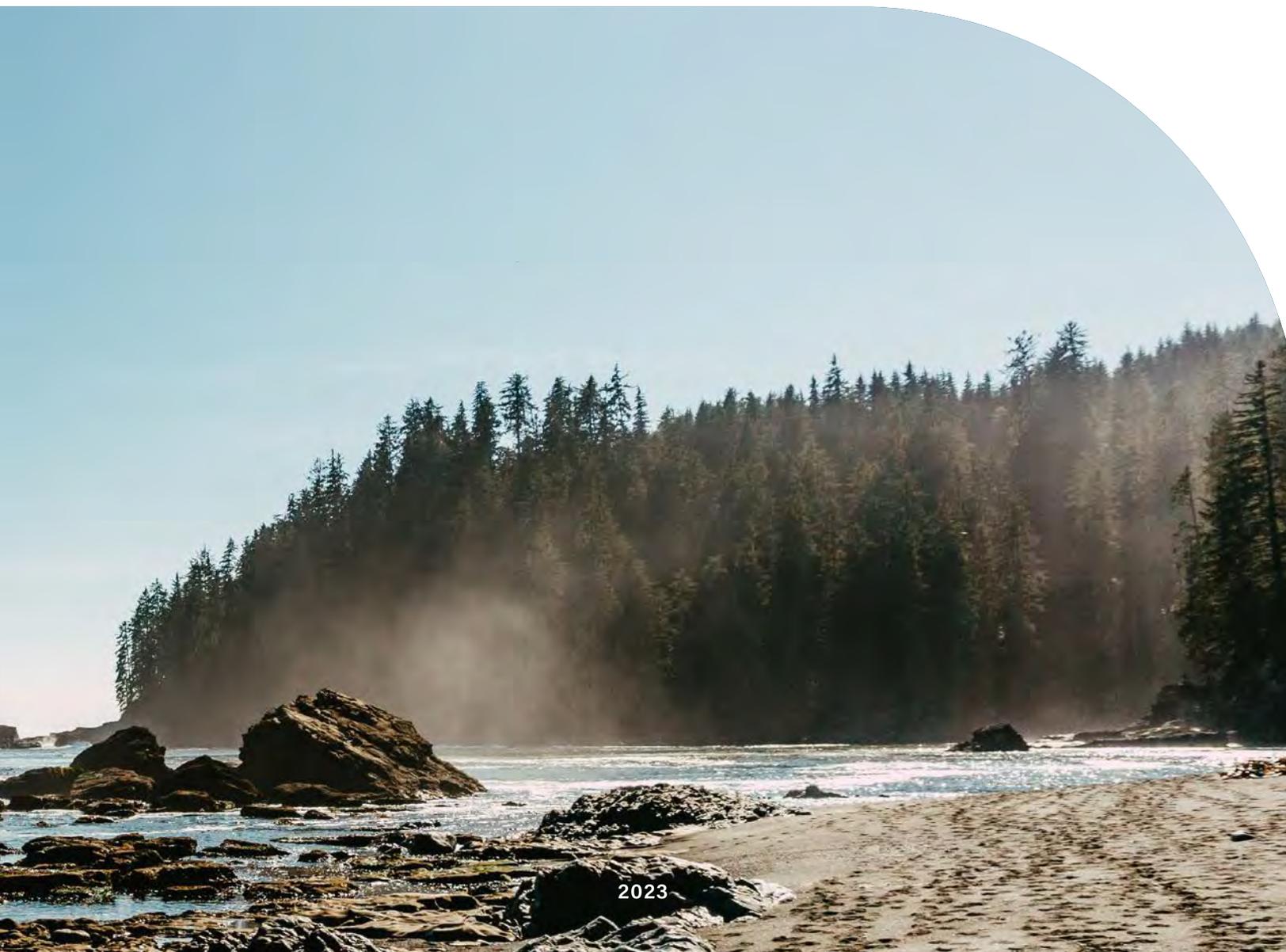




**First Nations  
Fisheries Council**  
of British Columbia

# First Nations Open-Net Pen Transition Plan

## Blueprint Recommendations



2023

**This First Nations Transition Plan Blueprint (“Blueprint”) is the culmination of feedback that FNFC has heard from First Nations that have participated in FNFC meetings and working groups held between November 2021 and February 2023.**

It summarizes broad advice from different First Nations across BC, and distills that advice into key elements and themes that the transition plan blueprint for open-net pen fish farms should include. Among the crucial themes that this process should uphold include respect for First Nations self-governance and self-determination and protection for wild Pacific salmon.

**By design, the Blueprint is not a prescriptive document. FNFC has heard clearly that a one-size-fits-all approach will not work and that the diversity of First Nations interests and priorities, and authority over their territories, needs to be respected.**

FNFC is not a rights-holding organization. FNFC recognizes and respects the sovereignty and self-governance of all First Nations as rights holders and supports their right to make their own decisions. FNFC’s role is to provide information and support First Nations positions where their collective interests align.

This document does not represent a consensus First Nations perspective on the transition plan for open-net pen fish farms. It is not prescriptive nor does it speak on behalf of any First Nations rights holders. It does not satisfy government’s legal duty of consultation.

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**“Indigenous peoples have the right to freely determine their political status, and freely pursue their economic, social, and cultural development.”**

