



BACKGROUND PAPER

CANADA'S AQUACULTURE INDUSTRY

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Canada's Aquaculture Industry
(Background Paper)

Publication No. 2021-03-E

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EXECUTIVE SUMMARY

Aquaculture production has seen important increases over the past 35 years, both in Canada and worldwide. British Columbia leads Canada's finfish production (principally salmon), while Prince Edward Island leads the country's shellfish production. In 2019, 187,026 tonnes of seafood were produced by Canada's aquaculture sector, valued at more than \$1.2 billion, contributing to the local economies of many small and coastal communities.

The regulatory framework of Canada's aquaculture industry is shared between the federal and provincial governments. Further complicating matters is the fact that these regulatory responsibilities differ for certain provinces. In addition to recent regulatory reforms, a federal Aquaculture Act has been proposed to help clarify the division of powers and to simplify the regulatory regime both for industry and the general public. Work towards such a federal Act has begun.

In addition to regulatory uncertainty, Canada's aquaculture industry also continues to face challenges, including concern over environmental impacts, negative public perceptions and global competition. However, many opportunities, such as emerging technologies, increased Indigenous participation and industry transparency, are also on the horizon.

Aquaculture has been part of Canada's economy for decades and environmentally sound aquaculture may be a cornerstone of the achievement of a long-term sustainable blue economy.

CANADA'S AQUACULTURE INDUSTRY*

1 INTRODUCTION

The Food and Agriculture Organization of the United Nations (FAO) explains that

aquaculture covers the farming of both animals (including crustaceans, finfish and molluscs) and plants (including seaweeds and freshwater macrophytes) ... in both inland (freshwater) and coastal (brackishwater, seawater) areas.¹

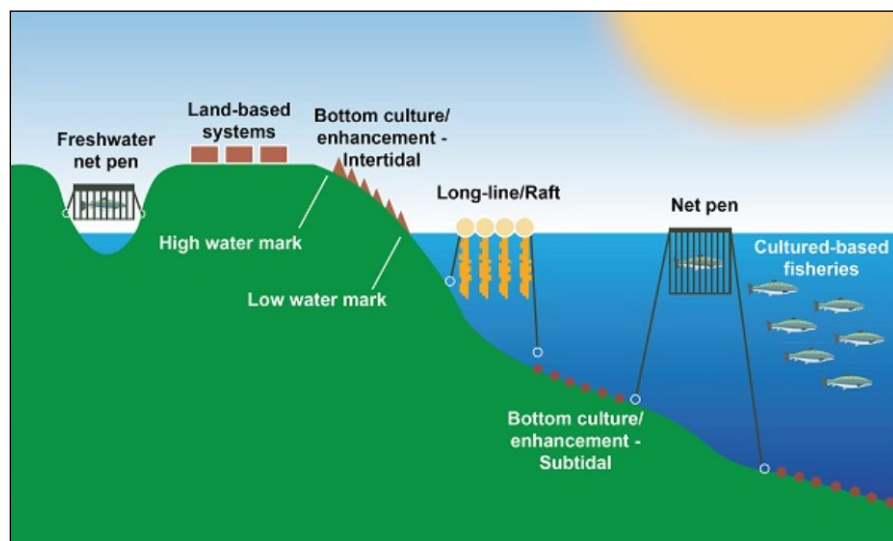
This Background Paper will examine aquaculture production in Canada, the employment opportunities it fosters and the unique regulatory framework surrounding the industry, including recent regulatory reforms. Some of the challenges and opportunities the aquaculture industry faces in Canada will also be examined.

2 AQUACULTURE PRODUCTION

2.1 CANADA'S AQUACULTURE PRODUCTION

In Canada, 45 species are commercially cultivated, including finfish, shellfish and marine plants.² Coastal net-pen production of finfish is the most common type of aquaculture in the country. Many other forms of aquaculture production also exist, including freshwater net-pen, land-based systems and intertidal bottom culture enhancement, among others (see Figure 1).³

Figure 1 – Types of Aquaculture in Canada



Source: Government of Canada, [Farmed species profiles](#).

In 2019, Canada produced 187,026 tonnes of aquaculture products, valued at more than \$1.2 billion,⁴ with production and value being led by Atlantic salmon for finfish and oysters for shellfish.

