



Nova Scotia Aquaculture Regulatory Review Submission

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prepared for

the Nova Scotia Department of Fisheries and Aquaculture

and

Davis Pier Consulting

prepared by

the Ecology Action Centre

1. Introduction

The Ecology Action Centre (EAC) is Atlantic Canada's oldest and largest environmental non-profit, active since 1971, with over 4,100 supporting members across the region. Our organization has been engaged in aquaculture policy, market development and sustainability in Nova Scotia for 15 years. As a founding organization of SeaChoice, we work with partners in B.C. on national aquaculture policy and aquaculture supply chains as well, contributing most recently to the development of Canada's Aquaculture Act. We sit on the Minister's Aquaculture Regulatory Advisory Committee and we have engaged in dozens of aquaculture licence applications as a stakeholder since 2006. We made significant contributions to the Doelle-Lahey Panel's *Independent Aquaculture Regulatory Review for Nova Scotia*.¹ We appreciate the opportunity to participate in such a process once again, this time through the first mandatory regulatory review established by new *Fisheries and Coastal Resources Act (FCRA)* regulations. Here, we outline a series of challenges facing Nova Scotia's existing aquaculture regulatory regime and provide recommendations for improvement throughout. We invite readers to reach out with any questions that arise.

2. Principles

Nova Scotia's regulatory system for aquaculture should be based on the following principles, to be established within the *FCRA*:

- The rigorous protection of marine ecosystems
- The protection of public access to public waters held in trust by the Government of Nova Scotia
- The implementation of the Precautionary Principle
- The recognition of Indigenous self-determination and the facilitation of reconciliation
- Meaningful public engagement and the empowerment of local communities in aquaculture decision-making processes
- Transparency and the release of public information on aquaculture operations and regulatory processes

¹ Doelle, M., & Lahey, W. (2015). *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]*. Government of Nova Scotia.

- The clear definition of social and ecological siting criteria for distinct methods of aquaculture and species of cultivation
- The establishment of a “right-sized” approach to aquaculture regulations, matching the rigor of administrative and regulatory processes to the level of social and environmental risk posed by aquaculture proposals
- The separation of promoter and regulator roles

2.1 Protection of marine ecosystems

Nova Scotia’s aquaculture regulations should be designed to provide comprehensive protection for the marine ecosystems that all communities rely upon in Nova Scotia. Today, that standard is not adequately met for all sectors of aquaculture. Our submission recognizes important distinctions within the aquaculture industry, as ecological and social impacts vary by species reared, required inputs, waste outputs and scale of operation. While some of our recommendations apply across the aquaculture industry, some are specific to certain subsectors and have been grouped to address specific sector risks and opportunities. In particular, we challenge regulators to address the terminal harms caused by open-net pen (ONP) finfish aquaculture operations, and develop systems that will prepare our province for a transition towards more sustainable forms of aquaculture in the long-term.

2.2 Public trust and access to public waters

All Canadian waters are held in trust by the Government of Canada. However, through the *Canada-Nova Scotia Memorandum of Understanding on Aquaculture Development*, Nova Scotia is granted special jurisdictional privilege in a marine aquaculture context. As the regulator of aquaculture lease, licence and management regulations in Canadian waters, Nova Scotia must adopt the role of trustee for the public waters administered by the government on behalf of citizens. As a co-trustee in the context of aquaculture development, the Nova Scotia Department of Fisheries and Aquaculture (NSDFA) must be accountable for the protection of the marine environment and for the maintenance of public access to public waters. Regulatory structures must reflect this accountability.

2.3 Empowerment of local communities

In some parts of Nova Scotia, coastal communities have fought to oppose the development of ONP aquaculture in local waters for more than a decade. For just as long, consecutive

provincial governments have failed to recognize the imperative of communities to act as decision-makers in an aquaculture context, often backing industry development plans at the expense of municipalities and residents. This cannot continue. We recognize now that projects should not be developed without community support or social licence, and we urge Nova Scotia to ensure that aquaculture regulations finally reflect that reality.

2.4 Transparency and communication

A lack of transparency and communication related to ONP aquaculture developments has long impeded trust between communities, regulators and industry. Operators have been allowed to pollute in private, shielded from public scrutiny by proprietary protections. There is no appropriate basis upon which to hold back information related to the impacts of aquaculture development on public waters held in trust. Amended aquaculture regulations must enable a radical overhaul of the NSDFA's communication regime, to promote transparency and release aquaculture information to the public in an accessible, comprehensive and timely fashion.

2.5 "Right-sized" approach

Nova Scotia's regulatory system must be appropriately rigorous for high-impact operations (e.g., ONP finfish aquaculture), without overburdening low-impact operations (e.g., small-scale shellfish and seaweed aquaculture). Regulations and policy must respond to varying levels of risk to marine ecosystems, holding high-impact projects to high ecological standards of approval, while easing regulatory and administrative burdens for appropriately-scaled, low-impact projects. The objective is to ensure "rigorous, not onerous" regulations that safeguard the marine ecosystems from industrial projects while allowing low-impact, sustainable alternatives to develop relatively quickly. Owner-operator livelihood opportunities in the aquaculture industry should be accessible to all.

Today, permitting low-impact, low-risk shellfish and seaweed farms is a time intensive and financially intensive process. There is no roadmap for applicants to navigate the complex administrative system. This must change if Nova Scotia is going to be a leader in the emerging markets for sustainable opportunities in seaweed and shellfish aquaculture.

2.6 Separate roles of promoter and regulator

Conflicting duties of the NSDFA as both the regulator and promoter of the aquaculture industry in Nova Scotia continue to challenge the development of an effective regulatory system. These roles should be separated, with one moved to a different government department to be determined through consultation with stakeholders and rights-holders.

3. Preparing for transition, improving existing ONP finfish aquaculture regulations

Wherever ONP aquaculture sites exist, environmental harms follow, especially as operations scale up. In Nova Scotia, we remain concerned that there are not enough guardrails in place through our regulatory system to avoid unacceptable environmental risks. We outline several of these risks in following sections, highlighting known ecological impacts of sea lice and disease outbreaks, escaped farmed salmon, untreated waste dispersion, and the build-up of anoxic environments at ONP sites. Best practice ecological siting criteria have not been developed to mitigate these risks (or, if they exist, are not available to stakeholders or public), and the environmental bases for ONP finfish aquaculture approvals are unclear, discretionary, and hidden from public view.

We must ensure that the principle of environmental protection is placed at the heart of any changes to the regulatory system. The EAC has advocated, and continues to advocate for, a transition away from ONP technologies towards land-based, closed containment (LBCC) finfish systems, as the federal government has implemented in B.C., and as a number of other jurisdictions are implementing internationally. Doubling-down on the expansion of industrial ONP practices that do not comport with principles of ecological sustainability that Nova Scotians support is a recipe for environmental, economic and political failure. If we continue down the path of ONP expansion as currently defined by industry, social unrest is sure to continue in coastal communities. Nova Scotia will continue to lag behind regional neighbours in the development of shellfish and seaweed production, and the province will lose critical early opportunities for LBCC finfish aquaculture growth. With LBCC technologies improving and production costs declining quickly, the sector is primed to absorb a huge percentage of the global market for salmon products.²

² *Is the future on dry land? The development of a new massive land-based salmon farming industry.* (2021). iLaks and Salmon Business. <https://www.lokalkampanjer.no/ilaks-is-the-future-on-dry-land/>

We urge the NSDFA to develop regulations in preparation for this transitional phase, with amendments designed to ensure that operators are paying for the full cost of the environmental damage they create. These amendments will weaken the business case for the development of ONP aquaculture in the province, and help to deter new entrants. In their place, regulations should support the continued development of sustainable, low-impact shellfish, seaweed and LBCC sectors.

