquaculture, had killed these lobsters. Several other lobster kills followed, and the resulting tension between the two industries reinforced the need for research that targets environmental impacts of aquaculture with respect to the habitat and health of commercial fish stocks. Since 2006, members of the Coastal Community University Research Alliance (CURA), a Maritimes-wide alliance investigating the role of communities in integrated management, have been examining the interaction of finfish aquaculture and the inshore fisheries in SWNB. In order gain some understanding of the fishermen's local ecological knowledge (LEK) on the problem, and to suggest directions for future targeted science, the Coastal CURA and Fundy North Fishermen's Association undertook a preliminary and small-scale study of ecological change in aquaculture areas as observed by inshore fishermen.

Wildish D, Hargrave B and MacLeod C (2003). "Detection of organic enrichment near finfish net-pens by sediment profile imaging at SCUBA-accessible depths". *Journal of Experimental Marine Biology and Ecology*, 285/286, pp. 403–413.

Sediment profile images (SPI) of cores collected by SCUBA diver were obtained using a modified Hargrave corer from fish farm sites in the Bay of Fundy, Canada and southeastern Tasmania, Australia. Shipboard and land based photography were used to obtain the SPI with a tripod mounted digital camera and image analysis by commercially available software. Computer images were analyzed to determine the variables used by Nilsson and Rosenberg [Mar. Ecol., Prog. Ser. 197 (2000) 139], modified to account for non-equilibrium conditions, to assess successional stages of organic enrichment. To validate the method, we concurrently sampled macrofaunal species composition and abundance and measured profiles of redox potentials and total sulphides by ion analysis. In each case, the null hypothesis that sediments collected directly under an active salmon net-pen were indistinguishable from a nearby reference site was rejected. The SPI method can successfully detect organic enrichment where impacts occur in soft sediments in geographically diverse locations.

Wildish DJ, Hargrave BT, Pohle G (2001). "Cost-effective monitoring of organic enrichment resulting from salmon mariculture". *ICES Journal of Marine Science*, 58, pp. 469–476.

Two methods of environmental monitoring proposed for the salmon mariculture industry are compared and contrasted on the basis of scientific and cost-effectiveness criteria: a technique based on macrofaunal community structure and one using process-oriented sediment geochemistry. For this purpose, field sampling was confined to one salmon farm and a nearby reference site in the Bay of Fundy. Both methods produced significant differences between farm and reference sites, as well as meeting other appropriate scientific criteria. The geochemical method was based on field measurements of sedimentary Eh, by redox electrode, and sedimentary sulphide after fixing the sediment in a sulphur anti-oxidant buffer and ion analyses with Ag/Ag sulphide and combination reference electrode. Both measures can be completed in the field from the sampling vessel. Results suggested that the geochemical method was of significantly lower cost than the technique based on macrofaunal community structure. This is because of the lengthy laboratory time required to determine the identity and abundance of macrofaunal taxa. Both methods can categorize the sedimentary organic impact as normal, oxic, hypoxic, or anoxic, which depends ultimately on the dominant microflora present. This, in turn, depends on the rate of carbon reaching the sediment, as well as its utilization by biological and physical processes.

Université Sainte Anne

TAB K

2023 NSARB-2023-001

This is Exhibit “K” referred to in the
Affidavit of Nathaniel Feindel
affirmed before me by videoconference
on January 22, 2024

[redacted]

Signature
CAITLIN MENCZEL-O’NEILL
A Barrister of the Supreme Court of Nova Scotia

Containment Management Framework
Nova Scotia Department of Fisheries and Aquaculture
2021

Introduction

Containment management is an important function of comprehensive and effective management of marine finfish farming. Proper containment is crucial to address environmental sustainability from wild fish genetics, ecological and fish health perspectives and it makes good business sense to maintain a valuable crop.

A solid governance regime has an integral role in effective containment management, which, in the province of Nova Scotia is led by the establishment of the **Aquaculture Management Regulations (AMRs)** made under Section 64 of the *Fisheries and Coastal Resources Act* (2015). These Regulations provide the regulatory tools that are used to support a responsible approach to aquaculture. The Containment Management content of these Regulations provide the basis for the Containment Management Framework for the aquaculture industry in Nova Scotia.

Principles

Reducing and minimizing the chance of any fish being released or escaping from a marine finfish site are the primary goals of containment management measures.