The industry has grown considerably over the years. Fisheries and Oceans Canada's (DFO's) aquaculture production statistics are available from 1986. That year, 10,488 tonnes of aquaculture products were produced in Canada, which were valued at \$35.1 million⁵ (worth approximately \$73 million in 2019 dollars). Cultured finfish species at the time consisted of salmon, trout and steelhead, while shellfish mostly consisted of oysters and mussels.

Comparatively, in 2018, Canada's commercial fisheries (i.e., wild capture fisheries) landed (i.e., put ashore) 838,510 tonnes of seafood, valued at more than \$3.74 billion, which included both freshwater and sea commercial fisheries.⁶

2.2 PROVINCIAL AQUACULTURE PRODUCTION

In 2019, Canada's finfish production was led by British Columbia (B.C.), while shellfish production was greatest in Prince Edward Island (P.E.I.). Both provinces accounted for roughly 60% of overall production in their respective categories (see Tables 1 and 2).

Table 1 – Finfish Aquaculture Production and Value by Province, 2019

Province	Production (tonnes)	Value (\$ millions)
British Columbia	90,595	681.7
Ontario	5,887	38.1
Quebec	920	7.7
New Brunswick	22,395	188.4
Nova Scotia	8,202	69.6
Prince Edward Island	492	4.1
Newfoundland and Labrador	14,167	118.0
Canada	143,820	1,114.3

Note: Production and value statistics for Manitoba, Saskatchewan and Alberta are not reported by Fisheries and Oceans Canada to meet the confidentiality requirements of the *Statistics Act*. However, the production and value statistics of these provinces are included in Canada's totals.

Source: Table prepared by the Library of Parliament based on data obtained from Fisheries and Oceans Canada, "Canadian Aquaculture Production, 2019 (tonnes)," [Aquaculture Production and Value](#); and Fisheries and Oceans Canada, "Canadian Aquaculture Value, 2019 (\$000)," [Aquaculture Production and Value](#).

Table 2 – Shellfish Aquaculture Production and Value by Province, 2019

Province	Production (tonnes)	Value (\$ millions)
British Columbia	9,684	26.9
Ontario	14	0.7
Quebec	375	2.8
New Brunswick	1,898	17.1
Nova Scotia	1,996	12.5
Prince Edward Island	25,751	50.3
Newfoundland and Labrador	3,488	5.4
Canada	43,206	115.8

Note: Production and value statistics for Manitoba, Saskatchewan and Alberta are not reported by Fisheries and Oceans Canada to meet the confidentiality requirements of the *Statistics Act*. However, the production and value statistics of these provinces are included in Canada's totals.

Source: Table prepared by the Library of Parliament based on data obtained from Fisheries and Oceans Canada, "Canadian Aquaculture Production, 2019 (tonnes)," [Aquaculture Production and Value](#); and Fisheries and Oceans Canada, "Canadian Aquaculture Value, 2019 (\$000)," [Aquaculture Production and Value](#).

3 EMPLOYMENT OPPORTUNITIES

In 2019, Canada reported more than 260 aquaculture-based businesses. The size breakdown of these employers was as follows:

- 55.3% were considered micro establishments, employing fewer than five people;
- 41.3% were considered small establishments, employing between five and 99 people; and
- 3.4% were considered medium-sized establishments, employing between 100 and 499 people.⁷

Most Canadian aquaculture businesses are small or microbusinesses, with only nine businesses reported as medium-sized. In 2019, DFO reported that more than 3,700 Canadians were directly employed in the aquaculture industry.⁸

4 SHARED GOVERNANCE

In Canada, provincial and federal governments share responsibility for managing the industry, and these responsibilities vary between provinces. Two provinces, B.C. and P.E.I., have special arrangements with the federal government for some aspects of aquaculture management in their jurisdiction.