However, while Nova Scotia moves towards that transitional paradigm, there are a number of regulatory improvements that must be made immediately to ensure the protection of localized marine habitat, wild fish stocks, commercial fisheries, and wild Atlantic salmon.

Recommendations

- Develop regulations to prepare Nova Scotia for a transition away from ONP finfish farming and towards sustainable aquaculture alternatives

3.1 Escaped salmon and introgression

Nearly two decades of research definitively concludes that escaped farmed Atlantic salmon are one of the greatest threats to wild Atlantic salmon populations. Studies conducted in Norway, New Brunswick, Newfoundland, Scotland and elsewhere show that the interbreeding of farmed and wild populations results in a decreased genetic fitness and survival rate in wild stocks across the Atlantic.^{3 4 5 6} Farmed escapes have infiltrated almost every wild Atlantic salmon river in proximity to the salmon farming industry in Atlantic Canada. A 2008 study found escaped farmed salmon in 54 of 62 (87%) rivers investigated within a 300km radius of the ONP aquaculture industry, including 11 rivers that contain endangered Atlantic salmon populations.⁷ Overall, the researchers found documented evidence of approximately 500,000

³ Keyser, F., Wringe, B. F., Jeffery, N. W., Dempson, J. B., Duffy, S., & Bradbury, I. R. (2018). Predicting the impacts of escaped farmed Atlantic salmon on wild salmon populations. *Canadian Journal of Fisheries and Aquatic Sciences*, 75(4), 506–512. <https://doi.org/10.1139/cifas-2017-0386>

⁴ Diserud, O. H., Fiske, P., Sæggrov, H., Urdal, K., Aronsen, T., Lo, H., Barlaup, B. T., Niemelä, E., Orell, P., Erkinaro, J., Lund, R. A., Økland, F., Østborg, G. M., Hansen, L. P., & Hindar, K. (2019). Escaped farmed Atlantic salmon in Norwegian rivers during 1989–2013. *ICES Journal of Marine Science*, 76(4), 1140–1150. <https://doi.org/10.1093/icesjms/fsy202>

⁵ Naylor, R., Hindar, K., Fleming, I. A., Goldberg, R., Williams, S., Volpe, J., Whoriskey, F., Eagle, J., Kelso, D., & Mangel, M. (2005). Fugitive Salmon: Assessing the Risks of Escaped Fish from Net-Pen Aquaculture. *BioScience*, 55(5), 427. [https://doi.org/10.1641/0006-3568\(2005\)055\[0427:FSATRO\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2005)055[0427:FSATRO]2.0.CO;2)

⁶ Karlsson, S., Diserud, O. H., Fiske, P., Hindar, K., & Handling editor: W. Stewart Grant. (2016). Widespread genetic introgression of escaped farmed Atlantic salmon in wild salmon populations. *ICES Journal of Marine Science*, 73(10), 2488–2498. <https://doi.org/10.1093/icesjms/fsw121>

⁷ Morris, M. R. J., Fraser, D. J., Heggelin, A. J., Whoriskey, F. G., Carr, J. W., O'Neil, S. F., & Hutchings, J. A. (2008). Prevalence and recurrence of escaped farmed Atlantic salmon (*Salmo salar*) in eastern North American rivers. *Canadian Journal of Fisheries and Aquatic Sciences*, 65(12), 2807–2826. <https://doi.org/10.1139/F08-181>

escaped farmed salmon in eastern North America prior to 2006 and concluded that the true number was likely much higher.

Nova Scotia is home to some of the most degraded wild Atlantic salmon populations in Canada. The precarious state of wild salmon throughout the mainland means that introgression is a serious risk even with low levels of escapes appearing in threatened river systems. Recent studies conducted in Newfoundland suggest that demographic decline and genetic change begin to occur when the percentage of escapees relative to wild salmon reaches or exceeds 10% annually.⁸ Datasets collected on monitored rivers in New Brunswick show that escapes continue to find their way into systems where wild Atlantic salmon populations are critically low.⁹ On the Magaguadavic River, high escape numbers precede a significant decline and the eventual extirpation of the river's wild salmon population.^{10 11} The recent discovery of aquaculture salmon in Nova Scotia's Gaspereau River, home to the SARA-listed Inner Bay of Fundy (IBoF) wild Atlantic salmon population, confirms that escapes will travel vast distances from source events.¹²

A 2018 Canadian Science Advisory Secretariat review of the science associated with the IBoF population concluded that a reduction of European ancestry and future introgression of European genes into the population should be at the top of the list of advice for managers working with this stock.¹³ Fisheries and Oceans Canada (DFO) recognizes the prevention of aquaculture escapes as one a key recovery actions listed at the federal IBoF Recovery Strategy document.¹⁴ Canada has also made commitments to ensure the full prevention of escaped farmed fish through the North Atlantic Salmon Conservation Organization (NASCO). Recent NASCO evaluation reports gave Canada a failing grade for a continued inability to

⁸ Bradbury, I.R., Duffy, S., Lehnert, S.J., Jóhannsson, R., et al. 2020. Model-based evaluation of the genetic impacts of farm-escaped Atlantic salmon on wild populations. *Aquacult Environ Interact* 12:45-59.

⁹ DFO. 2020. Stock Status Update of Atlantic Salmon in Salmon Fishing Areas (SFAs) 19–21 and 23. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/031.

¹⁰ Thorstad, E., Fleming, I., McGinnity, P., & Soto, D., Wennevik, V., & Whoriskey, F. (2008). Incidence and Impacts of Escaped Farmed Atlantic Salmon *Salmo salar* in Nature.

¹¹ Auld, A. (2017, October 5). Conservation group says no wild Atlantic salmon detected at site in N.B. river. The Canadian Press. <https://globalnews.ca/news/3786987/conservation-group-says-no-wild-atlantic-salmon-detected-at-site-in-n-b-river/>

¹² Dean-Simmons, B. (2021, December 3). [Salmon Federation raises concerns after aquaculture escapees found in Atlantic Canada river](#). *SaltWire Network*.

¹³ DFO. 2018. Review of the Science Associated with the Inner Bay of Fundy Atlantic Salmon Live Gene Bank and Supplementation Programs. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2018/041.

¹⁴ DFO. (2019.) Action Plan for the Atlantic Salmon (*Salmo salar*), inner Bay of Fundy population in Canada 2019. https://www.registrelep-sararegistry.gc.ca/document/doc1917f/ind_e.cfm

improve on escape prevention measures.¹⁵ Provincial governments bear responsibility for this failure in Atlantic Canada.

Since the implementation of new regulations in Nova Scotia, the province has experienced several recorded escape events, including four escapes confirmed by DFO in 2016 and 2017, the most recent years for which federal data exist.¹⁶ Further escape incidents have been recorded in more recent years, but have not been publicly reported by DFO.¹⁷ ¹⁸ Researchers predict that substantially more low profile escape events are occurring at levels below the reportable threshold for industry.¹⁹ We are aware of anecdotal escape reports by anglers or residents living near fish farm operations which suggest this “trickle” effect is occurring in Nova Scotia.

Recommendations

- Activate the Nova Scotia Aquaculture Salmon Traceability Committee to develop a mandatory, province-wide genetic tracking program to ensure that the source of escaped farmed salmon can be identified
- Empower an independent escape tracking network, spearheaded by third parties with support from NSDFA; work with local watershed and non-profit organizations to establish regular salmon monitoring stations on rivers near ONP sites
- Ensure each ONP finfish lease renewal establishes funding for the independent monitoring of nearby rivers to check for escapes
- Data collected by existing tracking programs employed by industry should be made available to the public

¹⁵ NASCO. (2021.) Minimising Impacts of Salmon Farming on Wild Atlantic Salmon: Supporting Meaningful and More Rapid Progress Towards Achievement of the International Goals for Sea Lice and Containment. J. Campbell, J. Crocker, P. Gargan, H. Hansen, P. Knight, S.G. Sutton, S.L. Forero Segovia, W. Kenyon, V. Newton and E.M.C. Hatfield. (Eds.). Report of a Theme-based Special Session of the Council of NASCO, CNL(21)65. 124 pp.

