Creating an Aquaculture Coastal Classification System – Project Update Report

Nova Scotia Department of Fisheries and Aquaculture

January 2025

NOVA SCOTIA

PLANNING FOR RESPONSIBLE AND SUSTAINABLE AQUACULTURE DEVELOPMENT IN NOVA SCOTIA

Aquaculture, the farming of fish, shellfish and aquatic plants, is an economic driver and an important part of Nova Scotia's future. In 2023, the aquaculture industry employed nearly 800 people and generated about $120 million for Nova Scotia's economy. As global demand for seafood increases, Nova Scotia is well-positioned for sustainable growth of the aquaculture sector.

To guide planning for responsible aquaculture development, the Nova Scotia Government is developing an online mapping tool that will proactively assess coastal waters to help highlight areas that may be suitable for different types of aquaculture development. These large-scale assessments will cover the entire coastline of Nova Scotia and are intended to be used as a reference tool to help a wide range of users identify where opportunities could exist for aquaculture development.

This province-wide assessment is part of a proactive planning process – it is not intended to be used for regulated decision-making. The results will help highlight areas where aquaculture development for a particular farmed species may be feasible, but more detailed assessments will be required to confirm site suitability.

When the aquaculture coastal classification system is completed, interested industry members will still be required to go through the regulated licensing and leasing process (following the requirements and steps set out in the Aquaculture License and Lease Regulations) – including opportunity for public input and consultation with the Mi'kmaq of Nova Scotia.

The online mapping tool will be publicly available online and will provide easier access to science-based information about aquaculture. It will also provide everyone with a greater understanding of where different types of aquaculture development may or may not be possible.

REGULATING AQUACULTURE DEVELOPMENT IN NOVA SCOTIA

Selecting proper (or suitable) locations for new aquaculture farms is crucial for sustainable and responsible aquaculture development. Determining if a site is suitable involves a thorough review and evaluation of many different ecological, biological, social, cultural, and economic considerations.

In Nova Scotia there are eight regulated factors used in decisions related to marine aquaculture sites:

a) the optimum use of marine resources;
b) the contribution of the proposed operation to community and Provincial economic development;
c) fishery activities in the public waters surrounding the proposed aquacultural operation;
d) the oceanographic and biophysical characteristics of the public waters surrounding the proposed aquacultural operation;
e) the other users of the public waters surrounding the proposed aquacultural operation;
f) the public right of navigation;
g) the sustainability of wild salmon; and,
h) the number and productivity of other aquaculture sites in the public waters surrounding the proposed aquacultural operation.

The Nova Scotia Department of Fisheries and Aquaculture (Department) Development Plan Guides provide further information on the minimum data and information requirements for each of the eight factors.

This data and information is required so that government network agencies -- like Fisheries and Oceans Canada (DFO), Environment and Climate Change Canada (ECCC), Nova Scotia Department of Natural Resources (NSDNR), Nova Scotia Department of Environment and Climate Change (NSECC), etc.-- can fulfill their jurisdictional duties to advise the Department or the Nova Scotia Aquaculture Review Board on proposed aquaculture development activities.

INTRODUCING AN AQUACULTURE COASTAL CLASSIFICATION SYSTEM

The aquaculture coastal classification system is a new online mapping tool that will proactively screen coastal waters to help highlight areas that may be suitable for different types of aquaculture

development. All of Nova Scotia's near-shore coastal waters will be included in the suitability screening assessments (See Figure 1 below).

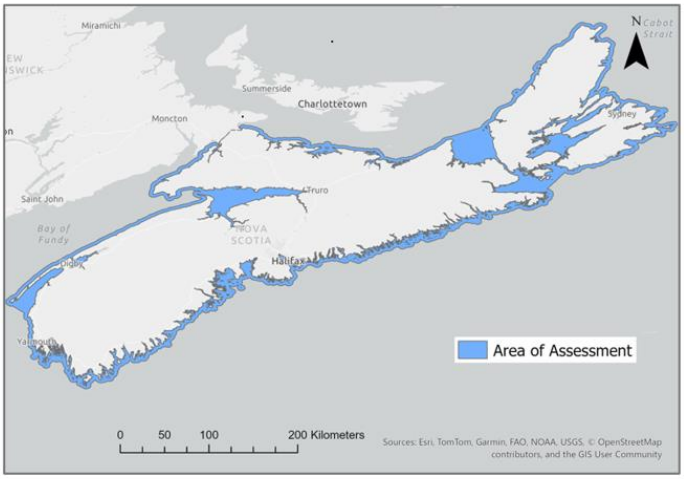

Figure 1. Map showing the area of assessment for the aquaculture coastal classification system.