**(United Nations, 2007)**

# 1 FIRST NATIONS & OPEN-NET PEN TRANSITION PLAN

## 1.1 CONTEXT

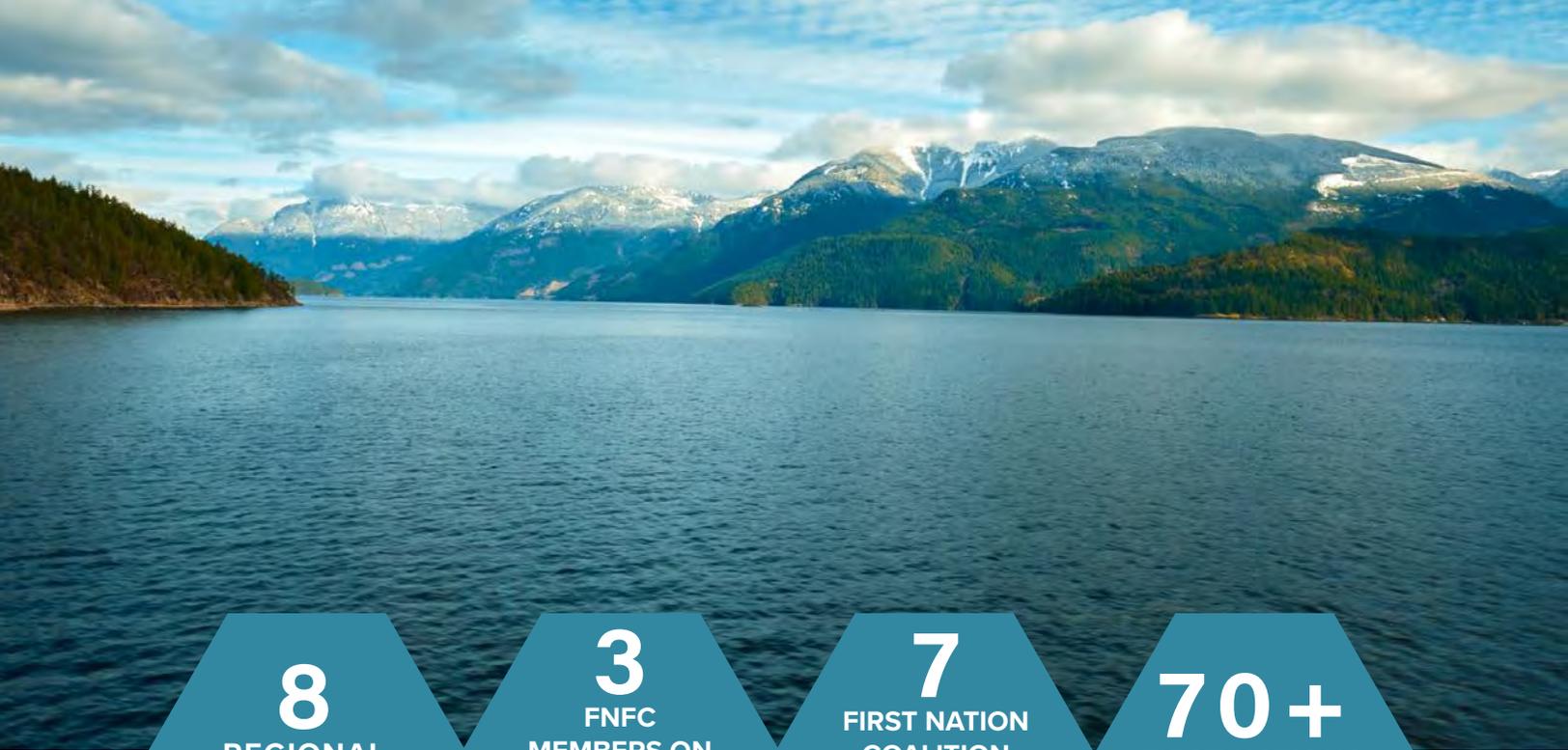
**The decline of wild Pacific salmon populations across British Columbia (BC) has been attributed to numerous factors, including overfishing, agriculture, predation, habitat loss and degradation, industrial activities, open-net pen aquaculture, climate change, pollution, diseases, etc.**

In response to these declines in 2019 and again in 2021, the Prime Minister of Canada mandated the Minister of Fisheries, Oceans and the Canadian Coast Guard (DFO) to collaborate with the Province of BC and with First Nations in BC to create a transition plan for salmon open-net pen farming for coastal BC, to be completed by 2025 (Trudeau, 2021). The development of the transition plan included creating multiple draft versions based on feedback gathered through several phases of engagement with First Nations, rigorous scientific research, and comprehensive analyses of alternative technologies and species. Some key themes emerging from FNFC engagement with First Nations in BC on the transition plan include respect for First Nations governance and self-determination and the need to develop a plan that considers impacts to the lifecycle stages of salmon and their respective habitats. The federal government proposed the plan be finalized by June 2023.

## 1.2 DEVELOPING A FIRST NATIONS TRANSITION PLAN BLUEPRINT

**FNFC: The First Nations Fisheries Council of BC (FNFC) is a provincial-scale First Nations organization that is designed to create forums and space for open dialogue and collaboration among 200+ First Nations in BC.** FNFC is a convener, and understands the complexity of bringing together the unique and distinct views of First Nations across BC. FNFC supports First Nations to collaborate and work towards common interests, recognizing that First Nations can more effectively advance interests when speaking in coherent and cohesive voices. FNFC respects that First Nations have inherent rights to self-determination and self-governance, reaffirmed in the *United Nations Declaration on the Rights on Indigenous Peoples* (UNDRIP) and *Free, Prior and Informed Consent* (FPIC).

The FNFC's role in the open-net pen transition plan development process is to support First Nations to convene, discuss and provide advice on the future of sustainable aquaculture in BC, which includes the development of a plan that reflects First Nations interests. Over the last several years, FNFC has facilitated a number of meetings with First Nations and with Fisheries and Oceans Canada (DFO), to create forums for collaboration and opportunities to bring forward First Nations interests such that their voices are heard and reflected in the development of the transition plan.



**FNFC’s activities** have focused on provincial scale coordination, while regional and local First Nation-led organizations and Nations work at watershed and local scales. Adopting a similar approach to the First Nations Coalition, led by FNFC in 2016, which provided shared recommendations to inform the amendment of the *Fisheries Act (2019)*, FNFC facilitated engagement with First Nations in BC through two primary processes: *a*) a First Nations Coalition Working Group (CWG), and *b*) regional workshops with First Nations in BC.