¹⁶ DFO. *Escape prevention for farmed fish: Annual national escape reports*. Accessed: Aug. 26, 2022. <https://www.dfo-mpo.gc.ca/aquaculture/protect-protege/escape-prevention-evasions-eng.html>

¹⁷ Yates, D. (2019, September 16). DFO Investigates farmed fish escape in Whycocomagh Bay, CB. *Go Cape Breton*. https://docs.wixstatic.com/ugd/90bfdd_ac5af90cc1d042beae44b2bd448351b5.pdf

¹⁸ Trout found out of school in Whycocomagh Bay. (2019, October 8). *SaltWire Network*. <https://www.saltwire.com/cape-breton/news/trout-found-out-of-school-in-whycocomagh-bay-361376/>

¹⁹ Thorstad, E. B. (2008). *Incidence and impacts of escaped farmed Atlantic salmon *Salmo salar* in nature [report from the Technical Working Group on Escapes of the Salmon Aquaculture Dialogue]*. NINA.

3.2 Sea lice

Sea lice are recognized as extremely harmful to the sustainability of wild salmon in fish farming nations today.^{20 21 22 23} Recent studies have shown that wild Atlantic salmon smolts are particularly vulnerable to sea lice: on average, wild smolt mortality rates reach 50% with 4-6 sea lice attached, and 100% with more than 6 sea lice attached.²⁴ Estimates suggest that sea lice can travel significant distances from host sites, dispersing at least 10km from their original source in the Bay of Fundy.²⁵ With outbreaks occurring regularly at ONP sites across Atlantic Canadian waters, sea lice pose a dire threat to depleted or near-extirpated wild salmon populations across Nova Scotia, particularly during migration seasons. This threat continues to expand due to the declining effect of established sea lice treatment and increasingly warm seas.^{26 27 28}

To date, Nova Scotia has seen a relatively low number of reported sea lice outbreaks relative to its Atlantic neighbours. However, this trend cannot be relied upon as industry looks to expand ONP finfish production in the province. Two major sea lice outbreaks at both of Cooke's Annapolis Basin sites in the fall of 2021 suggest that Nova Scotia's relatively clean track record on sea lice may be making a turn.²⁹

For an example of the sea lice impacts we can anticipate if Nova Scotia continues to expand the ONP finfish industry, we can look to the Fundy Isles region of New Brunswick, Atlantic Canada's most productive fish farming area. In 2020, industry reporting at several salmon

²⁰ Thorstad, E. B. et al. (2020). Status of wild Atlantic salmon in Norway 2020. Norwegian Scientific Advisory Committee for Atlantic Salmon. <https://brage.nina.no/nina-xmlui/handle/11250/2657947?show=full>

²¹ Gargan, P. G. et al. (2012). Evidence for sea lice-induced marine mortality of Atlantic salmon (*Salmo salar*) in western Ireland from experimental releases of ranched smolts treated with emamectin benzoate. *Canadian Journal of Fisheries and Aquatic Sciences*, 69(2), 343–353. <https://doi.org/10.1139/f2011-155>

²² Morton, A. et al. (2011). Sea lice dispersion and salmon survival in relation to salmon farm activity in the Broughton Archipelago. *ICES Journal of Marine Science*, 68(1), 144–156. <https://doi.org/10.1093/icesjms/fsg146>

²³ Finstad, B. et al. (2010). The Effect of Sea Lice on Atlantic Salmon and other Salmonid Species. In Ø. Aas, S. Einum, A. Klemetsen, & J. Skurdal (Eds.), *Atlantic Salmon Ecology* (pp. 253–276). Wiley-Blackwell. <https://doi.org/10.1002/9781444327755.ch10>

²⁴ Taranger, G. L. et al. (2015). Risk assessment of the environmental impact of Norwegian Atlantic salmon farming. *ICES Journal of Marine Science*, 72(3), 997–1021. <https://doi.org/10.1093/icesjms/fsu132>

²⁵ Parent, M. I., Stryhn, H., Hammell, K. L., Fast, M. D., Grant, J., & Vanderstichel, R. (2021). Estimating the dispersal of *Lepeophtheirus salmonis* sea lice within and among Atlantic salmon sites of the Bay of Fundy, New Brunswick. *Journal of Fish Diseases*, 44(12), 1971–1984. <https://doi.org/10.1111/jfd.13511>

²⁶ Aen, S. M. et al. (2015). Drug resistance in sea lice: a threat to salmonid aquaculture. *Trends in Parasitology*, 31(2), 72–81. <https://doi.org/10.1016/j.pt.2014.12.006>

²⁷ Wristen, K., & Morton, A. (2018). Lousy Choices: Drug-resistant Sea Lice in Clayoquot Sound. Living Oceans Society & Raincoast Research. Retrieved from: <https://livingoceans.org/sites/default/files/Lousy%20Choices.pdf>

²⁸ Medcalf, K. et al. (2021). Warming temperatures and ectoparasitic sea lice impair internal organs in juvenile Atlantic salmon. *Marine Ecology Progress Series*, 660, 161–169. <https://doi.org/10.3354/meps13610>

²⁹ Lycan-Lang, E. (2021, December 1). [Endangered wild salmon at risk from sea lice outbreak at two fish farms in Annapolis Basin](#). *The Halifax Examiner*.

aquaculture sites recorded *upwards of 40 adult female sea lice per fish* on average during certain times of year.³⁰ These extremely high numbers may not capture the full extent of proliferation in the region, as they do not include counts for pre-adult or adult male lice.³¹ Studies suggest that industry counters may also be more likely to report lower lice counts than auditors when pre-adult and adult male lice numbers are high, casting doubt upon industry-collected data.³²

With these high sea lice loads, we can also anticipate aggressive sea lice treatments. In New Brunswick, more than 1185 pesticide treatments were applied across 57 sites in the Bay of Fundy between 2010 and 2016.³³ While the industry states they have moved toward more mechanical treatment methods, the Atlantic Canada Fish Farmers Association reports that 22.7% of sea lice treatments in New Brunswick still used Paramove 50 or Salmosan pesticide products in 2020.³⁴ Both products are classified as toxic or very toxic to aquatic life.^{35 36} In our view, there is no appropriate justification for the commercial use of pesticides in public waters under any circumstance, and Nova Scotia should establish a zero tolerance policy for the use of pesticides in aquaculture. ONP companies must be responsible for handling sea lice outbreaks without discharging pesticides into localized marine environments – this practice constitutes a perverse environmental subsidy for operators, at the expense of wild fish habitat, and must not be allowed to continue.

Nova Scotia regulations should endeavour to meet best practice thresholds for sea lice treatment, following the lead of other jurisdictions. Norway maintains sea lice thresholds of 0.2 female sea lice per fish during wild salmon migration season and 0.5 female sea lice per fish during other times of year.³⁷ Considering the extreme vulnerability of depleted wild Atlantic salmon populations in Nova Scotia, the NSDFA should ensure thresholds equally as strict.

³⁰ New Brunswick Annual Sea Lice Management Report 2020. (March, 2021). Atlantic Canada Fish Farmers Association. Retrieved from: <https://www.atlanticfishfarmers.com/sea-lice-reports>

³¹ *Ibid.*

³² Elmoslemany, A. et al. (2013). Sea lice monitoring on Atlantic salmon farms in New Brunswick, Canada: comparing audit and farm staff counts. *Journal of Fish Diseases*, 36(3), 241–247. <https://doi.org/10.1111/jfd.12051>

³³ INTEROX® PARAMOVE® 50 Safety Data Sheet. (2020). Solvay. <https://www.solvay.com/en/product/interox-paramove-50>

³⁴ [Salmosan Vet Safety Data Sheet](#). (2017). Fish Vet Group.

