

**Appendix 1:** Detailed comparison of the Canadian Fisheries Research Network framework for comprehensive evaluation of fisheries sustainability (presented in Stephenson et al. 2019b) with the scope of three certifications schemes: Forest Stewardship Council, Aquaculture Stewardship Council and Marine Stewardship Council in Southwest New Brunswick.

CFRN Framework 1.1	Forest Stewardship Council	Aquaculture Stewardship Council	Marine Stewardship Council
<p style="text-align: center;"><b>Ecological</b></p> <p style="text-align: center;">Productivity and trophic structure</p>	<p>6.3 Ecological functions and values shall be maintained intact, enhanced and restored, including :a) forest regeneration and succession; and c) natural cycles that affect the productivity of the forest ecosystem</p> <p>6.9 The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts</p> <p>6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion: c) will enable clear, sustainable, additional, secure long-term conservation benefits across the forest management unit</p>	<p>2.5 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> Interaction with wildlife including predators</p> <p>3.1 <i>Protect the health and genetic integrity of wild population:</i> Introduced or amplified parasites and pathogens</p> <p>3.2 <i>Protect the health and genetic integrity of wild population:</i> Introduction of non-native species</p> <p>4.1 <i>Use resources in an environmentally efficient and responsible manner:</i> Traceability of raw materials in feed</p> <p>4.2 <i>Use resources in an environmentally efficient and responsible manner:</i> Use of wild fish for feed</p> <p>4.3 <i>Use resources in an environmentally efficient and responsible manner:</i> Source of marine raw materials</p> <p>4.4 <i>Use resources in an environmentally efficient and responsible manner:</i> Source of non-raw materials in feed</p>	<p>1.1.1 The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing</p> <p>1.1.2 Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe.</p> <p>1.2.1 There is a robust and precautionary harvest strategy in place</p> <p>2.1.1 The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI.</p> <p>2.1.2 There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</p> <p>2.2.1 The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biologically based limit.</p> <p>2.2.2 There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species; and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</p> <p>2.5.1 The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.</p> <p>2.5.2 There are measures in place to ensure the Unit of Assessment does not pose a risk of serious or irreversible harm to ecosystem structure and function.</p>

	Biodiversity	<p>6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g. nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.</p> <p>6.3 Ecological functions and values shall be maintained intact, enhanced and restored, including : b) genetic, species and ecosystem diversity</p> <p>6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources</p> <p>6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion: a) entails a very limited portion of the forest management unit</p>	<p>2.1 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> benthic biodiversity and benthic effects</p> <p>2.4 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> Interaction with critical or sensitive habitats and species</p> <p>3.3 <i>Protect the health and genetic integrity of wild population:</i> Introduction of transgenic species</p> <p>3.4 <i>Protect the health and genetic integrity of wild population:</i> Escapes</p>	<p>2.3.2 The UoA has in place precautionary management strategies designed to: - meet national and international requirements; and - ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>
	Habitat and ecosystem integrity	<p>6.5 Written guidelines shall be prepared and implemented to control erosion; minimize forest damage during harvesting, road construction and all other mechanical disturbances; and protect water resources</p> <p>6.6 Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides [...]</p> <p>6.7 Chemical, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations</p> <p>6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion: b) does not occur on high conservation value forest land</p>	<p>2.2 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> Water quality in and near the site of operation</p> <p>2.3 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> Nutrient release from production</p> <p>2.4 <i>Conserve natural habitat, local biodiversity and ecosystem function:</i> Interaction with critical or sensitive habitats and species</p> <p>4.5 <i>Use resources in an environmentally efficient and responsible manner:</i> Non-biological waste from production</p> <p>4.6 <i>Use resources in an environmentally efficient and responsible manner:</i> Energy consumption and greenhouse gas emissions on farms</p> <p>4.7 <i>Use resources in an environmentally efficient and responsible manner:</i> Non-therapeutic chemical inputs</p>	<p>2.4.1 The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.</p> <p>2.4.2 There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.</p>
Social and economic	Sustainable communities	<p>4.1 The communities within, or adjacent to, the forest management area should be given opportunities for employment, training and other services</p> <p>4.4 Management and planning operations shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups (both men and women) directly affected by management operations</p> <p>5.5 Forest management operations shall recognize, maintain and, where appropriate, enhance the forest services and resources such as watersheds and fisheries</p>		