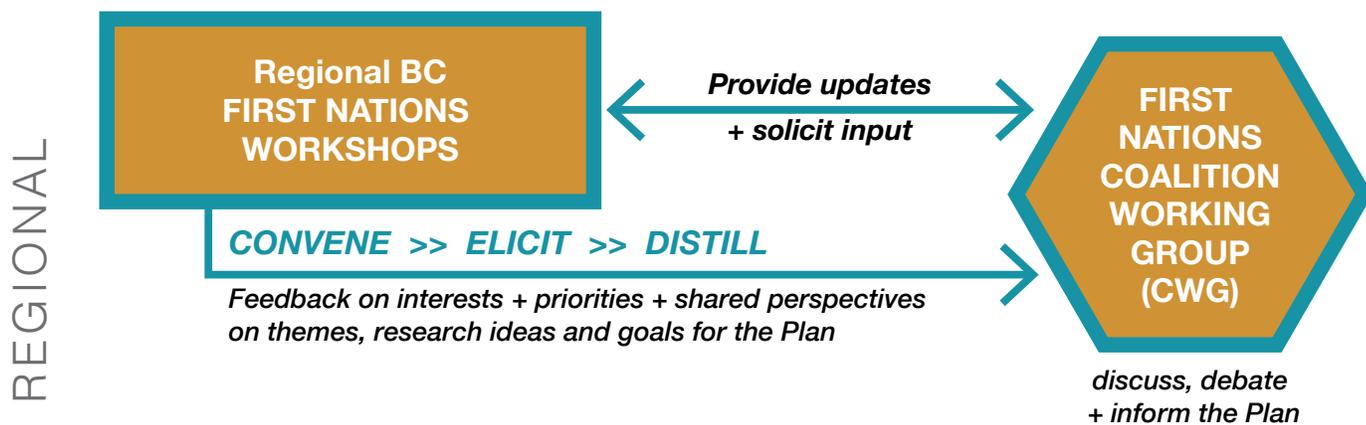
**DFO: Throughout the development of the transition plan, the Aquaculture Management Division of DFO provided financial and technical support and prepared presentations and reports.**

In addition to participating in some FNFC regional workshops, the DFO engaged directly with First Nations through information sessions, bilateral meetings, minister-led roundtable meetings, and through an online survey.

*Figure 1 (on p. 3) shows how feedback and advice from First Nations was elicited and distilled to inform regional and local scale discussions.*

**Figure 1**

Open-net pen transition plan information flow figure.



**FNFC-led Processes**  
**EXPECTED OUTCOMES**

- B.C. First Nations working together to develop coherent recommendations related to the Open Net-Pen Transition Plan development
- B.C. First Nations are informed and engaged on the goals, development, status and future steps of the plan development



**NATION to NATION Processes**  
**EXPECTED OUTCOMES**

- Rights-based conversations between First Nations and Government representatives about the issues, priorities and concerns that impacts the First Nations communities and/or their territories
- Consent-based decision-making between First Nations and Governments throughout the development of transition plan
- Individual plans for transition should be consent-based between impacted First Nations and Government



## 1.3 SCOPE

**The scope of the First Nations Transition Plan Blueprint is for open-net pen Atlantic salmon farms off BC’s Pacific coast. These farms have been primarily concentrated around the North & West coast of Vancouver Island, Johnstone Strait, Discovery Islands, Broughton Archipelago and Sunshine Coast. Many facilities operate in First Nations territories: some farms share formalized agreements with First Nations communities, while some First Nations oppose the operation of these farms within their territories.**

While the adoption of the 2007 *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) by federal and provincial governments represents a significant step forward for reconciliation, a great deal of work must be done to implement UNDRIP and to reflect on how governments work with First Nations. Governments and First Nations must work together to ensure that UNDRIP has tangible, practical impacts.

FNFC developed a directions paper, *Turning the Tide* (2020), that outlines concrete actions to implement the *BC Declaration on the Rights of Indigenous Peoples Act* in the context of fish, fisheries, and aquatic habitat priorities in BC. The recommendations in this paper identify specific changes in provincial legislation, policy, and program development and implementation aimed at protecting wild fish and their habitats and upholding First Nations self-determination and authority. FNFC is working with First Nations to advance a vision for the future of fisheries management that is centered on the rights and interests of First Nations communities. Building from this work, FNFC continues to support UNDRIP implementation with the federal government and to inform the development of the UNDA Action Plan. Broadly, these activities and discussions should continue to inform DFO’s plans and how they work with First Nations in a respectful manner while developing the Open-Net Pen Transition Plan.

The Fisheries and Oceans Minister’s mandate was to develop a responsible plan to transition from open-net pen salmon farming in coastal BC waters by 2025. Based on DFO’s communications, FNFC had understood that DFO intends to develop said plan by June 2023, with implementation to follow in the summer/fall 2023. It is not confirmed if this timeline is accurate.

## 2 UNDRIP AND FIRST NATION SELF-DETERMINATION

The *United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)* is a human rights document that contains 46 articles that set out comprehensive standards for the rights and well-being of Indigenous peoples. Rights addressed in UNDRIP relate to:

- » LANDS
- » RESOURCES
- » CULTURES
- » LANGUAGES
- » GOVERNANCE
- » HEALTH

(United Nations, 2007)

The Province of BC became the first jurisdiction to formally adopt legislation guided by UNDRIP, when it passed the *Declaration of the Rights of Indigenous Peoples Act* (2019). DRIPA requires the Province of BC to ensure that all provincial laws, policy, and programs are consistent with the mandate outlined in the *Declaration Act* (Government of BC, 2019; United Nations, 2007).

In 2018, Canada declared *10 Principles* (Government of Canada) that provides a whole of government approach to respecting the relationship Canada shares with Indigenous peoples, and to adhere to in order to renew nation-to-nation and government-to-government relationships, based on a recognition of rights, respect, co-operation, and partnership as the foundation for change. In June of 2021 the *United Nations Declaration on the Rights of Indigenous Peoples Act* (Bill C-15) received Royal Assent, which commits the government to fully implement UNDRIP as a roadmap for working with Indigenous communities (Government of Canada).

First Nations in BC have repeatedly emphasized the importance of ensuring that UNDRIP principles are woven throughout the development and implementation of the transition plan and have advocated for the protection of Aboriginal Rights and Title and as such, the transition plan should be developed and implemented in a way that protects these interests.

**UNDRIP indicates that:**

- **Indigenous peoples have the right to own, use, develop, and control the lands and resources that they possess by reason of traditional ownership, occupation, or use (United Nations, 2007).**
- **Indigenous peoples have the right to freely determine their political status and freely pursue their economic, social, and cultural development (United Nations, 2007).**

First Nations have a right to govern and manage resources and development within their own territories and the plan should be developed in a way that reflects this desire for self-determination and accounts for the diverse priorities of BC First Nations.