³⁵ Gautam, R. et al. (2016). Evaluating bath treatment effectiveness in the control of sea lice burdens on Atlantic salmon in New Brunswick, Canada. *Journal of Fish Diseases*, 40(7), 895–905. <https://doi.org/10.1111/jfd.12569>

³⁶ New Brunswick Annual Sea Lice Management Report 2020. (March, 2021). Atlantic Canada Fish Farmers Association. Retrieved from: <https://www.atlanticfishfarmers.com/sea-lice-reports>

³⁷ Dean, K. R., Aldrin, M., Qviller, L., Helgesen, K. O., Jansen, P. A., & Bang Jensen, B. (2021). Simulated effects of increasing salmonid production on sea lice populations in Norway. *Epidemics*, 37, 100508. <https://doi.org/10.1016/j.epidem.2021.100508>

Public reporting of weekly sea lice counts must be made an explicit priority for public release, along with treatment methods. Current regulations requiring reporting “to the Minister at the Minister’s request” are not clear, lacking thresholds and timelines, and allow companies to avoid public scrutiny. Nova Scotia is the last fish farming jurisdiction in Canada that does not release industry sea lice counting data to the public, with Newfoundland now reporting as of 2021.

The best way for Nova Scotia to ensure that sea lice problems do not continue to worsen in the province is to forgo the development of new ONP aquaculture sites. Existing sea lice populations continue to build resistance to established treatment methods, and warming waters augment the frequency and size of sea lice infestations.³⁸ Widespread ONP operations in New Brunswick have enabled a regional dispersal of sea lice such that wild Atlantic salmon populations are virtually unable to avoid contact. In areas heavily saturated with ONP sites, wild populations have reached a point of functional extirpation.³⁹ If Nova Scotia hopes to protect mainland wild Atlantic salmon populations hanging on by a thread from the Eastern Shore to the Inner Bay of Fundy, this dynamic cannot be allowed to occur in our waters.

Recommendations

- No new ONP aquaculture sites should be established in Nova Scotia
- Current sites across the province should operate on schedules ensuring fallow periods during migratory seasons for wild salmon, and coordinated lice treatments
- Sea lice weekly monitoring required of finfish farms should be released to the public within seven days of the count, along with any associated treatment plans for outbreaks that exceed a threshold
- Establish treatment thresholds of 0.2 sea lice per fish during migration periods, and 0.5 sea lice per fish during non-migration periods
- Zero tolerance for pesticide-based sea lice treatments
- Develop mechanisms to automatically revoke licences for sites that routinely exceed sea lice thresholds
- All audit records on farms compliance should be made publicly available

³⁸ Godwin, S. C., Krkosek, M., Reynolds, J. D., & Bateman, A. W. (2021). Sea-louse abundance on salmon farms in relation to parasite-control policy and climate change. *ICES Journal of Marine Science*, 78(1), 377–387. <https://doi.org/10.1093/icesjms/fsaa173>

³⁹ DFO. 2020. Stock Status Update of Atlantic Salmon in Salmon Fishing Areas (SFAs) 19–21 and 23. DFO Can. Sci. Advis. Sec. Sci. Resp. 2020/031.

3.3 Environmental Monitoring Program, anoxia and hypoxia

According to [environmental monitoring data](#) for Nova Scotia, sediment samples collected between 2009 and 2021 indicate a routine, year-over-year depletion of oxygen in marine habitat near ONP sites throughout the province. The development of these conditions, resulting in the onset of blackened sediment, bacterial infestations and localized biodiversity loss, represent another environmental subsidy granted to the ONP aquaculture industry. Existing regulatory mechanisms for deterrence and remediation do little to prevent damage to marine ecosystems, as it appears conditions have not meaningfully improved since 2009.

The current system, requiring updated mitigation plans, follow-up monitoring and a letter from the NSDFA in serious cases, must be significantly more strict. Polluters must pay for the hypoxic and anoxic conditions they create, with offenders subject to fines. Regulators must ensure that meaningful remediation takes place following low-oxygen events. Environmental monitoring data and information on remedial enforcements must be released to the public in a timely manner.

Recommendations

- Aquaculture regulations must protect localized ecosystems, and should not tolerate the routine creation of hypoxic and anoxic conditions at ONP sites
- Hypoxic and anoxic conditions should necessitate immediate remedial action, escalating in severity following sustained readings at monitoring levels two and three
- Licence holders should be subject to punishment, fines, and the possible suspension or revocation of licence following multiple violations

3.4 Threat to public access

Nova Scotia's aquaculture regulations must establish strong principles for the protection of the public's access to public waters. As the industry continues to grow over time, lease sites continue to expand in size. A single ONP finfish aquaculture proposal put forth by Canadian Salmon now seeks to claim Nova Scotia's largest aquaculture leases: four 80-hectare sites totalling 320 hectares across multiple locations. Nova Scotia's aquaculture lease sites represent a de facto privatization of public waters used by fishers, sailors, tourism operators, and coastal residents. The maintenance of access is especially critical for the inshore fishing fleets upon which so many coastal communities rely. With aquaculture developers grabbing more and more space, it is critical that access to traditional inshore fishing grounds, tourism

routes, and areas of cultural importance is protected and maintained, so as to avoid the potential displacement of small-scale independent fishers, tourism operators, and cultural users of the marine environment.

Recommendations

- Aquaculture regulations should establish protections for the public's right to access public waters, including within lease areas

3.5 Siting criteria

Section 3 of the Aquaculture Lease and Licence Regulation outlines eight factors for consideration in aquaculture siting decisions. These eight factors represent appropriate topics for discussion in siting contexts, but they are vague, subjective and poorly applied in decision-making settings in Nova Scotia. Non-expert Aquaculture Review Board (ARB) members are asked to make aquaculture siting decisions based on an assessment of "biophysical and oceanographic characteristics", on the "sustainability of wild salmon", etc. Which of these biophysical characteristics should Board members consider, and how should they be considered relative to ONP versus shellfish applications, for example? How should Board members assess the sustainability of wild salmon if there is no data available to properly assess the health of populations?

Instead, Nova Scotia needs standardized guiding criteria by which to determine whether an aquaculture site should go forward. These criteria should be tailored to aquaculture species and methods and vary based on the level of ecological risk posed by respective applications. Clear, evidence-based thresholds engaging strong science should act as the foundation for ecological criteria. Government should work with communities and municipalities to determine appropriate measures for the assessment of social criteria as well, with a foundation in social licence research. The Precautionary Principle should animate any decisions where there is not enough data to properly assess the potential environmental impact of a given project. A lack of data pertaining to a particular threshold should necessitate further study until the parameters of risk can be adequately identified and sufficiently contained.

Detailed criteria and the establishment of standards and thresholds for aquaculture development, where appropriate, will provide guidance for decision-makers and stakeholders, while clarifying and streamlining decision-making processes. We encourage the NSDFA to

work with knowledge holders to determine appropriate and detailed siting criteria for specific ecosystems in relation to various aquaculture practices.