Selecting a location for aquaculture development requires a comprehensive review of a variety of important information, but it is not practical to include all the necessary restrictions and considerations in province-wide assessments. However, by looking at some of the information on a broad scale, we can start to identify areas where development may be possible.

The suitability screening assessments will focus on restrictions and considerations related to the following objectives:

a) the biophysical conditions required for the health and well-being of the farmed species (like exposure to extreme temperatures, ice conditions, water depth, etc.);

b) supporting environmental protection and conservation of significant habitats and species (like marine protected and conserved areas, critical habitats for species at risk, etc.); and,

c) reducing potential overlaps with other marine activities (like anchorage areas, vessel track lines, public coastal access points, etc.).

Due to the limitations with the type and amount of information included in these broad scale assessments, they will not be used for regulated decision-making. The aquaculture coastal classification system will be used to help guide and inform future planning, policy development, and individual aquaculture projects.

Interested industry members will still need to go through the regulated licensing and leasing process – requiring more comprehensive assessments that follow the steps and requirements set out in the Aquaculture License and Lease Regulations. These more targeted assessments could be led by a proponent through the license and lease application process or by the Department through a strategic assessment (like the work completed for the Argyle Aquaculture Development Area Pilot Project).

DEVELOPING AN AQUACULTURE COASTAL CLASSIFICATION SYSTEM

Who is involved?

Centre for Marine Applied Research

The Centre for Marine Applied Research (CMAR), a division of Perennia Food and Agriculture Corp., is providing scientific support to the development of the aquaculture coastal classification system. This includes completing the suitability screening assessments and the development of the new mapping tool that will display the results of the assessments.

Data Committees

Three Data Committees were established by CMAR to support the development of the aquaculture coastal classification system:

> Biophysical Data Committee: technical experts with knowledge and understanding of biophysical and oceanographic parameters in Nova Scotia and/or how those properties relate to the requirements for the growth, health, and well-being of the farmed species.
>
> Ocean Use Data Committee: technical experts with knowledge and understanding of coastal and ocean uses in Nova Scotia, including expertise related to marine spatial planning and marine management.
>
> Wild Salmon Data Committee: technical experts with knowledge and understanding of wild Atlantic salmon and/or the potential interactions between wild Atlantic salmon and aquaculture.

The role of each Data Committee is to provide technical advice and recommendations on various aspects of the project. This includes identifying data requirements, ensuring data quality, reviewing methods for data analysis and interpretation, as well as advising on other relevant decisions or

assumptions required for the development of the aquaculture coastal classification system. The members of each Data Committee are provided in **Appendix A**.

Nova Scotia Science Advisory Committee

The Nova Scotia Aquaculture Science Advisory Committee (NSASAC) is providing the final technical review and validation of all the decisions and assumptions made throughout the development of the aquaculture coastal classification system.

The NSASAC consists of experts in scientific fields related to aquaculture regulation and provides science-based recommendations to the Minister of Fisheries and Aquaculture. The NSASAC members can be found on the Department's website.

Consultation with the Mi'kmaq of Nova Scotia

The provincial Government has a duty to consult and, where appropriate, accommodate, the Mi'kmaq of Nova Scotia when contemplating decisions that have the potential to adversely impact established or asserted Aboriginal and/or Treaty rights. The Department is leading Aboriginal consultation on the aquaculture coastal classification system project, with the Office of L'nu Affairs coordinating the provincial consultation process.

Government Departments and Agencies

The Department and CMAR have met with representatives from various provincial and federal departments to provide an overview of the aquaculture coastal classification system, the intended use of the new mapping tool, and to discuss any potential data sharing opportunities. Discussions with government departments and agencies are ongoing.

Other Interest Holders

The Department and CMAR have met with various interest holders to discuss the project – including community groups, environmental organizations, researchers, industry, etc. Discussions with interested parties are ongoing.