The Containment Management Framework concentrates on two elements:

- farm infrastructure and operating procedures; and
- traceability of escaped fish

Subsequently, it addresses:

1) minimum infrastructure and cage array design/construction requirements;
2) site operational procedures;
3) mandatory reporting of suspected or confirmed escapes or breaches of containment;
4) provisions for recapture plans;
5) techniques/procedures that enable traceability of escaped fish (marking plan); and
6) an auditing regime to ensure application of the Containment Management components of the Farm Management Plan (FMP).

Farm Management Plan Requirements

While the core of the Containment Management Framework is the AMRs, it is augmented by the contents of the FMP, which by Regulation, focus on: the infrastructure and procedures needed for containment management; reporting procedures for suspected or confirmed breaches of containment; and the marking specifics used to effectively identify the ownership of any farmed fish detected outside of a farmed fish enclosure.

Specifically, the FMP must include any information required by the Minister that pertains to:

- operating procedures that limit the risk of a breach;
- processes for installing and maintaining infrastructure in place to limit the risk of a breach;
- responses to breaches;
- areas of potential impact if a breach occurs;
- management of the site if unusual events or severe weather occurs;
- schedules for reporting:
    - initial farm stocking;
    - inventory levels during production;
- proof of a professional engineer's approval of the design of the structures in place for containment management; and
- marking of fish in such a manner that it can be traced to the licensed grower of the said fish.

It is also important to note, that as per the AMRs, the containment management sections of the FMP must be audited by a third-party auditor approved by the Minster, during time periods specified in the AMRs. The FMP Containment Management Audit Framework outlines the conformity requirements, assessment guidelines, and scoring criteria that auditors must use during an audit. Auditors must contact the Aquaculture Operations Manager at the Nova Scotia Department of Fisheries and Aquaculture (NSDFA) prior to the commencement of any audit to outline and discuss all requirements associated with each individual audit.

1) Farm Infrastructure

Prior to the initial stocking or re-stocking of an aquaculture site, an aquaculture licence holder must be in possession of an approved FMP, which includes approved/certified engineering documentation pertaining to the integrity of the site's infrastructure. In essence, the site infrastructure design and construction must have been deemed as being satisfactory to reasonably withstand the prevailing oceanographic and meteorological conditions (e.g., weather, currents, ice flow, etc.) at the site's location to ensure the fish stay contained.

The engineering documentation referenced above must be submitted to the NSDFA and must include a professional engineer's assessment of the design of the structure in place for the fish farm operation. If the assessment does not contain technical specifications for all materials utilized in the mooring systems (i.e. anchors, ropes, chains, buoys, thimbles, shackles, etc.), it is the responsibility of the farm operator to include such information in their FMP. In addition, any auxiliary equipment, barges, rafts or secondary working vessels must also be included in the engineer's assessment or described in the FMP.

Professional engineers must be licensed to practice in Nova Scotia. They must do a risk analysis using recognized standards/best practices that apply to the design and construction of a marine

finfish net pen array and its supporting infrastructure. Any standards/best practice utilized by the professional engineer must be identified in the risk analysis. It is important to acknowledge that technology and associated standards are constantly evolving. Therefore, mandating explicit standards or best practices may in fact hinder efficient operations versus allowing professional engineers to use a standard or best practice that would be appropriate for their client's operating environment.

All marine finfish sites will require a professional engineer's comprehensive assessment prior to stocking fish on the site and the first such assessment will be known as an original assessment.

Documentation to be included in the original assessment is as follows:

- details from a site survey/assessment outlining the oceanographic and meteorological conditions of the site, to support a risk analysis;
- a risk analysis assessing whether the infrastructure in place, or to be installed, is able to withstand prevailing oceanographic and meteorological conditions (including any safety margins required) at the site;
- a statement from the engineer indicating his/her assessment of the site infrastructure and that the site infrastructure is constructed and installed appropriately, using undamaged parts, for the prevailing oceanographic and meteorological conditions at the site; and
- a drawing of the site infrastructure stamped with the professional engineer's seal.

After an original assessment, and prior to re-stocking, a third-party audit is required which must include one of two sets of documents:

- a statement from an auditor or engineer that there have been no changes in the design or components of the site infrastructure and equipment and no change in the prevailing oceanographic and meteorological conditions at the site that would compromise the integrity of the site infrastructure and equipment since the last professional engineer assessment; **or**
- if it has been determined by an auditor or an engineer that, since the last professional engineer assessment, the site infrastructure and/or equipment integrity have been compromised, the Operator has changed or altered the infrastructure, as described below, or a change in the prevailing oceanographic and meteorological conditions have compromised the site infrastructure and/or equipment integrity, the farm operator will be required to have a reassessment of the site. Upon completion of the re-assessment, the farm operator must provide a statement from a professional engineer indicating that appropriate adjustments have been made and that, as per his/her assessment, the site infrastructure and equipment remains constructed and installed appropriately for the prevailing oceanographic and meteorological conditions at the site.