Recommendations

- Establish clear ecological, oceanographic, fish health and social criteria for ONP aquaculture siting decisions
- Ecological and oceanographic criteria should be based in strong scientific evidence and modeling made available to the public and subject to independent analysis
- Social criteria should developed in consultation with communities, rights-holders and stakeholders

4. Growing low-impact, small-scale aquaculture sectors

4.1 Right-sizing regulations

Nova Scotia's regulatory and administration processes for new or expanded aquaculture projects are not fit to the environmental risk profile of proposed developments. Small-scale aquaculture start-ups must overcome the same regulatory hurdles as established, multi-billion-dollar corporations, and low-impact projects are required to go through the same processes as high-impact projects. This mismatch creates a significant challenge for new entrants into the aquaculture space in Nova Scotia. Unforeseen costs, long bureaucratic delays, and heavy administrative burdens can be enough to prevent the successful development of proposals by applicants without sufficient time or resources in reserve. Inequities emerge in this case where small-scale, low-capital proponents are pushed out while large corporations are able to persist through the duration of the process. A right-sized approach where applicants face a risk-based regulatory burden consistent with potential environmental harms levied by the project can help to fix these inequities. High-impact proposals (e.g., ONP aquaculture operations) should be subjected to rigorous ecological and social standards for approval, whereas low-impact proposals (e.g., small-scale shellfish or seaweed aquaculture operations) should be subjected to a reduced administrative and regulatory burden.

High-impact projects should require comprehensive environmental impact assessments, subjected to comprehensive and timely review by government and independent experts, with

assessment documents made publicly available for review by stakeholders. Assessment criteria should prove that operations will not impact key marine ecological features. Comparatively, a small-scale shellfish or seaweed farm, for which social licence and a low-impact development profile is easily established, should face a thinner application process and should be streamlined through administrative approval.

Nova Scotia's [Experimental Marine Aquaculture License](#) sets a good precedent for the development of multiple application types, of which two could be tailored to fit shellfish and seaweed proposals. Policies and regulations in other jurisdictions have made progress towards the establishment of licensing systems specific to various aquaculture species, often focusing on a risk-based approach to assess the sensitivity of local ecosystems, the scale of production (i.e., lease size and production capacity), and harvesting methods.

For example, Maine has developed [a series of licensing streams](#) to accommodate shellfish and seaweed growers at various scales. Streams specified for shellfish and seaweed operators provide a suite of application options to suit the needs of applicants:

- "Standard", for any standard commercial shellfish or seaweed leases up to 100 acres in size;
- "Experimental", for shellfish or seaweed leases up to four acres in size and allowing for either commercial or research purposes;
- "Emergency", for situations in which the health of shellfish stocks are threatened, during which the operator has permission to move the stock; and
- "Limited-purpose", developed so that researchers or entrepreneurs can test the efficacy of different locations for shellfish and seaweed species prior to applying for a full-size lease, constrained by 400 square-feet and particular gear types.

Scotland takes a different approach through the country's [Seaweed Cultivation Policy Statement](#).⁴⁰ Defining small-medium seaweed farms as those with 0-50 lines of no more than 200 metres in size, the statement openly recognizes the government's support, in principle, for small-medium seaweed operations. Operators are still required to "demonstrate that mitigation measures have been considered to prevent adverse environmental impacts, and set out how these will be delivered". The statement also outlines generalized siting criteria (e.g., placing operations away from sewage outflows and ensuring cultivated species are native to the area, etc.) with proposals subject to more refined analysis later in the process.

⁴⁰ *Seaweed cultivation policy statement*. (2017). The Scottish Government.

In developing regulations to support small-scale operators, we can also look to protections for independent, owner-operator fish harvesters enshrined in the Canadian *Fisheries Act*.⁴¹ “Owner-Operator” rules were established as policy in 1989, requiring that the holder of a commercial fishing licence is aboard the vessel when the licence is fished.⁴² These obligations for licence holders have helped to ensure that the benefit and value of our inshore fisheries is equitably distributed throughout working fishing families and fishing communities. If vertically integrated companies are able to consolidate the shellfish and seaweed aquaculture sectors – much as Cooke and other companies have done with the ONP aquaculture sector – Nova Scotia risks a significant narrowing of potential economic benefit across the aquaculture industry and throughout coastal communities.

Recommendations

- Implement a “right-sized” system to match the potential ecological and social impacts of a development proposal to the level or regulatory burden that proponents must face; based on a risk-based framework examining scale, species, inputs, outputs, technology, etc.
- Establish a working group inclusive of shellfish and seaweed aquaculture operators, ecosystem experts, community representatives, public interest organizations, and rights-holders for consultation on the development of a framework for implementation within one year
- Increase NSDFA capacity to ensure clear procedural steps and the timely flow of information; support small-scale applicants through the administration process
- Establish owner-operator protections for developing shellfish and seaweed sectors

4.2 Development of extension services for shellfish aquaculture

Nova Scotia has fallen well behind its Atlantic neighbours in the development of the shellfish sector. Shellfish aquaculture in Atlantic Canada typically cultivates oysters, mussels, scallops, and clams. These bivalve species are widely lauded for their ability to “clean” nearby seawater through unique filter feeding mechanisms. While there are impacts associated with the development of shellfish farms – particularly very large-scale, mechanized operations – the

⁴¹ DFO. (2021.) *Policy for Preserving the Independence of the Inshore Fleet in Canada’s Atlantic Fisheries*. Retrieved: <https://www.dfo-mpo.gc.ca/reports-rapports/reqs/piifcaf-policy-politique-pifpcca-eng.htm>

⁴² Langille, C. (2021). [The History of Owner-Operator and Fleet Separation Policies: Cornerstones to Protecting the Independence of Fish Harvesters](#). *Union Forum Magazine*.

profile of ecological harm is much reduced relative to ONP salmon farming operations. In some cases, with appropriately-scaled development sizes and low-impact harvest methods, shellfish farms can indeed contribute to the improvement of localized ecosystems through nutrient processing.

With many protected bays and inlets, a diversity of coastal habitat suitable for a variety of shellfish species, and a culture of shellfish harvest and consumption, Nova Scotia is an ideal location for shellfish aquaculture. However, despite Nova Scotia's much longer coastline, our province trails New Brunswick in annual oyster production by more than six times, and trails Prince Edward Island in annual mussel production by more than 15 times.^{43 44} Nova Scotia is home to just 300 jobs in shellfish aquaculture, versus much higher employment numbers in PEI.^{45 46} In our view, an intense focus on the largely unsuccessful development of industrial-scale salmon farming has led to the relative neglect of the shellfish in Nova Scotia. We have been unable to overcome challenges with invasive species, pests, disease, and quality seed in shellfish aquaculture.

For example, invasive tunicates plaguing the production of mussels on Nova Scotia's South Shore have impacted neighbouring provinces as well. In PEI, government and industry have responded with the development of extension services to ensure that mussel sites are regularly cleaned of tunicate infestations, often deploying routine pressure washing methods. This straightforward extension service provides further employment opportunities for service contractors, and protects the value associated with mussel cultivation on the Island. Support for hatcheries and quality seed research and development has also enabled sector recovery after disease events and adaptation for changing environments.

Gaps in water quality testing data and safe shellfish harvest mapping pose further barriers to the development of small-scale shellfish entrants. While the federal government is responsible for mapping safe shellfish harvesting areas, significant portions of Nova Scotia's coastline are not currently monitored. For shellfish aquaculture licence applicants, that can mean a significant upfront cost for baseline testing, up to tens of thousands of dollars – enough to preclude some applicants from proceeding. Nova Scotia can aid small-scale aquaculturists by conducting testing or by subsidizing testing and mapping in areas that are

⁴³ DFO. (2020.) Aquaculture Production and Value 2020. Retrieved: <https://www.dfo-mpo.gc.ca/stats/aqua/aqua20-eng.htm>

⁴⁴ *Ibid.*

⁴⁵ *Aquaculture Employment Statistics*. (2021.) Nova Scotia Department of Fisheries & Aquaculture. Retrieved: <https://novascotia.ca/fish/documents/aqua-stats/2021-employment.pdf>

⁴⁶ Department of Fisheries and Communities. (2021.) *Economic Contributions of the Seafood Sector in Prince Edward Island*. Government of Prince Edward Island.

not currently mapped or monitored. Existing finfish and shellfish aquaculture operators could help to pay for this research with contributions relative to revenues and profit margins.