What are the steps being taken?

To create the mapping tool, the following steps are being taken:

1. Select species: Determine which types of farmed species will be included in the tool.

2. Review relevant restrictions and considerations: Identify the types of information used when selecting aquaculture sites and during the licensing and leasing process.
3. Compile a list of proposed criteria: Determine the specific considerations and restrictions (known as the criteria) that can be included in the mapping tool. Share the list with the Nova Scotia Aquaculture Science Advisory Committee for expert review and advice.
4. Share the list of criteria and invite public feedback: Publish a report to share the list of proposed criteria (like water depth, ice conditions, etc.) and invite feedback through an online survey.
5. Summarize feedback and changes: Release a report summarizing the feedback and how it was used to improve the mapping tool.
6. Complete the screening assessments: Combine the data using the new mapping tool. Share details of the process with the Nova Scotia Aquaculture Science Advisory Committee for expert review and advice.
7. Launch mapping tool: Finalize the tool and make it available online.
8. Publish a final report: Share a report detailing the entire process.

Updates on each of the steps in outlined in the following sections.

Selected species

Four suitability screening assessments will be completed, one for each of the top four species produced in Nova Scotia:

- Atlantic salmon
- Rainbow trout
- Blue mussels
- American oysters

The aquaculture coastal classification system will display a potential suitability map for each species.

Review of relevant restrictions and considerations

The Centre for Marine Applied Research's role includes assistance with determining the types of information (or criteria) that can be included in the mapping tool.

CMAR has prepared a report entitled *Recommendations on the Criteria for Inclusion*, providing a detailed overview of the process used to evaluate all the potential criteria considered. This report was submitted to Nova Scotia Aquaculture Science Advisory Committee for technical review and validation. The Committee's science advice (NSASAC-2024-01), including a copy of CMAR's report, is available on the Department's website.

CMAR used a science-based method to select the recommended criteria for the assessments. To be included, criteria had to be associated with the assessment's objectives and had to meet eight specific requirements to be used in the analysis[1]:

1. Relevance: The science is clear that it influences suitability for aquaculture development.
2. Rateability: The science is clear on how it influences suitability for aquaculture development.
3. Clarity: Its influence on suitability is easy to understand and explain.
4. Scale: It can be assessed on a broad scale[2].
5. Data Accessibility: The required data can be collected within project timelines.
6. Coastal Coverage: The data is available for all of Nova Scotia's near-shore coastal waters.
7. Measurement Reliability: It can be accurately measured within project timelines.
8. Redundancy: It is different information and not already covered by other criteria.

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[1] The spatial suitability analysis will be completed using Geographic Information Systems (GIS) technology coupled with multi-criteria decision analysis (MCDA) techniques.

[2] Detailed data points are important for more targeted assessments, but broad assessments tend to focus on general patterns or trends.

Proposed criteria

Based on the recommendations made by CMAR, and the science advice received from the Nova Scotia Aquaculture Science Advisory Committee, the Department has compiled a list of proposed criteria. The table below outlines the proposed criteria for each species' assessment, rationale for including it in the assessment, and the potential data sources that may be used.

Proposed Criteria	Relevance to Assessment Objectives	Potential Data Source(s)	Salmon	Trout	Mussels	Oysters
Extreme Cold	Exposure to extreme cold events can negatively impact aquatic animal health and well-being.	• Coastal Monitoring Program data (CMAR) • GHRSST Level 4 MUR Global Foundation Sea Surface Temperature (JPL NASA)	✓	✓	N/A	N/A
Extreme Heat	Exposure to periods of extreme heat can negatively impact aquatic animal health and well-being.	• Coastal Monitoring Program data (CMAR) • GHRSST Level 4 MUR Global Foundation Sea Surface Temperature (NASA)	✓	✓	✓	N/A
Water Depth (Bathymetry)	Inadequate water depth can negatively impact aquatic animal health and well-being, and can result in adverse environmental impacts.	• Gridded Bathymetric Data Set (GEBCO) • Non-Navigational (NONNA) Bathymetric Data (DFO)	✓	✓	✓	✓