**The transition plan development and implementation should:**

- **Respect where First Nations have shown an interest in moving forward with their own aquaculture related planning initiatives.**
- **Work with First Nations communities to plan future developments.**
- **Make efforts for a collaborative approach with First Nations through the transition plan process, rather than dictating a series of activities that goes against the interests and self-determination of First Nations.**

First Nations have highlighted the importance of bilateral engagement with First Nations that are affected by the plan in a manner that aligns with UNDRIP principles. DFO has a duty to consult and cooperate with First Nations in good faith through their representative institutions to obtain free, prior, and informed consent before the implementation of legislative measures and potential actions that have the potential to infringe on First Nations Rights and Title.

Throughout FNFC engagement, many First Nations delegates emphasized the importance of ensuring that the plan is co-developed alongside First Nations and incorporates systems that allow for consent-based decision making around matters that relate to aquaculture management within their individual territories.



# 3 EMERGING THEMES FOR DEVELOPING A TRANSITION PLAN

## 3.1 WHOLE OF SALMON LIFE CYCLE APPROACH

The protection and rebuilding of wild Pacific salmon stocks is a key priority for all First Nations in BC and the importance of salmon to the health of ecosystems is well known. First Nations have a unique relationship with salmon, the salmon provide food and are fundamental to the socio-cultural histories and relationships of communities. Salmon are integral to First Nation cultures and livelihoods.

Today, threats to wild salmon and their habitats persist. Salmon runs are in crisis, undermining First Nations cultures, food security, and economies. Salmon migrate through a wide range of habitats during their life cycle, from rivers, lakes and near-shore coastal environments to the open ocean. At each life cycle stage, a number of impacts increasingly and cumulatively threaten salmon populations. Throughout their life histories, the cumulative impacts of these threats further weaken already struggling stocks.

**While the transition plan focuses on reducing the impacts of one identified threat at one stage of the Pacific salmon life cycle, it is imperative that the DFO also consider impacts to wild Pacific salmon during other life history phases (Figure 2) as part of a holistic approach to protecting and rebuilding Pacific salmon populations. To integrate the First Nation world view that “everything is connected” appropriately, the transition plan must be developed holistically and consider all impacts to the different life cycle stages of a salmon and its respective habitats.**

First Nations have unique knowledge about Pacific salmon. Throughout the long history of First Nation peoples with salmon, a wealth of Indigenous knowledge around these species has accumulated and continues to evolve. Essential practices relate to the interconnectedness of First Nation views and principles, including protecting salmon populations, social gatherings, and more, (Molden et al., 2021) . As knowledge holders, First Nations must be part of efforts to restore salmon populations. In line with The Crown’s commitment to UNDRIP, First Nations must be supported to participate in the development of a comprehensive, holistic mitigation strategy to give the wild salmon the best chance of recovery and opportunities to consider how Indigenous Knowledge can support western science and vice versa.

## 3.2 RESPECT FOR FIRST NATIONS GOVERNANCE AND SELF-DETERMINATION

A “top-down” approach by the Crown is contrary to reconciliation efforts with First Nations and will not fully respect a First Nations right to self-determination. The plan should be co-developed such that Governments and First Nations are truly working together to consider the many factors that need to go into developing a transition plan, rather than a prescribed approach from the Crown that is unilaterally dictating to First Nations activities that occur within their territories. These efforts should be consistent with, and work towards securing from First Nations their free, prior, and informed consent throughout the transition plan development and implementation process.

### RESPECT FOR ABORIGINAL RIGHTS AND TITLE

Principle 1 of Canada’s *10 Principles* states that the Crown has a responsibility to respect First Nations right to self-determination, including the inherent right of self-government. The plan should not infringe upon Aboriginal Rights and Title and careful planning and considerations should take place to understand potential impacts that the transition plan could have on Aboriginal Rights and Title before the plan is finalized and implemented.

### RESPECT FOR FIRST NATIONS OBJECTIVES

The transition plan development process should respect the diversity of First Nations in BC, and recognize that a “one-size-fits-all” approach should not be applied. Instead, Governments should work with First Nations to understand the objectives that they hold for the lands, waters and resources. The transition plan should progress with a variety of options and pathways that different Nations can take to arrive at shared goals. First Nations should also be supported to come together to share their experiences to ensure the best outcomes possible for First Nations broadly, both now and for future generations.

## 3.3 WHOLE OF BC AQUACULTURE SECTOR APPROACH

There is a global demand for marine proteins and Canada is well-positioned to help meet this demand through a Blue Economy. With an extensive coastline and relatively temperate waters, BC is ideally suited for aquaculture. However, the development of aquaculture in BC has been relatively slow and has primarily focused on Atlantic salmon net pen aquaculture. Atlantic salmon net pen aquaculture is one species and one technology, aquaculture is broad and includes a number of different species and technologies. The development of the transition plan must look beyond just salmon net pen aquaculture and consider a broad whole-of-aquaculture sector approach that can consider the future of aquaculture in BC and different transition options including species and technologies. With adequate support, aquaculture is poised to play an increasingly significant role in the development of Canada’s Blue Economy and contribute significantly to BC’s economy, as well as supporting First Nations livelihoods and economic development.

Canada should be looking at ‘transitioning up’ – a process of sustainable aquaculture and enhancement – that is led and partnered with First Nations. First Nations have diverse interests in aquaculture with many First Nations already engaged in shellfish, finfish and seaweed aquaculture. Many Indigenous communities are looking for a prosperous seafood economy; therefore, transition must include support for innovation that could improve opportunities for First Nations’ participation in its development.

**An opportunity exists to work alongside First Nations’ long history with aquaculture into a broad BC aquaculture strategy, directed by First Nations and in collaboration with industry and the Crown, which will help guide the development of a more sustainable and inclusive aquaculture sector moving forwards.**