Recommendations

- Expand aquaculture extension services, research and development focused on shellfish in the province
- Reduce government subsidies and government commissioned research on salmon ONP aquaculture
- Undertake or subsidize regular water quality testing for potential shellfish and marine plant development areas

4.3 Aquaculture Development Areas

Aquaculture Development Areas (ADAs) are an underemployed tool built into existing regulations that could help to support sustainable shellfish and seaweed. ADAs create opportunities for shared planning processes to determine the appropriate use of public waters. For municipalities that have expressed an interest in establishing local shellfish and seaweed sectors, the NSDFA should continue to support efforts to establish ADAs.

Recommendations

- Remove barriers for the the development of community led shellfish and seaweed ADAs in interested communities

5. Public participation and engagement

5.1 Proponent scoping phase

As recognized throughout the Doelle-Lahey report, public participation and engagement within the regulation system must be a foundation for the development of trust between communities and the aquaculture industry. Right now, Nova Scotia does little to ensure the meaningful engagement of rights-holders, stakeholders, concerned citizens, and interested publics. With only a single “information session” required of developers seeking to move projects forward, local community members feel there is no place for them to speak to the concerns they have regarding aquaculture proposals early in the process. Our system must

do more to consult with local people during project scoping phases, and provide real avenues for community input and decision-making power.

Canadian Salmon Ltd. proposals to develop four sites in St. Mary's Bay provides a useful case study to examine the shortcomings of existing public engagement requirements. For this historically large proposal in important lobster fishing waters, Canadian Salmon held just two short online "information sessions". Sessions consisted primarily of generalized information about the salmon farming industry, rather than the proposed sites and their impacts. These sessions were held during the middle of the commercial lobster season in St. Mary's Bay, and were inaccessible to the fishing community. No two-way communication function was made available to online attendees at the sessions, and company representatives spoke without any opportunity for audience questions or other discussion.

When accused of failing to properly consult with residents of the Digby Neck, Canadian Salmon's CEO noted that the company was simply following provincial regulations to the letter. On the contrary, when Cermaq-Canada brought its own 20,000-ton proposal to Nova Scotia, the company hosted multiple open houses and reached out to individual (and potentially oppositional) stakeholders for private meetings. These procedural discrepancies during the scoping phase, where companies are allowed to determine exactly how much information and engagement opportunity they want to provide, cannot continue.

It is the responsibility of our government to ensure that citizens are granted an adequate opportunity to engage with projects, especially large-scale and high-risk proposals, seeking the use of public waters. Jurisdictions outside Nova Scotia can provide guidance on inclusive models to ensure that local communities are properly informed of and consulted. In Norway, for example, municipal governments are a primary actor in the planning of local aquaculture developments. Section 15 of Norway's *Aquaculture Act* states that licences may not be granted if they contravene existing land use or coastal zone plans developed in accordance with the *Planning and Building Act (PBA)*.⁴⁷ The *PBA* requires proponents to facilitate public participation.⁴⁸ The municipality must then decide whether or not an aquaculture proposal should undergo an environmental assessment, based on whether or not the project is likely to have a significant impact on the environment or society. Decision-making criteria include:

- *the characteristics of the project (i.e. size, use of natural resources, waste generation, risk of accidents);*

⁴⁷ *Aquaculture Act*, *supra* note 78, s 15(1).

⁴⁸ *Planning and Building Act*, *supra* note 93, s 5-1.

- *the location and environmental impact of the project, including whether the proposed area comes in conflict with protected areas, endangered species, and valuable cultural monuments;*
- *intensity and complexity of the impact (i.e. duration, frequency and reversibility); and*
- *the effects of the proposed project on other existing initiatives.*⁴⁹

Once complete, the municipality circulates the application and the impact assessment for public scrutiny and comments to the affected authorities, parties and interest groups – a period lasting six weeks.⁵⁰ The municipality is tasked to address and weigh the impact assessment plus comments received before making a final decision available to the public.⁵¹ These processes make local communities the key actor in determining whether an ONP development should go forward.

Recommendations

- For sites with high-risk profiles, we recommend proponent scoping requirements are overhauled to ensure meaningful public engagement opportunities early in aquaculture development processes; i.e., multiple engagement sessions are held within the first six months to one year of the beginning of the scoping phase
- Sessions are held near to proposed developments, with multiple locations available to community members for proposals spanning large areas
- Sessions are properly advertised in through all available local communications channels, including in print and online, with six weeks advance notice
- Sessions are not held during times when large stakeholder groups are unable to participate, or when a significant number of residents are unable to participate
- Community social licence and socioeconomic plans are assessed, and deployed during ARB hearings or other decision-making processes to determine whether a lease should be granted on socioeconomic grounds

⁴⁹ [Regulations on impact assessments](#), 2017 [IA Regulations], s 10.

⁵⁰ *Ibid*, s 25.

⁵¹ *Ibid*, s 29.

5.2 Aquaculture Review Board

One of the core recommendations of the Doelle-Lahey report, the ARB was supposed to be an independent body empowered to make fair judgements on aquaculture development proposals. According to Doelle-Lahey, a functional ARB should be oriented around opportunities to enhance fair public participation in the decision-making process. Doelle-Lahey also called for the creation of an independent, arms-length Board to hear community grievances against companies accused of violating regulations or otherwise acting in bad faith. This Board was to hear cases brought by communities and decide whether an operator's licence should be suspended or, in severe cases, revoked. This Board was never established, and communities continue to struggle to hold companies accountable for environmental damage through regular enforcement channels.

Today, with two proposals now decided by the existing ARB, we are left with significant concerns about the ARB's purpose. Rather than enhancing public participation and fair process, the ARB has actively excluded intervention by well-established civil society groups, and decisions appear hamstrung by the regulatory structure guiding its activities.

Our recent experience with the ARB hearing regarding Kelly Cove Salmon's Rattling Beach site provided an up-close look at several issues plaguing Board procedures. The process is onerous for proponents, intervenor applicants, and intervenors, with substantial preparations required at multiple procedural stages. Intervenor status is granted by ARB discretion, using subjective criteria where groups or individuals must prove they are "substantially and directly affected by the hearing". Hearings are set up in a combative trial-like style that does little to foster real understanding of proposed developments. Intervenors are not provided with the legal expertise or financial assistance they need to adequately "compete" with well-funded proponents. Federal government experts and key government representatives outside the NSDFA are not necessarily made available for cross-examination.

Leading up to the Rattling Beach hearing, our own organization's bid for intervenor status was rejected along with that of the St. Mary's Bay Protectors and the Healthy Bays Network. It appears the ARB has interpreted the "substantially and directly affected" test to mean "hyper-local", including residents or commercial actors with property or activity in close proximity to the location in question. This intervenor test fails to recognize the scope of economic, social and ecological factors to be considered when deciding on high-risk aquaculture projects. It is well-documented that environmental impacts stretch far beyond the physical location of a project, standing in relation to interconnected marine ecosystems,

species at risk, important fishing grounds, seafood supply chains, etc. Subject matter experts and non-local stakeholders must be recognized as legitimate voices regardless of their proximity to a given site. The information and experience they offer must be integrated into the process to ensure robust decisions and appropriate licence conditions.