Proposed Criteria	Relevance to Assessment Objectives	Potential Data Source(s)	Salmon	Trout	Mussels	Oysters
Ice Conditions	Ice can negatively impact aquatic animal health and well-being, and can damage infrastructure.	• Historical Ice Database (CMAR/NSCC AGRG) using Ice Charting Working Group for the World Meteorological Organization (IICWG)	✓	✓	✓	✓
Wind and Wave Conditions	Strong waves can negatively impact aquatic animal health and well-being, and can damage infrastructure.	• Coastal Wind and Wave Exposure Modeling (CMAR/DSA Ocean)	✓	✓	✓	✓
MSX	MSX can negatively impact aquatic animal health and well-being.	• Map of declared areas for molluscan diseases (CFIA)	N/A	N/A	N/A	✓
Critical Habitat for Species at Risk	Compliance with applicable laws and regulations to help protect and conserve critical habitats for species at risk.	• Critical Habitat for Aquatic Species at Risk – Canada (DFO) • Critical Habitat for Species at Risk National Dataset – Canada (ECCC/PCA)	✓	✓	✓	✓
Marine Protected and Conserved Areas	Compliance with applicable laws and regulations to help protect and conserve marine habitats and species.	• Canadian Protected and Conserved Areas Database (ECCC)	✓	✓	✓	✓
Wild Salmon Rivers	Consideration of the potential for interactions with wild salmon populations.	• Data collection and compilation in progress (CMAR)	✓	N/A	N/A	N/A

Proposed Criteria	Relevance to Assessment Objectives	Potential Data Source(s)	Salmon	Trout	Mussels	Oysters
Coastal Wetlands	Consideration of the potential for interactions with coastal wetlands.	• Canadian National Wetlands Inventory (ECCC)	✓	✓	✓	✓
Terrestrial Protected Areas and Parks	Consideration of the potential for interactions with terrestrial protected areas and parks.	• The Nova Scotia Protected Areas System (NSDNR and NSECC)	✓	✓	✓	✓
Important Bird Habitats	Consideration of the potential for interactions with important bird species and their habitats.	• Significant Species and Habitats Database (NSDNR) • Important Bird Areas in Canada (BirdLife International - Birds Canada and Nature Canada)	✓	✓	✓	✓
Public Coastal Access Points	Consideration of the potential for interactions with other users of marine areas.	• Ecological Land Classificaion (Government of Alberta) • Boat Launches (NSDFA) • Small Craft Harbours Locations and Information (DFO) • Marinas and Yacht Clubs (CMAR)	✓	✓	✓	✓
Vessel Traffic (AIS)	Consideration of the potential for overlap with high-use navigation areas.	• Automatic Identification System (AIS) data (DFO)	✓	✓	✓	✓

Proposed Criteria	Relevance to Assessment Objectives	Potential Data Source(s)	Salmon	Trout	Mussels	Oysters
Vessel Traffic (VMS)	Consideration of the potential for overlap with high-use navigation areas.	• National Vessel Monitoring System (VMS) data (DFO)	✓	✓	✓	✓
Anchorage Areas	Development can not occur in designated anchorage areas.	• Canadian Anchorages and Anchorage Areas (DFO)	✓	✓	✓	✓
Designated Navigation Features	Development can not occur in areas that have been designated for navigation (e.g., shipping and ferry routes, traffic separation zones, sight lines from lighthouses etc.)	• Vessel Traffic Routes (DFO)	✓	✓	✓	✓
Marine Renewable Energy Areas	Development can not occur in areas designated as Marine Renewable Energy Areas.	• Marine Renewable Energy Areas maps (NSDNR)	✓	✓	✓	✓
At-Sea Disposal Sites	Development can not occur in designated at-sea disposal sites.	• Active and Inactive Disposal at Sea Sites in Canadian Waters (ECCC)	✓	✓	✓	✓
Existing Leases and Easements on Submerged Crown Land	Consideration of the potential for overlap with other users.	• Issued Leases and Easements on Submerged Crown Land maps (NSDNR)	✓	✓	✓	✓
Private Water Lots	Consideration of the potential for overlap.	• Lot boundaries provided by GeoNOVA	✓	✓	✓	✓

Proposed Criteria	Relevance to Assessment Objectives	Potential Data Source(s)	Salmon	Trout	Mussels	Oysters
Shellfish Harvest Area Classification	Compliance with applicable laws and regulations for shellfish harvesting activities.	• Shellfish Water Classification Program – Shellfish Harvest Area Classification in Canada (ECCC)	N/A	N/A	✓	✓

N/A: Not Applicable (does not influence potential suitability for the species)

The above proposed list of criteria is subject to change based on feedback received through the public engagement survey and/or consultation with the Mi'kmaq of Nova Scotia.