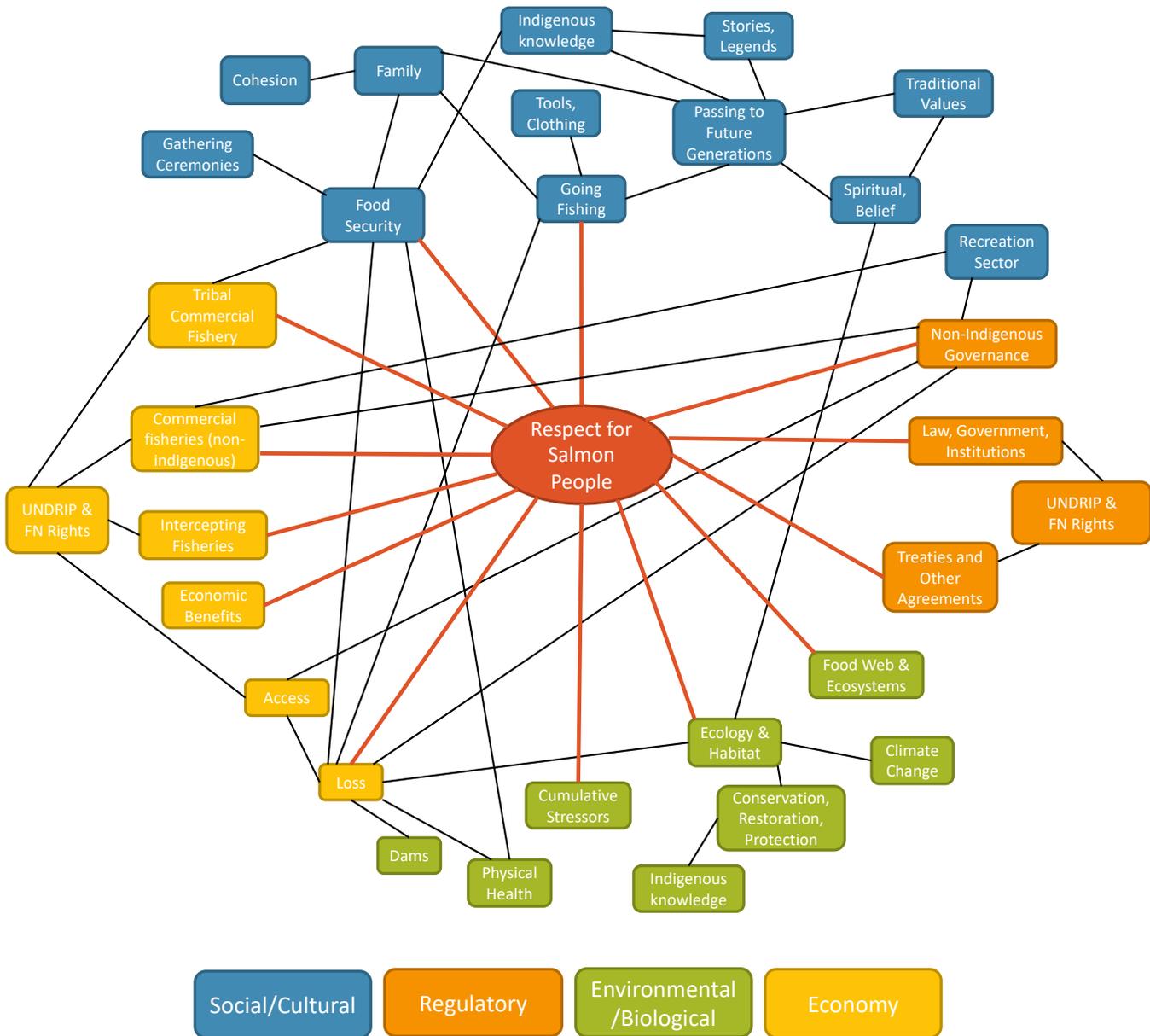
### **3.4 PROTECTION FOR FIRST NATIONS INVESTMENTS**

The transition plan process should respect and protect those First Nations that have made significant investments in aquaculture and open-net pen fish farms that may be impacted by the transition process. The Crown needs to engage with communities to fully understand what investments those communities have made and to identify options to support communities so that their livelihoods and investments are protected. It is suggested that federal and provincial governments work with First Nations to undertake or support comprehensive socio-economic studies, on a Nation-by-Nation basis, to understand the implications of transitioning away from open-net pen aquaculture and take measures to minimize and eliminate negative impacts to those First Nations.

The plan development should outline steps for the procurement of funds and expertise to help First Nations to determine in what ways the transition takes place, including potential for alternative forms of aquaculture (e.g., different species or technologies). In addition, capacity needs to be provided to facilitate new training initiatives and community capacity development.

**The establishment of a First Nations “center of excellence” to enhance First Nation aquaculture capacity should be considered as part of a broader aquaculture development strategy, and can help guide the future of BC’s aquaculture sector.**





**Figure 2**

Relationship and connections of salmon to factors in the environmental (green), economical (yellow), social (blue), and regulatory (orange) domains. An example of “everything is connected” and highlights the connection that First Nations have with Salmon. Adapted from (Earth Economics, 2021) and based on feedback obtained during CWG and ACC meetings.

## 4 GUIDING PRINCIPLES

**Feedback from First Nations emphasized high-level guiding principles as a central component in the First Nations Transition Plan Blueprint development process.** By design, these principles are broad and non-prescriptive, but aim to provide DFO with a resource to assist with decision making during the development of the transition plan. These principles include:

- **Protection of wild Pacific salmon:** The transition plan should prioritize protecting, restoring, and recovering wild Pacific salmon and highlight the importance of salmon to First Nations communities and culture.
- **Sustainable Aquaculture:** Aquaculture needs to be conducted sustainably to mitigate risks and potential impacts on wild fish stocks. Aquaculture should be managed in a way that considers past and future generations.
- **First Nations' right to self-determination and self-govern:** The Federal Government recognizes that all relations with Indigenous Peoples must be based on the recognition and implementation of their right to self-determination, including the inherent right of self-government (i.e., *Principle 1 from Canada's Ten Principles*).
- **Adoption of UNDRIP and Canada's Ten Principles:** Canada's full adoption of UNDRIP and Canada's Ten Principles should be acknowledged (i.e., co-design, co-develop, co-deliver and co-accountability principle). Canada's efforts to advance reconciliation efforts with First Nations in BC must continue to apply.
- **Co-development of the Transition Plan:** The Federal Government should not make unilateral decisions that may impact or infringe on First Nations rights in a multi-stakeholder (Tier 3) environment. Decisions must be co-developed with First Nations and/or First Nations' governing body as appointed or self-determined.
- **Trust and Transparency:** Clear and transparent communications are critical to support and be accountable to First Nations in BC. Structured processes and clear communications are necessary to convey, report, and solicit feedback and guidance from First Nations in BC.
- **Funding for First Nations:** First Nations should be adequately funded to transition from open-net pen aquaculture and participate in the transition plan development (i.e., engagement).
- **Protection of First Nation Economic Interests:** The Federal Government should protect and support the investments and economic development that First Nations have made to support their communities. This includes working with First Nations to create economic safeguards to protect their livelihoods.
- **Decision-Making:** Nation-to-Nation consent-based decision-making must occur.