Health and well-being	<p>4.2 Forest managers should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families</p>	<p>6.5 <i>Develop and operate farms in a socially responsible manner:</i> Work environment health and safety</p> <p>6.7 <i>Develop and operate farms in a socially responsible manner:</i> Contracts (labour) including subcontracting</p> <p>6.8 <i>Develop and operate farms in a socially responsible manner:</i> Conflict resolution</p> <p>6.9 <i>Develop and operate farms in a socially responsible manner:</i> Disciplinary practices</p> <p>6.10 <i>Develop and operate farms in a socially responsible manner:</i> Working hours and overtime</p> <p>6.11 <i>Develop and operate farms in a socially responsible manner:</i> Education and training</p> <p>5.1 <i>Manage disease and parasites in an environmentally responsible manner:</i> Survival and health of famed fish</p> <p>5.2 <i>Manage disease and parasites in an environmentally responsible manner:</i> Therapeutic treatments</p> <p>5.3 <i>Manage disease and parasites in an environmentally responsible manner:</i> Resistance of parasites, viruses and bacteria to medicinal treatments</p> <p>5.4 <i>Manage disease and parasites in an environmentally responsible manner:</i> Biosecurity management</p>	
Ethical fisheries	<p>3.3 Sites of special cultural, ecological, economic or religious significance to Indigenous People shall be clearly identified in cooperation with such Peoples, and recognized and protected by forest managers</p> <p>4.3 The rights of workers to organize and voluntarily negotiate with their employer shall be guaranteed as outlined in Conventions 87 and 98 of the ILO</p>	<p>6.1 <i>Develop and operate farms in a socially responsible manner:</i> Freedom of association and collective bargaining</p> <p>6.2 <i>Develop and operate farms in a socially responsible manner:</i> Child labour</p> <p>6.3 <i>Develop and operate farms in a socially responsible manner:</i> Forced, bonded or compulsory labour</p> <p>6.4 <i>Develop and operate farms in a socially responsible manner:</i> Discrimination</p> <p>6.12 <i>Develop and operate farms in a socially responsible manner:</i> Corporate policies for social responsibility</p>	
Economic viability and prosperity	<p>5.1 Forest management should strive toward economic viability while taking into account the full environmental, social and operational costs of production, ensuring investments necessary to maintain the ecological productivity of the forest</p> <p>5.3 Forest management should minimize waste associate with harvesting and on-site processing operations and avoid damage to other forest resources</p> <p>5.4 Forest management should strive to strengthen and diversify the local economy, avoiding dependence on a single forest product</p> <p>5.6 The rate of harvest of forest products shall not exceed levels with can be permanently sustained</p>		
Distribution of access and benefits	<p>2.2 Local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free informed consent to other agencies</p>	<p>6.1 <i>Develop and operate farms in a socially responsible manner:</i> Wages</p> <p>7.3 <i>Be a good neighbour and conscientious citizen:</i> Access to resources</p>	

	Regional economic benefits to community	5.2 Forest management and marketing operations should encourage the optimal use and local processing of the forest's diversity of products		
Institutional	Obligations to law and Indigenous People	<p>1.3 In signatory countries, the provisions of all binding international agreements such as CITES, ILO Conventions, ITTA, and Convention on Biological Diversity, shall be respected</p> <p>1.4 Conflicts between laws, regulations and the FSC Principles and Criteria shall be evaluated for the purposes of certification , on a case by case basis, by the certifiers and the involved or affected parties</p> <p>2.1 Clear evidence of long term forest use rights to the land (e.g. land title, customary rights, or lease agreements) shall be demonstrated</p> <p>2.3 Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. The circumstances and status of any outstanding disputes will be explicitly considered</p> <p>3.2 Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous people</p>	7.2 <i>Be a good neighbour and conscientious citizen:</i> respect for indigenous aboriginal cultures and traditional territories	3.1.1 The management system exists within an appropriate and effective legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the Unit of Assessment(s) - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and -Incorporates an appropriate dispute resolution framework.
	Good governance structure	<p>1.1 The operation complies with all [applicable] legislation</p> <p>1.5 Forest management areas should be protected from illegal harvesting, settlement and other unauthorized activities</p> <p>3.1 Indigenous people shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies</p> <p>6.8 Use of biological control agents shall be documented, minimized, monitored, and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited</p>	1.1 Compliance with all applicable local and national legal requirements and regulations	2.3.1 The UoA meets national and international requirements for protection of ETP species. The UoA does not hinder recovery of ETP species.

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Effective decision-making processes</p>	<p>3.4 Indigenous Peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence</p> <p>7.1 The management plan and supporting documents shall provide: a) management objectives; b) description of forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions and a profile of adjacent lands; c) description of Silvicultural and/or other management systems, based on the ecology of the forest in question and information gathered through resource inventories; d) rational for rate of annual harvest and species selection; provisions for monitoring of forest growth and dynamics; f) environmental safeguards based on environmental assessments; g) plans for the identification and protection of rare, threatened and endangered species; h) maps describing the forest resource base including protected areas, planned management activities and land ownership; and i) description and justification of harvesting techniques and equipment to be used</p> <p>7.2 The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances</p> <p>7.4 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the primary elements of the management plan, including those listed in Criterion 7.1</p> <p>8.1 The frequency and intensity of monitoring should be determined by the scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change</p> <p>8.2 Forest management should include the research and data collection needed to monitor, at a minimum, the following indicators: a) yield of all forest products harvested; b) growth rates, regeneration and condition of the forest; c) composition and observed change in the flora and fauna; d) environmental and social impacts of harvesting and other operations; e) costs, productivity, and efficiency of forest management</p> <p>8.3 Documentation shall be provided by the forest manager to enable monitoring and certifying organizations to trace each forest product from its origin, a process known as “chain of custody”</p> <p>8.4 The results of monitoring shall be incorporated into the implementation and revision of the management plan</p> <p>9.4 Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes</p>	<p>7.1 <i>Be a good neighbour and a conscientious citizen</i>: community engagement</p>	<p>1.2.3 Relevant information is collected to support the harvest strategy.</p> <p>1.2.4 There is an adequate assessment of the stock status.</p> <p>2.1.3 Information on the nature and amount of primary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species.</p> <p>2.2.3 Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.</p> <p>2.4.3 Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.</p> <p>2.5.3 There is adequate knowledge of the impacts of the Unit of Assessment on the ecosystem.</p> <p>3.1.2 The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties.</p> <p>3.1.3 The management policy has clear long-term objectives to guide decision making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach.</p> <p>3.2.1 The fishery specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC’s Principles 1 and 2</p> <p>3.2.2 The fishery specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives and has an appropriate approach to actual disputes in the fishery.</p>
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