Overall, it has become increasingly clear that the ARB is an extended licensing process, and neither can nor should act as a replacement for the environmental assessment processes necessary for large-scale, high-impact aquaculture proposals. Board members are not subject matter experts, and their role should be scoped to review the fulfillment of licence and lease requirements and ensure a public hearing. The ARB should be integrated into a broader environmental impact assessment for high-risk aquaculture development proposals (e.g., new ONP finfish applications) and subjected to the same evaluation processes as other resource development projects in the province. Other aquaculture jurisdictions, including Scotland and Norway, have processes and criteria in place to determine whether an aquaculture development presents a sufficient social or ecological risk to qualify for the environmental assessment track.⁵²

Recommendations

- Subject high-impact aquaculture proposals to existing provincial environmental assessment processes; integrate the ARB to conduct lease and licence decisions before a public hearing
- Empower a multistakeholder advisory committee to provide input to government decision-makers on latest science and development proposals; representatives of the sector, civil society groups, community, etc. (see similar federal fishery advisory committees for Atlantic Canadian fisheries)
- Funding should be available for intervenors to assist in preparing and presenting arguments at ARB hearings (e.g., [Federal Participant Funding Program](#))
- DFO and other government agencies responsible for authoring Letters of Advice should be permitted, enabled and expected to testify
- Add a ninth factor to Aquaculture Licence and Lease Regulations, allowing Board members to consider other information deemed relevant
- Eased test for intervenors should include individuals and organizations that can speak to the social and ecological impacts of proposed developments

⁵² Everest, G. (2022.) *A comparative jurisdictional analysis of aquaculture licensing regulations*. Environmental Law Placement. Dalhousie University Schulich School of Law.

- The ARB should be responsible for hearing community grievances as per initial Doelle-Lahey recommendations

6. Transparency and communication

6.1 ONP aquaculture industry reporting

A lack of transparency regarding ONP finfish operations has routinely fomented and augmented distrust between the public and regulators. This distrust has led to a public perception of industry capture within the NSDFA. Important information about aquaculture operations occurring in public waters is not published and is often characterized inappropriately as proprietary.

As the Doelle-Lahey report recognized, transparency is key to earning back the trust that has been broken in some coastal communities. The NSDFA should make all information about commercial ONP aquaculture operations available to the public. In particular, citizens need the information required to understand and assess the sustainability of aquaculture projects, such as stocking densities, sea lice and disease reports, containment regimes, inputs such as food and treatments being released into the water, waste release, etc. This information not only allows independent verification of impact by external experts, auditors, and concerned citizens, but provides critical information to determine impacts on other ocean users and inform marine planning processes.

Recommendations

We recommend a dramatic increase in published information on active aquaculture operations. A risk-based framework as recommended above can be applied here to ensure important environmental and operational information is made available, without creating unnecessarily onerous processes of information sharing across sectors. The following should be considered for release:

- government commissioned research, scoping, and consultation reports;
- department siting criteria and modeling;
- actual stocking density that occurred during grow out;
- mortality rates on sites per grow out period;
- notifications of suspected breaches at the site;

- environmental monitoring plans and reports;
- harm reduction and impact mitigation plans in place by industry;
- containment management plans;
- fish health records and incidents of disease and sea lice outbreak;
- reports of antibiotic use and sea lice treatments;
- reports of mass mortalities events;
- results of third party audits re: containment management;
- certificate of health transfer;
- applications for lease and licence;
- public comments on proposed lease or licence during the scoping phase; and
- criteria for selecting aquaculture development areas.

6.2 Communication of aquaculture decision processes

A limited effort by the NSDFA to advertise important aquaculture affairs, including new development proposals and lease amendment or renewal processes, creates a perception that the Department is unwilling or uninterested in communicating with stakeholders. Other government agencies at federal, provincial and local levels across Canada routinely communicate important messages to the public via mail, newsprint, community posters, Twitter, Facebook, Instagram, email, and a variety of other media. The NSDFA must do more to notify citizens about the establishment of development proposals in local areas, or the opening of public comment periods, etc., beyond posting information to its own website. Interested citizens may not be able to find these postings if they are not well-versed in the various components of the NSDFA site.

Recommendations

- New aquaculture development proposals, lease amendments, assignments, and renewals should be widely publicized across NSDFA channels and through publicly available digital and print media
- Open community dialogue on development proposals, lease amendments, assignments, and renewals at the earliest possible developmental phase
- Consider the use of ADA plans and regional assessments for shellfish and seaweed

aquaculture to alleviate administrative burden of individual siting processes

- Clearly communicate ecological siting criteria for assessment and harm mitigation measures for identification prior to approvals

6.3 Communication and capacity of enforcement regime

Information on aquaculture violation reporting and enforcement procedures is often hard to find or difficult to engage with for community members. Coupled with an enforcement regime that routinely appears under-funded and under-staffed, the lack of clarity has undermined public trust in oversight of the sector. A lack of responsiveness and an apparent inability to address community-based complaints in a coordinated and timely manner is a continuing concern. We encourage a close investigation of Twin Bays Coalition (TBC) interactions with the NSDFA and Nova Scotia Environment (NSE) in an effort to address a pollution problem at Bayswater Beach as a case study. We refer you to the TBC documents provided as submission to the regulatory review process, which outlines a multi-year correspondence log between TBC members at Bayswater and provincial government officials, and which has yet to be resolved.

Recommendations

- Clearly communicate procedural approaches to enforcement issues, foster dialogue between enforcement officials and community complainants
- Staff enforcement and administrative postings adequately to address community concerns in a coordinated and timely fashion
- Establish procedures to address community concerns across jurisdictional boundaries

7. Seaweed

Seaweed is a relatively new aquaculture sector in Nova Scotia and should be developed with stakeholders, rights-holders, and the engaged public to ensure a solid foundation of trust going forward. In line with recommendations for the rest of the aquaculture industry, regulations, policies and guidelines developed specifically for the seaweed industry should promote transparency, communication and ongoing engagement with the public. Decision-making structures should ensure that seaweed development proposals have a clear

pathway to fruition within a reasonable timeframe, while still holding operators accountable for environmental health.

7.1 Lease and licence regulations for seaweed aquaculture

While Nova Scotia does provide some guidance on seaweed applications through the [Guide for Shellfish and Plant Marine Aquaculture Development Plans](#), seaweed applicants are subject to a distinct lack-of-fit and an unnecessarily arduous process within the NSDFA's standard aquaculture application forms. For projects involving a nursery component, multiple agencies and applications must be involved. Licence applications require information that can be irrelevant or difficult to obtain. Small and low-impact applications can take years to process, by which time a small proponent has potentially lost their investment and market opportunity. Baseline water quality research often has not been completed in the applicant's location of interest. These and other time-consuming and expensive administrative issues may pose insurmountable barriers to seaweed entrepreneurs.

Regulations of lease, licences and management must work towards an organized, accessible, and seaweed-specific process in which the government can guide applicants, screen applications, and ensure consultation with local communities within a reasonable timeframe. Streamlined seaweed farm lease and licence processes for low-impact development plans should be clear and easy to navigate, and should aim to reduce financial and administrative burdens for small-scale proponents.

7.2 Maintaining access to public waters in a seaweed context

While the ecological impacts of seaweed operations can be minimal relative to other forms of aquaculture, seaweed developments in other jurisdictions have been subjected to social licence challenges. Concern around the restriction of access to public waters has emerged as a significant issue in locations where seaweed aquaculture is growing fast. As with other forms of aquaculture development, communities fear that they may be kept out of areas contributing to existing livelihoods in fishing and tourism, among other pursuits. Seaweed developments should be subjected to the same regulations around the protection of the public's access to public waters, and siting criteria should ensure development scales appropriate for local harbours and bays, conscious of other marine users.