Although general triggers that would flag compromised site infrastructure and equipment integrity are listed below, the onus is upon the site operator to seek the expertise of an engineer to determine that since the last professional engineer assessment, the site infrastructure or equipment integrity has not been compromised.

- Removal of mooring lines
- Major change in anchor location
- Reduction in mooring line length
- Reduction in mooring line strength
- Addition of net pens or expansion of the system within the approved lease area
- Addition of feed barge
- Change in site orientation (i.e. anchor positions change)
- Change in net half mesh size of netting, change of net size affecting drag, or net and weighting system design
- Change in floater high-density polyethylene (HDPE) rings
- Any substantive change which will affect the loads (including any increase in stocking density above the maximum planned density previously approved), or any reduction in the specification of minimum break strength (MBS) of a component
- Any substantive change in materials used or in the system design

In addition to the engineering documentation discussed above, other infrastructure requirements in the FMP include:

- tagging of specific equipment so that components that have gone adrift can be traced back to the fish farm;
- manufacturer and equipment technical/life cycle specifications;
- breaking strengths, where applicable;
- maintenance records;
- installation/removal procedures; and
- inspection schedules/procedures.

2) Breaches of Containment

With regards to containment management, the FMP must describe:

- procedures that limit the risk of a breach, including fish leakage/losses during farm operations such as fish transfers, counting, grading, harvesting, net cleaning/changes and net pen re-positioning;
- processes for installing and maintaining infrastructure in place to limit the risk of a breach;
- responses to breaches;
- areas of potential impact if a breach occurs; and

- management of the site if unusual events or severe weather occurs.

There are also mandatory notification requirements in the event that a breach occurs or is suspected. Aquaculture licence holders for marine finfish or any personnel of their aquacultural operation who know or suspect a breach must immediately[1] notify the NSDFA by phone with an e-mail follow up of the initial notification.

Information included in the notification includes details pertaining to:

- contact information of the party making the report;
- date and time of the event;
- location of the event;
- attributes of the fish that escaped (e.g. species, number of fish, age, size, year stocked, weight, health status);
- the freshwater place of origin of the fish that escaped;
- cause of the breach; and
- mitigation efforts and/or corrective actions to prevent further escapes.

Experience has indicated that immediate recovery or recapture activities of escaped salmon in the immediate area of the accountable farm, has resulted in minimum success and has caused harm to other marine life. A more efficient endeavour to prevent escaped salmon from interacting with wild fish may be an enhanced river monitoring program that is triggered once a breach of farmed fish has been detected. The NSDFA will be assessing the effectiveness of an enhanced monitoring program by developing such a program in partnership with the aquaculture industry, organizations devoted to the conservation of wild Atlantic salmon as well as other provincial and federal government organizations. Once developed, all marine finfish farmers operating within Nova Scotia are expected to be a participant in the enhanced river monitoring program.

Information and experience concerning recapture of escaped trout is very minimal. Therefore, recapture plans of escaped trout will be developed through discussions with the NSDFA and each individual trout farm operator. Both on-site and off lease recapturing efforts will be developed.

3) Marking

Growers may use the marking plan of their choice, but it must be approved by the Minister and meet the following criteria:

[1] The term “immediately” means as soon as it is safe, or it is possible to do so. This is expected to be within an hour of the determination of a known or suspected breach.

- Any marking (e.g., fin clipping that is unique to the farm operator, coded wire tags (CWTs), genotyping, branding, etc.) must be auditable. Where genetic markers are used, the Minister reserves the right to have access to the genetic information for auditing purposes.
- The mark must identify the fish as originating from a Nova Scotian marine fish grower.
- Fish must be marked prior to stocking.
- The marking scheme must take fish welfare into consideration and be a generally accepted industry practice.

While a marking plan is not a new concept, the implementation of a marking plan can require an extensive timeframe. Therefore, marking plans will be implemented in phases as per discussions between the licensed grower and the NSDFA. During the implementation process, the origin of any species of suspected farmed fish found in the wild, will be determined by the standby method. This method involves the collection of fish from farms in the area where the suspected farmed fish was detected and are of the same species and comparable year class. The data collected from testing these fish is then compared to the suspected escaped fish.

Containment Management Framework Revisions

The Containment Management Framework will be reviewed and updated by the NSDFA, as required, but at a minimum, on an annual basis by March 31 of each calendar year.