A 2009 Supreme Court of British Columbia decision (the *Morton Decision*)⁹ categorized aquaculture in that province as “a fishery,” and since fisheries fall within federal jurisdiction, the federal government was confirmed as the primary aquaculture regulator in that province. On 10 December 2010, the federal and B.C. governments signed a memorandum of understanding entitled the *Canada–British Columbia Agreement on Aquaculture Management*, which clarifies the roles and responsibilities of each level of government as they pertain to aquaculture.¹⁰

In P.E.I., the provincial government came to an agreement with DFO and the aquaculture industry in 1928 to establish the PEI Aquaculture Leasing and Management Board (the board).¹¹ Pursuant to this agreement, the board regulates access, manages property records and ensures compliance with the lease contract, among other aspects. The board, consisting of federal, provincial and industry representatives, provides advice and direction to DFO regarding various federally managed aspects of the industry. DFO maintains jurisdiction regarding aquaculture leasing as leases are issued by its PEI Aquaculture Leasing Division.¹²

To date, there have been no similar court decisions or agreements affecting other provinces, which means that the management of the aquaculture industry remains a shared responsibility between the federal and provincial governments in those jurisdictions. Table 3 outlines the main responsibilities related to aquaculture management and the level of government responsible for each.

Table 3 – Managing Aquaculture in Canada

Management area	British Columbia	Rest of Canada	Prince Edward Island
Site Approval: Determining where a farm can be located	Shared	Provincial	Shared
Land Management: Overseeing the land (seabed) where a farm is located	Provincial	Provincial	Federal
Day to Day Operations and Oversight: Monitoring of farm activities	Federal	Provincial	Federal
Introductions and Transfers: Managing the planned movement of live eggs and fish	Shared	Shared	Shared
Drug and Pesticide Approvals: Determining which drugs and pesticides are approved for use	Shared	Shared	Shared
Food Safety: Monitoring and ensuring the safety and quality of fish harvested and sold in Canada and international markets.	Federal	Federal	Federal

Source: Table prepared by the Library of Parliament based on data obtained from Government of Canada, [Infographic: How fish farming is regulated in Canada](#).

5 FEDERAL REGULATORY REFORM

Pursuant to the *Fisheries Act*,¹³ the Minister of Fisheries and Oceans (through DFO) “regulates the aquaculture industry in order to protect fish and fish habitat. The Act sets out authorities on fisheries licensing, management, protection and pollution prevention.”¹⁴

Several *Fisheries Act* regulations pertain to the management of aquaculture activities within Canada. Most prominent among them are the *Pacific Aquaculture Regulations* and *Aquaculture Activities Regulations*.¹⁵

5.1 PACIFIC AQUACULTURE REGULATIONS

Implemented in 2010, the *Pacific Aquaculture Regulations* provide the framework within which aquaculture activities (i.e., marine, freshwater and land-based operations) take place in B.C. and outline aquaculture licensing requirements.¹⁶

5.2 AQUACULTURE ACTIVITIES REGULATIONS

Implemented in 2015, the *Aquaculture Activities Regulations* “clarify conditions under which aquaculture operators may treat their fish for disease and parasites, deposit organic matter, and manage their facilities under sections 35 and 36 of the *Fisheries Act*”¹⁷ in all provinces, except B.C. The *Aquaculture Activities Regulations* also impose reporting requirements for environmental monitoring and sampling.

5.3 REPORTING REQUIREMENTS

Aquaculture producers are required to report certain types of information pertaining to their facilities on a yearly basis, and DFO now shares this information with the public through the Open Government Portal.¹⁸ Data is available for land-based, freshwater and marine facilities. The information shared is facility-specific and includes the instances where

- antibiotics are used, including the type of antibiotic used;
- in-feed pest control drugs are used, including the type of pest control drug used; and
- pesticides (baths) are used, including the type of pesticide used.¹⁹