7.3 Marine planning for seaweed aquaculture

Research to distinguish the key ecological impacts that may be associated with seaweed farming in a Nova Scotian context, and to map the areas of the province most appropriate for seaweed aquaculture, can help to reduce potential ambiguity for both the government and the public. Regulations can help to ensure that proponents, governments, and researchers are conducting this work as the industry grows. Alaska provides a roadmap for seaweed aquaculture site planning through the state's [Assessment of Seaweed Processing Locations in Alaska](#), which suggests ideal locations for seaweed farms based on energy availability, water services, labour needs, existing shellfish harvesting locations, and other factors.⁵³ This is coupled with Alaska's [Mariculture Development Plan](#), which includes the following recommendations under the state's "Plan for Action":

- *Establish an Alaska Mariculture Development Council*
- *Align laws, regulations and agency practices with stakeholder needs*
- *Build public understanding and support for mariculture*
- *Promote success through Alaska Native participation*
- *Summary of priority recommendations*
- *[Develop] a strategy to meet research needs⁵⁴*

A plan of this kind would aid in the development of strong regulations capable of supporting a sustainable seaweed aquaculture industry in Nova Scotia. At this early stage of development, we encourage government staff to work with seaweed farmers and civil society groups to convene stakeholders and rights-holders and begin the process of enhancing public awareness of local seaweed farms, operating procedures, ecological impacts, and regulatory safeguards. This can also contribute to the establishment of high quality seaweed production for food and other health products. Seaweed needs to be grown in waters that are relatively clean, away from nutrient run-off and finfish aquaculture sites that release waste into surrounding waters.

⁵³ McKinley Research Group. (2022). [Assessment of seaweed processing locations in Alaska](#). Alaska Fisheries Development Foundation.

⁵⁴ [Alaska Mariculture Development Plan](#). (2018). State of Alaska.

7.4 Protecting ecosystems from the impacts of seaweed aquaculture

Coastal areas, where seaweed farming will take place, are particularly rich in biodiversity. Potential concerns regarding the impact of seaweed farming include biodiversity loss, increased benthic shading and competition for nutrients with wild species. Wild kelp beds are critical to the function of coastal ecosystems in Nova Scotia, including as a nursery for many important commercial fish stocks. To address these concerns, seaweed aquaculture regulations must ensure the protection of marine biodiversity and wild kelps beds by preventing the release of invasive species, limiting benthic shading, monitoring water quality, and maintaining the genetic diversity of kelp in the wild.

Other jurisdictions have produced standard operating procedures to guide seaweed farmers through sustainable practices. The University of Malaysia has developed [A Practical Guide to the Aquaculture of *Kappaphycus* and *Euचेuma* in Malaysia](#), outlining farming guidelines for the public.⁵⁵ Tanzania has developed a similar best practice guide to assist farmers with pest and disease control, outlining biosecurity measures, pest and disease identification tools, and appropriate courses of corrective action.⁵⁶ Alaskan aquaculture regulations help to limit the spread of invasive species and maintain genetic diversity of wild seaweed by requiring that spores are collected within 50km of the farm site with tissue from at least 50 different plants.⁵⁷ These models could be emulated in Nova Scotia to support best practices for sustainability across the seaweed aquaculture sector.

7.5 Support for small-scale seaweed and community opportunity

Seaweed aquaculture's relatively low start-up cost has the potential to provide accessible economic opportunities for residents in coastal communities. Nova Scotia's regulatory system should aim to support small-scale and owner-operated seaweed farms. We must recognize biases in current regulatory structures that favour large-scale, export-oriented development in aquaculture. Small-scale seaweed operations can fit seasonal, patchwork livelihood approaches often employed in coastal communities. Locally produced seaweed products can better serve local markets, in contrast to the export-oriented market streams

⁵⁵ Phaik Eem, L. (2021). [A Practical Guide to the Aquaculture of *Kappaphycus* and *Euचेuma* in Malaysia](#). Institute of Ocean and Earth Sciences (IOES), Universiti Malaya (UM).

⁵⁶ Matoju, I. et al. (2021). [Diseases & pests of cultivated seaweeds *Kappaphycus* & *Euचेuma* in Tanzania](#). Botany Department, University of Dar Es Salaam. Global Seaweed Star.

⁵⁷ Stopha, M. (2020, April). Alaska Kelp Farming The Blue Revolution. Alaska Fish & Wildlife News. https://www.adfg.alaska.gov/index.cfm?adfg=wildlifeneews.view_article&articles_id=949

required by large-scale seaweed companies. Seaweed regulations can help to facilitate a shift in support of localized, owner-operator businesses with equitable and bespoke licensing processes, financing options and equal opportunities for marginalized or minority groups, and technical support for small-scale entrepreneurs.

Other nations provide guidance on programming to support desirable socioeconomic outcomes in seaweed aquaculture. For example, a [Zanzibar co-management program](#) provides opportunities for women to lead local seaweed farming initiatives, and points to increased autonomy, empowerment, economic opportunity, and well-being for participants. Similarly, the Alaska non-profit [Native Conservatory](#) assists Indigenous communities through the process of seaweed farm licensing, with a ten-year goal to facilitate 100 Indigenous-owned kelp farms of 20 acres each. The organization has a community kelp seed nursery and research lab, published best practices for farming, and established opportunities for low-income individuals to get involved. We encourage the NSDFA to consider how the development of regulations for seaweed in Nova Scotia could help to enable projects and programs like these.

Recommendations

- Establish a risk-based framework for seaweed licencing that ensures small-scale farms can be established within one year
- Create seaweed specific guidelines and processes that are rigorous, not onerous; reduce the number of provincial and federal agencies involved in permitting seaweed farms; reduce complexities, time and cost of process
- Consider Maine's Limited-Purpose lease: granted within months to test an area's suitability for growth while the broader licence application is processed; this licensing stream could accelerate the application process for new farmers with small-scale, low-risk seaweed proposals (limited to five acres, three years and in adherence with existing Nova Scotia aquaculture regulations)
- Identify recommended best practice and low-risk method of operation (machinery, noise, light, line density, etc.)
- Define small-, medium-, and large-scale lease sizes based on acreage
- Identify and designate nearshore ocean plots specifically suitable for seaweed and shellfish farming in collaboration with federal government agencies and ongoing regional spatial planning initiatives (e.g., [DFO's regional Oceans Plan](#))

- Apply a precautionary and proactive approach to determine guidelines for farms that will minimize potential impacts on the environment
- Provide financial support for necessary water testing, surveys, etc. required for the establishment of seaweed farms
- Identify wild kelp sub populations through genetic testing throughout Nova Scotia; determine limits on transport of wild tissue and seedlings between regions
- Prioritize access for Indigenous peoples and communities to this emerging sector

8. Conclusion

There is lots that Nova Scotia can do to ensure the development of an environmentally robust, right-sized and “rigorous not onerous” regulatory system for the aquaculture industry. This review process presents a rare opportunity to make meaningful improvements to existing components of the regulatory system that are not working – in some cases for industry, and in some cases for stakeholders and coastal communities.

With the federal government moving away from ONP technologies due to environmental and social concerns, it is critical that we begin to prepare for a similar transition in Atlantic Canada. The ONP aquaculture sector is not as entrenched in Nova Scotia as it is in other Atlantic provinces, and Nova Scotia should seek to cap new ONP aquaculture developments before tabled expansions can occur. We can end more than a decade of social conflict over fish farming in coastal communities, protect marine ecosystems in support of existing livelihoods, and create new Nova Scotia-first owner-operator opportunities in emerging shellfish, seaweed and LBCC markets. A framework like this would establish Nova Scotia as a world leader in sustainable aquaculture development, and a hub for future-facing innovation in the industry going forward.

We thank you once again for the opportunity to contribute to this process, and we encourage continued dialogue following the receipt of this submission.

For more information please contact:

Shannon Arnold

Senior Marine Program Coordinator

sarnold@ecologyaction.ca

902-446-4840

Simon Ryder-Burbidge
Marine Campaign Coordinator
sryderburbidge@ecologyaction.ca
902-446-4840