The guiding principles are in no order of priority.

## 5 TECHNICAL (GREY BOOK)

This section provides a brief technical overview of some considerations for First Nations who are considering a transition away from open-net pen salmon aquaculture. It also includes a SWOT analyses of alternative aquaculture species and technologies. This information is aimed at helping guide preliminary decision making that can be used as the starting point for much more in-depth investigations which are beyond the scope of this document.



# 5.1 CONSIDERATIONS

Any plan to transition away from Open-net pen salmon aquaculture must consider a number of environmental, economic, biological, social, and regulatory factors as they relate to First Nation communities across the province. Although not a comprehensive list of considerations, this section aims to provide some preliminary information to help stimulate further discussion.

<p><b>5.1.1 Environmental</b></p>	<p>Alternative aquaculture systems or farmed species must be considered in terms of the potential for harm to the health of the surrounding ecosystem. The introduction of pathogens or parasites into the surrounding environment, risk of escapees, discharge of deleterious substances and energy and water requirements are examples of environmental considerations.</p>
<p><b>5.1.2 Economic</b></p>	<p>Economics must be considered to ensure new systems or species are sustainable, cost-competitive, and profitable at scale (DFO, 2021). First Nation communities must benefit financially, and their investments and economic interests must be protected. Important economic considerations include profitability, start-up and operating costs, employment benefits and potential for expansion.</p>
<p><b>5.1.3 Social</b></p>	<p>Social licence, at the local, regional and global scale, is an important consideration for any aquaculture species or technology and the social benefits and risks to First Nation communities must be a top priority. Employment opportunities, cultural connection with species and opportunities to revitalize cultural practices are examples of social considerations.</p>
<p><b>5.1.5 Regulatory</b></p>	<p>Regulatory factors, such as jurisdiction and licensing must also be considered when deciding whether to transition. Aquaculture in BC is regulated by several different federal and provincial authorities, and this leads to a complex regulatory environment. Depending on species and technologies, this regulatory burden may be different.</p>

## 5.2 STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS (SWOT) ANALYSIS FOR ALTERNATIVE SPECIES & TECHNOLOGIES

During engagement, First Nations expressed interest in a number of alternative species and technologies to transition away from Atlantic salmon open-net farming. Delegates suggested a SWOT analysis of species and technologies of interest should be undertaken to help First Nations when deciding on their preferred transition pathway. This section provides a brief overview of information gathered for this work and is intended to provide a basic resource to guide further investigation.

### 5.2.1 ALTERNATIVE SPECIES

A SWOT analysis was conducted for alternative species to evaluate the environmental, biological, economic, social, and regulatory benefits and drawbacks of each species. A high-level summary of the analyses for each species and summary graphic are presented below. All species presented are being cultured currently in BC.

SPECIES	STRENGTHS / OPPORTUNITIES	WEAKNESSES / THREATS
<p><b>5.2.1.1 ARCTIC CHAR (LAND-BASED)</b></p> <p>A cold-water salmonid, native to the northern regions of Canada</p>	<ol style="list-style-type: none"> <li>high market value and high yields</li> <li>seen as sustainable choice</li> <li>can grow at low temperatures</li> </ol>	<ol style="list-style-type: none"> <li>limited number of egg and fry suppliers</li> <li>strong international competitors</li> <li>feeding can be time-consuming</li> </ol>
<p>Arctic char could be a viable option for interested Indigenous groups due to its high-value and environmental suitability while providing moderate economic, social, and regulatory benefits relative to open-net pen Atlantic salmon farming.</p>		
<p><b>5.2.1.2 RAINBOW TROUT (LAND-BASED)</b></p> <p>freshwater fish occurs naturally across Canada, well-established aquaculture species</p>	<ol style="list-style-type: none"> <li>life cycle well understood</li> <li>eggs available year round</li> <li>good social licence</li> </ol>	<ol style="list-style-type: none"> <li>high levels of competition</li> <li>high CAPEX and running costs</li> <li>high energy requirements</li> </ol>
<p>Land-based farming of rainbow trout provides a relatively strong economic and social alternative to Atlantic salmon net pen aquaculture, with relatively moderate environmental and biological benefits.</p>		
<p><b>5.2.1.3 COHO SALMON (LAND-BASED)</b></p> <p>anadromous salmonid that spawns in BC</p>	<ol style="list-style-type: none"> <li>important cultural connection for First Nations in BC</li> <li>favorable growth rates</li> <li>life cycle well understood</li> </ol>	<ol style="list-style-type: none"> <li>skilled labour required</li> <li>susceptible to bacterial kidney disease</li> <li>listed as threatened by COSEWIC, which may create social perception issues</li> </ol>
<p>Land-based farming of coho salmon provides a relatively strong economic and social alternative to Atlantic salmon net pen aquaculture, with relatively moderate environmental and biological benefits.</p>		