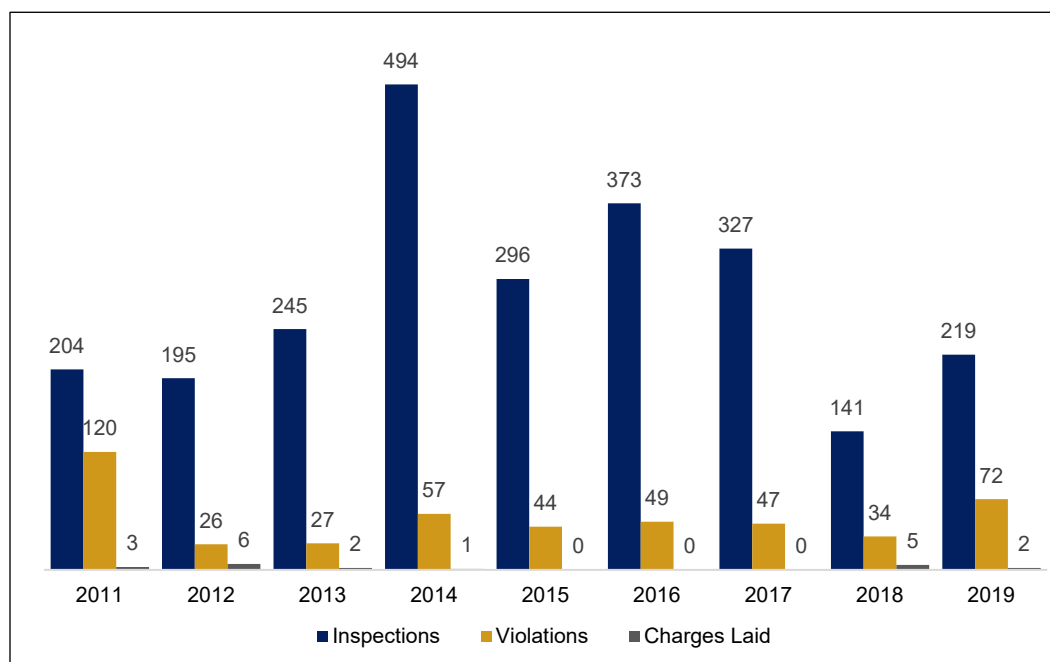
DFO offers additional information specific to B.C. aquaculture facilities on escapes (i.e., finfish escaping their enclosures), benthic monitoring (i.e., monitoring of the ocean floor beneath finfish pens) and other topics.

Reporting requirements and frequency can be found within regulations or within the conditions listed in aquaculture licences.²⁰ Public reporting of aquaculture data is intended to “enhance [the industry’s] transparency and accountability.”²¹

5.4 MONITORING AND INSPECTION

Pursuant to *Fisheries Act* regulations, aquaculture facilities must be monitored and inspected. Between 2011 and 2019, 2,494 inspections were conducted, 476 violations were reported, and 19 charges were laid (see Figure 2).²²

Figure 2 – Aquaculture Facility Inspections Conducted Pursuant to *Fisheries Act* Regulations, Violations Reported and Charges Laid, 2011–2019



Source: Figure prepared by the Library of Parliament based on data obtained from Government of Canada, "Key results," [Management of Canadian aquaculture](#).

Charges included reporting violations, illegal transportation, exceeding the maximum allowable biomass, activities occurring outside the designated time or area, and attempting to obstruct or hinder a fishery officer. Charges are not always laid as a result of non-compliance, and this decision depends on the severity of the violation. In addition to laying charges, enforcement officers can recommend education, require changes or issue warnings. "A risk-management approach is used to determine the frequency of inspections and operations to be inspected."²³

6 A FEDERAL AQUACULTURE ACT

6.1 CONTEXT AND PURPOSE

The idea of a federal Aquaculture Act has been discussed for years. However, the industry's shared jurisdiction between the federal and provincial governments adds a layer of complexity to any future legislative drafting. To further complicate

matters, the divided powers are shared differently between the two levels of government in some provinces, making the regulatory framework difficult to navigate.

Following a Canadian Council of Fisheries and Aquaculture Ministers meeting in December 2018, ministers “agreed to the development of a federal Aquaculture Act that will enhance sector transparency, facilitate the adoption of best practices and provide greater consistency and certainty for industry.”²⁴

As outlined in section 5 of this Background Paper, the Canadian aquaculture industry is federally regulated pursuant to the *Fisheries Act*. However, the *Fisheries Act* was not originally designed to regulate that industry; it was designed to regulate and manage wild capture fisheries.²⁵ A new federal Aquaculture Act is intended to do the following:

- foster national consistency, while respecting federal, provincial, and territorial jurisdiction;
- improve clarity and certainty for the industry;
- enhance environmental protection; and
- help sustainably grow the industry for the benefit of Indigenous and rural communities.²⁶

6.2 WORK COMPLETED SO FAR

DFO has undertaken certain steps regarding proposed aquaculture legislation. In 2019, the department led more than 20 engagement sessions across Canada; online engagement activities also took place.²⁷ The Minister of Fisheries, Oceans and the Canadian Coast Guard’s 2019 mandate letter included the task of beginning “work to introduce Canada’s first-ever Aquaculture Act.”²⁸ In 2020, DFO published a discussion paper entitled *A Canadian Aquaculture Act*, which outlined the key elements and authorities that would be included in the proposed federal Aquaculture Act.²⁹

Most recently, the federal government has published on its website the main sections it proposes be added to a draft Aquaculture Act.³⁰ This includes provisions that would be replicated from the *Fisheries Act* and new provisions to be drafted.