There are three different ways the criteria may be incorporated into the mapping tool:

1. Factors: are criteria that can either improve or reduce the potential suitability ratings. Each factor will be individually scored (lower to higher suitability) and then combined to calculate potential suitability ratings.

2. Constraints: are criteria that identify restricted areas for aquaculture development (i.e. "no-go" areas).

The final potential suitability ratings will be a determined using the factors and the constraints. Together these are considered the index criteria.

3. Informational: are criteria that are recognized as important considerations for aquaculture development but cannot be individually scored due to the broad nature of the assessments and/or other noted concerns with the available data.

The informational criteria layers will be available to view over the results of the potential suitability ratings.

Next Steps

Invite public feedback

A public engagement survey will be posted on the Department's engagement website. It will be used to inform those interested in the project about the mapping tool and how it can be used, and to gather

feedback on the science-based criteria that will be used to screen coastal waters for each type of aquaculture development.

The survey will launch early February 2025 and remain open for a minimum of 30 days.

Summarize and share feedback

The Department will analyze the feedback received and produce a *What We Heard* summary report for publication on the engagement website.

The feedback received will be used to inform the development of the mapping tool.

Complete assessments and launch the new mapping tool

After completing the suitability screening assessments using the selected criteria, the Department will submit another *Request for Science Advice* to the Nova Scotia Aquaculture Science Advisory Committee seeking the final technical review and validation of the full development process – including all the decisions and assumptions made during the assessments.

The new mapping tool will then be finalized and shared on the Department's website, along with the final project report.

Stay Informed

For more information, go to: https://novascotia.ca/coastal-classification-system-engagement/

Contact us at coastalclassificationsystem@novascotia.ca

APPENDIX A- DATA COMMITTEE MEMBERS

BIOPHYSICAL DATA COMMITTEE		
Ramon Filgueira	Associate Professor - Marine Affairs (Aquaculture)	Dalhousie University
Peter Kraska	Coastal Ecosystem Science Division - Data Manager	Fisheries and Oceans Canada
Amanda Swim	Aquatic Animal Health - Lead Veterinarian/Manager	Nova Scotia Department of Fisheries and Aquaculture
Anthony Snyder	Aquatic Animal Health - Veterinarian	Nova Scotia Department of Fisheries and Aquaculture
Stephanie Hall	Aquatic Animal Health - Program Specialist	Nova Scotia Department of Fisheries and Aquaculture
Melinda Watts	Aquaculture Development - Development Advisor	Nova Scotia Department of Fisheries and Aquaculture
Anne Aubin	Regional Development Unit - Industry Specialist - Seafood	British Columbia Ministry of Agriculture and Food

OCEAN USE DATA COMMITTEE		
Kasia Rozalska	Marine Planning and Conservation - Spatial Planner	Fisheries and Oceans Canada
Scott Coffen-Smout	Marine Planning and Conservation - Biologist	Fisheries and Oceans Canada
Mark Flaherty	Professor – Geography (Aquaculture)	University of Victoria
Matthew King	Aquaculture Development - Planning & GIS Officer	Nova Scotia Department of Fisheries and Aquaculture
Michael Devanney	Senior Policy Analyst / Acting Deputy Director	Agriculture and Agri-Food Canada

WILD SALMON DATA COMMITTEE		
Kurt Samways	Parks Canada Research Chair in Aquatic Restoration	University of New Brunswick/Government of Canada
Jason LeBlanc	Inland Fisheries - Director	Nova Scotia Department of Fisheries and Aquaculture
Sarah Tuziak	Maritimes Region - A/Atlantic Salmon Coordinator	Fisheries and Oceans Canada
David Hardie	Population Ecology Division - Aquatic Biologist	Fisheries and Oceans Canada
Nathaniel Feindel	Aquaculture Development - Manager	Nova Scotia Department of Fisheries and Aquaculture

Note: Multiple representatives from the Centre for Marine Applied Research also participate in the Data Committee meetings.