SPECIES	STRENGTHS / OPPORTUNITIES	WEAKNESSES / THREATS
<p><b>5.2.1.4 TILAPIA (LAND-BASED)</b></p> <p>non-native to Canada, currently farmed in BC, Alberta, and Ontario</p>	<ol style="list-style-type: none"> <li>1. fast-growth and fast return on investment</li> <li>2. well established aquaculture species,</li> <li>3. utilizes sustainable feed</li> </ol>	<ol style="list-style-type: none"> <li>1. strong international competition</li> <li>2. minimal cultural connection with First Nations</li> </ol>
<p>Land-based farming of tilapia provides a relatively strong economic and environmental/biological alternative to Atlantic net pen aquaculture, with relatively weak social benefits.</p>		
<p><b>5.2.1.5 WHITE STURGEON (LAND-BASED)</b></p> <p>large fish found naturally in BC</p>	<ol style="list-style-type: none"> <li>1. multiple high value products (e.g., fin, skin, liver, etc.)</li> <li>2. integral species to the cultures and histories of many First Nations</li> </ol>	<ol style="list-style-type: none"> <li>1. slow growth rate and long return on investment (i.e., around 11 years)</li> <li>2. strong international competition</li> <li>3. require large facilities and tanks</li> </ol>
<p>Land-based farming of white sturgeon provides a relatively strong social alternative with moderate environmental and biological benefits relative to Atlantic salmon open-net pen aquaculture, with weaker economic benefits.</p>		
<p><b>5.2.1.6 SABLEFISH (NET PEN)</b></p> <p>deep-water fish found naturally in BC</p>	<ol style="list-style-type: none"> <li>1. high value product</li> <li>2. hardy species</li> <li>3. relatively new industry with low competition</li> </ol>	<ol style="list-style-type: none"> <li>1. high capital requirements</li> <li>2. limited eggs/seeds suppliers</li> <li>3. complex hatchery phase</li> </ol>
<p>Open-net pen farming of sablefish provides a strong economic, environmental, and biological alternative to open-net pen Atlantic salmon aquaculture, with relatively moderate social benefits.</p>		
<p><b>5.2.1.7 SHELLFISH</b></p> <p>scallops (bay, Japanese, Pacific hybrid, and sea), oysters (American &amp; Pacific), mussels (Western blue, Gallo/ Mediterranean, Eastern blue), crayfish, and clams (hard/quahog, littleneck, Manila, soft shell, varnish, geoduck)</p>	<ol style="list-style-type: none"> <li>1. low input costs and high yields</li> <li>2. strong international markets</li> <li>3. excellent economic opportunity for First Nations that also aligns with culture</li> </ol>	<ol style="list-style-type: none"> <li>1. can be susceptible to disease and increasingly affected by climate change</li> <li>2. industry growth relatively stagnant</li> <li>3. strong provincial and international competition</li> </ol>
<p>Shellfish farming provides a relatively moderate economic, environmental, biological, social, and regulatory alternative to open-net pen Atlantic salmon farming.</p>		
<p><b>5.2.1.8 MARINE PLANTS (KELP)</b></p> <p>brown algae (kelp), green algae (sea lettuce), and red algae (Irish moss/dulse)</p>	<ol style="list-style-type: none"> <li>1. sustainable, no feed inputs required, low impact, carbon sequestration, no waste</li> <li>2. low start-up and running costs</li> <li>3. no disease risks</li> </ol>	<ol style="list-style-type: none"> <li>1. climate change impacts unknown</li> <li>2. strong international competition</li> <li>3. fewer employment opportunities than finfish or shellfish aquaculture</li> </ol>
<p>Marine plant aquaculture provides a strong environmental and biological alternative to open-net pen salmon farming, with relatively moderate social and regulatory benefits, but relatively weak economic benefits.</p>		

## RELATIVE GUIDE TO SELECTION CRITERIA FOR ALTERNATIVE SPECIES

Note: colour ratings are probable only, based on best guesses gleaned from available information, desk-based research, and First Nation Feedback. Colours may change based on considerations not included in this report.

SPECIES	RELATIVE STRENGTH			
	Economic	Environmental/ Biological	Social	Regulatory
Arctic Char	<i>moderate</i>	<i>strong</i>	<i>moderate</i>	<i>moderate</i>
Rainbow Trout	<i>strong</i>	<i>moderate</i>	<i>strong</i>	<i>moderate</i>
Coho Salmon	<i>strong</i>	<i>moderate</i>	<i>strong</i>	<i>moderate</i>
Tilapia	<i>strong</i>	<i>strong</i>	<i>weak</i>	<i>moderate</i>
Sablefish	<i>strong</i>	<i>strong</i>	<i>moderate</i>	<i>moderate</i>
Sturgeon	<i>weak</i>	<i>moderate</i>	<i>strong</i>	<i>moderate</i>
Shellfish	<i>moderate</i>	<i>moderate</i>	<i>moderate</i>	<i>moderate</i>
Marine Plants (Kelp)	<i>moderate</i>	<i>strong</i>	<i>moderate</i>	<i>moderate</i>

Relatively stronger = **Green**; Relatively moderate = **Blue**; Relatively weak = **Red**



## 5.2.2 ALTERNATIVE TECHNOLOGIES

A SWOT analysis was conducted for alternative aquaculture technologies to evaluate the environmental, biological, economic, social, and regulatory benefits and drawbacks of each. A high-level summary of the analyses for each species and summary graphic are presented below. Not all technologies presented are currently being utilized in BC.

TECHNOLOGY	STRENGTHS / OPPORTUNITIES	WEAKNESSES / THREATS
<p><b>5.2.2.1 LAND-BASED RECIRCULATING AQUACULTURE SYSTEMS (RAS)</b> systems involve growing fish in tank facilities on land</p>	<ol style="list-style-type: none"> <li>1. lower risk of disease transfer and escapees, less waste and pathogens into environment</li> <li>2. low water requirement</li> <li>3. high yield per area</li> </ol>	<ol style="list-style-type: none"> <li>1. high capital outlay</li> <li>2. high energy and labour costs</li> <li>3. high energy inputs</li> <li>4. off-flavour of product</li> </ol>
<p>Despite land-based RAS emerging as a strong alternative to open-net pen farming, the economic feasibility of these systems remains poorly established. Land-based RAS provides a relatively strong environmental, biological, social, and regulatory alternative to open-net pen salmon farming, with relatively moderate economic benefits.</p>		
<p><b>5.2.2.2 FLOATING SEMI-CLOSED AND CLOSED CONTAINMENT SYSTEMS</b></p> <p>marine-based systems that can vary in design, including the use of different wall structures (e.g., rigid/closed or flexible/semi-closed) or mechanisms for waste collection (Gardner Pinfold Consultants Inc., 2019; PICFI, 2019).</p>	<ol style="list-style-type: none"> <li>1. reduced risk of interaction between farmed and wild fish and reduced risk of fish escape</li> <li>2. more cost-effective than land-based RAS (i.e., lower operational costs)</li> <li>3. deep water supply ensures minimal sea lice</li> </ol>	<ol style="list-style-type: none"> <li>1. technology is not fully proven commercially</li> <li>2. still require land-based RAS to raise smolt</li> <li>3. requires 3-phase power/connection to grid</li> </ol>
<p>Floating CCS provides a relatively strong economic, environmental, and biological alternative to open-net pen salmon farming with relatively moderate social and regulatory benefits.</p>		
<p><b>5.2.2.3 OFFSHORE SYSTEMS</b></p> <p>used in deeper waters (&gt;20m) and must be able withstand waves greater than 1m and open ocean conditions. Designs vary from floating to submerged, fixed to mobile and open to semi-closed.</p>	<ol style="list-style-type: none"> <li>1. reduced nearshore spatial conflict and more available sites</li> <li>2. currents reduce waste accumulation and disease &amp; pathogen loading life cycle well understood</li> <li>3. more suitable culture environment due to natural conditions</li> </ol>	<ol style="list-style-type: none"> <li>1. higher transportation and insurance costs</li> <li>2. risk of fish escapes, increased storms with climate change</li> <li>3. regulatory environment unclear</li> </ol>
<p>Offshore systems provide a marine-based alternative with high potential for economic returns, however many environment risks remain unknown, and inland First Nation communities cannot typically participate.</p>		