7 CHALLENGES AND OPPORTUNITIES

7.1 CHALLENGES

7.1.1 Environmental Impacts

The potential negative effects of aquaculture production on the environment are a constant challenge for the industry and have been for decades. Unlike traditional farming, aquaculture (apart from land-based facilities) takes place in public waters,

and its mismanagement can have significant harmful environmental impacts. The following concerns are often cited:

- the impacts of finfish aquaculture on the benthic environment (i.e., the deposit and accumulation of uneaten food and fish excrement beneath finfish enclosures);
- the use of antibiotics and pesticides and their potential negative impacts on non-target species;
- the escape of cultured fish from aquaculture enclosures, which could create competition for wild fish stocks; and
- the high concentration of aquaculture facilities in proximity to areas frequented by wild fish, increasing the risk of disease and pest transfers from cultured fish to wild fish.³¹

7.1.2 Communications

As the department charged with regulating aquaculture at the federal level, DFO is also responsible for communicating information about the industry. In view of concerns about environmental impacts, there is a need for better communication of the scientific findings that underpin government decisions. In a December 2018 report, the Independent Expert Panel on Aquaculture Science reported that it was “challenging at times to retrieve information on existing science reports, research programs or research findings” related to aquaculture on the DFO website. The panel recommended that DFO create an aquaculture information portal and tailor the information for target audiences, such as the general public, scientists and industry. This would allow “information on scientific findings, scientific uncertainties and science-informed decisions to be communicated at the appropriate level.”³²

7.1.3 Impacts of the Cohen Commission

The Cohen Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River was established by the Government of Canada in 2009.³³ The commission’s final report, released in 2012, included 75 recommendations, 13 of which were related to aquaculture. One recommendation suggested that aquaculture facilities located in the Discovery Islands be prohibited, pending further research of their impact on wild sockeye salmon stocks.

In 2010, DFO produced a report that studied the feasibility of moving B.C. aquaculture to closed-containment facilities (i.e., aquaculture facilities that limit interactions with the aquatic environment, which can be land-based or floating).³⁴ Closed-containment salmon aquaculture was also studied in 2013 by the House of Commons Standing Committee on Fisheries and Oceans, and aquaculture more generally was studied by the Standing Senate Committee on Fisheries and Oceans in 2016.³⁵

More recently, DFO conducted risk assessments on nine pathogens known to cause disease from aquaculture operations in the Discovery Islands area and estimated that the risk to wild Fraser River Sockeye salmon populations in all nine cases was “minimal.”³⁶ However, this conclusion has been criticized as it did not seem to take into consideration the transfer of sea lice from cultured to wild salmon stocks or the currently fragile nature of wild salmon stocks in B.C.³⁷

In December 2020, following consultations with local First Nations, the Minister of Fisheries, Oceans and the Canadian Coast Guard announced that salmon aquaculture facilities in the Discovery Islands area would be phased out within 18 months; that no new fish may be introduced into existing facilities within the area; and that all aquaculture facilities in the area would be free of fish by 30 June 2022, with the exception of existing fish that had yet to complete their growth cycle.³⁸ The decision affected 19 aquaculture facilities in the area, nine of which were already fallow (i.e., no fish were being cultivated) at the time of the announcement.

7.1.4 Regulatory Uncertainty

In November 2020, DFO announced that the Parliamentary Secretary to the Minister of Fisheries, Oceans and the Canadian Coast Guard would be responsible for “engaging with First Nations in B.C., the aquaculture industry, and environmental stakeholders” to transition open net-pen aquaculture in B.C., although it has not been specified what the industry would be transitioning to. The results of the engagement process are expected to be presented to the minister in an interim report in spring 2021, which will provide guidance on the way forward.³⁹

The inconsistent division of powers regarding the aquaculture industry across Canada also adds a layer of regulatory complexity that could discourage the expansion of the industry. The federal government’s objective of transitioning open net-pen aquaculture in B.C. could potentially generate additional uncertainty for aquaculture producers in that province and in other regions of the country as it is unclear at this time what this transition would look like, what timeframe it would need to adhere to and what the cost of this transition for industry may be.

7.1.5 Global Competition

Aquaculture is a global industry, with the FAO reporting a rise in aquaculture production worldwide of 527% between 1990 and 2018.⁴⁰ The FAO also noted that sustainable aquaculture development would be critical in maintaining this trend.⁴¹ Employment attributed to aquaculture in 2018 was estimated to be 20.5 million jobs worldwide, but only 388,000 jobs were attributed to the industry in the Americas.

The Organisation for Economic Co-Operation and Development (OECD) reported that in 2018, Canada ranked 20th in aquaculture production worldwide, by weight.⁴² Canada must therefore compete with much larger producers to secure and retain export markets. The same year, the OECD reported that the top three aquaculture producers were China, Indonesia and India.

7.2 OPPORTUNITIES

7.2.1 Emerging Technologies

Every two years, DFO publishes, in partnership with the Aquaculture Association of Canada, a review of Canadian aquaculture research and development projects conducted by researchers across Canada during the previous two years. These projects cover a variety of topics including fish health, production, husbandry technology, nutrition and environmental interactions.⁴³

Industry innovation is growing. For example, the Global Salmon Initiative lists non-medicinal methods of sea lice management that are being investigated and tested by the aquaculture industry worldwide.⁴⁴ Examples of innovative sea lice management methods include the following:

- The use of sea lice skirts, which consist of sheets of material being installed on the top portion of the salmon net pens to keep sea lice larvae out. The larvae are “generally found in the first few [metres] of water below the surface.”⁴⁵
- Thermal treatments, which expose fish to warmer water, which kills sea lice because they are sensitive to water temperature changes without harming the fish.
- Introducing certain species of fish, such as lumpfish, which are the natural predators of sea lice. Lumpfish introduced in salmon net pens eat the sea lice right off the salmon.

7.2.2 Marketing and Diversification

Canada commercially cultivates 45 species of finfish, shellfish, and marine plants. Thus, a variety of Canadian fisheries products can be and are marketed nationally and internationally.⁴⁶ Specialty, high-value products are also being produced by the aquaculture industry. For example, certain land-based facilities in Canada produce products such as caviar.

Many Canadian aquaculture companies have been accredited by third parties for various certifications, including for best aquaculture practices (BAP) and for sustainable seafood production, while some facilities have been certified organic. These certifications can increase marketability and revenues and provide “added assurance of responsible seafood farming practices” for consumers and the general public.⁴⁷

7.2.3 Increased Indigenous Participation

From 2013 to 2018, the Aboriginal Aquaculture in Canada Initiative worked to increase the participation of Indigenous communities in Canada's aquaculture industry.⁴⁸ The initiative hosted workshops and helped communities by providing technical expertise and helping to develop feasibility studies, pilot projects, among other supports.

Following the sunset of the initiative, funding and support was made available through the Northern Integrated Commercial Fisheries Initiative, which “supports [the] development of Indigenous-owned communal commercial fishing enterprises and aquaculture operations.”⁴⁹ Increasing Indigenous participation in the aquaculture industry could help expand the industry, create employment for Indigenous communities and contribute to reconciliation.

7.2.4 Increased Transparency

The introduction of a federal Aquaculture Act could help reduce the regulatory uncertainty that currently exists for the aquaculture industry. It could also help Canadians better understand the regulatory framework within which the industry operates and how the various levels of government manage the industry.

Providing scientific information in a user-friendly format and targeting the information to different user groups (e.g., the general public, scientists or aquaculture producers) could also increase transparency and ultimately help better inform Canadians about the industry and its practices.

8 CONCLUSION

The aquaculture industry has played an increasingly important role in Canada's fisheries economy; its impact is most significantly felt in the coastal communities in which most production facilities are located. However, regulatory uncertainty and the cost of mitigating environmental impacts may be stalling the expansion of the industry.

New reporting and monitoring requirements and increased transparency, coupled with a federal Aquaculture Act, may help alleviate public and industry concerns alike. The implementation of emerging technologies and innovative solutions to common problems (e.g., sea lice management) by aquaculture producers may also help grow public support while increasing production and decreasing the environmental impacts of facilities. Despite the challenges it faces, the aquaculture industry may be a key component of Canada's path towards a sustainable blue economy.⁵⁰

NOTES

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