SPECIES	STRENGTHS / OPPORTUNITIES	WEAKNESSES / THREATS
<p><b>5.2.2.4 AQUAPONICS</b></p> <p>combines recirculating aquaculture and hydroponics* in a symbiotic relationship, and uses aquaculture in natural environments (Bernstein, 2011; Hart et al., 2013)</p>	<ol style="list-style-type: none"> <li>1. production of multiple species can increase returns</li> <li>2. reduced water consumption and waste production</li> <li>3. can benefit coastal and inland First Nation communities</li> </ol>	<ol style="list-style-type: none"> <li>1. profitability is uncertain</li> <li>2. difficult to balance the nutritional needs of both fish and plants</li> <li>3. challenging regulatory environment</li> </ol>
<p>Aquaponics provide a relatively strong environmental and biological alternative to open-net pen salmon farming, with relatively moderate economic, social, and regulatory benefits.</p> <p>* Hydroponics is a method of growing plants in a water and chemical solution where they absorb nutrients through their roots (Hart et al., 2013)</p>		
<p><b>5.2.2.5 INTEGRATED MULTI-TROPHIC AQUACULTURE (IMTA)</b></p> <p>simulates natural ecosystems and includes a fed component (e.g., fish), an inorganic matter extractive component (e.g., a marine plant), and an organic matter extractive component (e.g., bivalves and/or bottom-feeding invertebrates) (PICFI, 2019)</p>	<ol style="list-style-type: none"> <li>1. production of multiple species can increase returns</li> <li>2. reduced operational costs</li> <li>3. reduced feed and wastes</li> </ol>	<ol style="list-style-type: none"> <li>1. balancing environment requirements for multiple species can be challenging</li> <li>2. potential transmission of pathogens among species</li> <li>3. challenging regulatory environment</li> </ol>
<p>IMTA provides a relatively strong economic, environmental and biological alternative to open-net pen salmon farming, with relatively moderate social and regulatory benefits.</p>		
<p><b>5.2.2.6 RAFT SYSTEM</b></p> <p>used for shellfish nearshore farming at deepwater sites. Generally include an anchored floating raft constructed from interconnected beams and floats with ropes that act as a substrate for shellfish attachment.</p>	<ol style="list-style-type: none"> <li>1. nearshore operations may be close to markets</li> <li>2. low input costs and high yields</li> <li>3. lower carbon footprint due to proximity to shore</li> </ol>	<ol style="list-style-type: none"> <li>1. risk of wild species becoming entangled in ropes</li> <li>2. requires shoreline developments</li> <li>3. severe storms can result in lost rafts</li> </ol>
<p>Raft systems provides a relatively moderate economic, environmental, biological, social, and regulatory alternative to open-net pen salmon farming.</p>		
<p><b>5.2.2.7 CLAM GARDENS</b></p> <p>include the construction of intertidal rock-walled terraces to create shallow sloping intertidal shelves that helps improve the growing conditions for clams (Groesbeck et al., 2014)</p>	<ol style="list-style-type: none"> <li>1. low startup and operation costs</li> <li>2. little technical training required</li> <li>3. culturally important practice for First Nations and opportunities to promote food security</li> </ol>	<ol style="list-style-type: none"> <li>1. limited to small-scale operations</li> <li>2. less employment opportunities than finfish aquaculture</li> <li>3. integrity of clam gardens risked by ongoing industrial activities, climate change, and tourism</li> </ol>
<p>Clam farming provides a relatively strong environmental, biological, social, and regulatory alternative to open-net pen salmon farming, with relatively weak economic benefits.</p>		

## RELATIVE GUIDE TO SELECTION CRITERIA FOR ALTERNATIVE TECHNOLOGIES

Note: colour ratings are probable only, based on best guesses gleaned from available information, desk-based research, and First Nation Feedback. Colours may change based on considerations not included in this report.

TECH	RELATIVE STRENGTH		
	Economic	Environmental/ Biological	Social/Regulatory
Land-based RAS	<i>moderate</i>	<i>strong</i>	<i>strong</i>
Semi-Closed and Closed Containment Systems	<i>strong</i>	<i>strong</i>	<i>moderate</i>
Offshore Systems	<i>strong</i>	<i>weak</i>	<i>weak</i>
Aquaponics	<i>moderate</i>	<i>strong</i>	<i>moderate</i>
Integrated Multi-Trophic Aquaculture	<i>strong</i>	<i>strong</i>	<i>moderate</i>
Raft Systems	<i>moderate</i>	<i>moderate</i>	<i>moderate</i>
Clam Gardens	<i>weak</i>	<i>strong</i>	<i>strong</i>

Relatively stronger = **Green**; Relatively moderate = **Blue**; Relatively weak = **Red**

## 6 CONCLUDING REMARKS

The First Nations Transition Plan Blueprint is the culmination of feedback that FNFC have heard from First Nations that have participated in a series of FNFC meetings and working groups (Nov 2021–Feb 2023). It summarizes broad advice from different First Nations across BC, and distills that advice into key elements and themes that the transition plan blueprint for open-net pen fish farms should include.

Through these engagements, First Nations in BC outlined four critical areas that the transition plan should address:

1. **Whole of Salmon Lifecycle**
2. **Whole of BC Aquaculture Sector Approach**
3. **Respect for First Nations self-governance and self-determination, and**
4. **Protection of First Nations Investments.**

A set of *Guiding Principles* is recommended to be adopted as part of the transition plan.

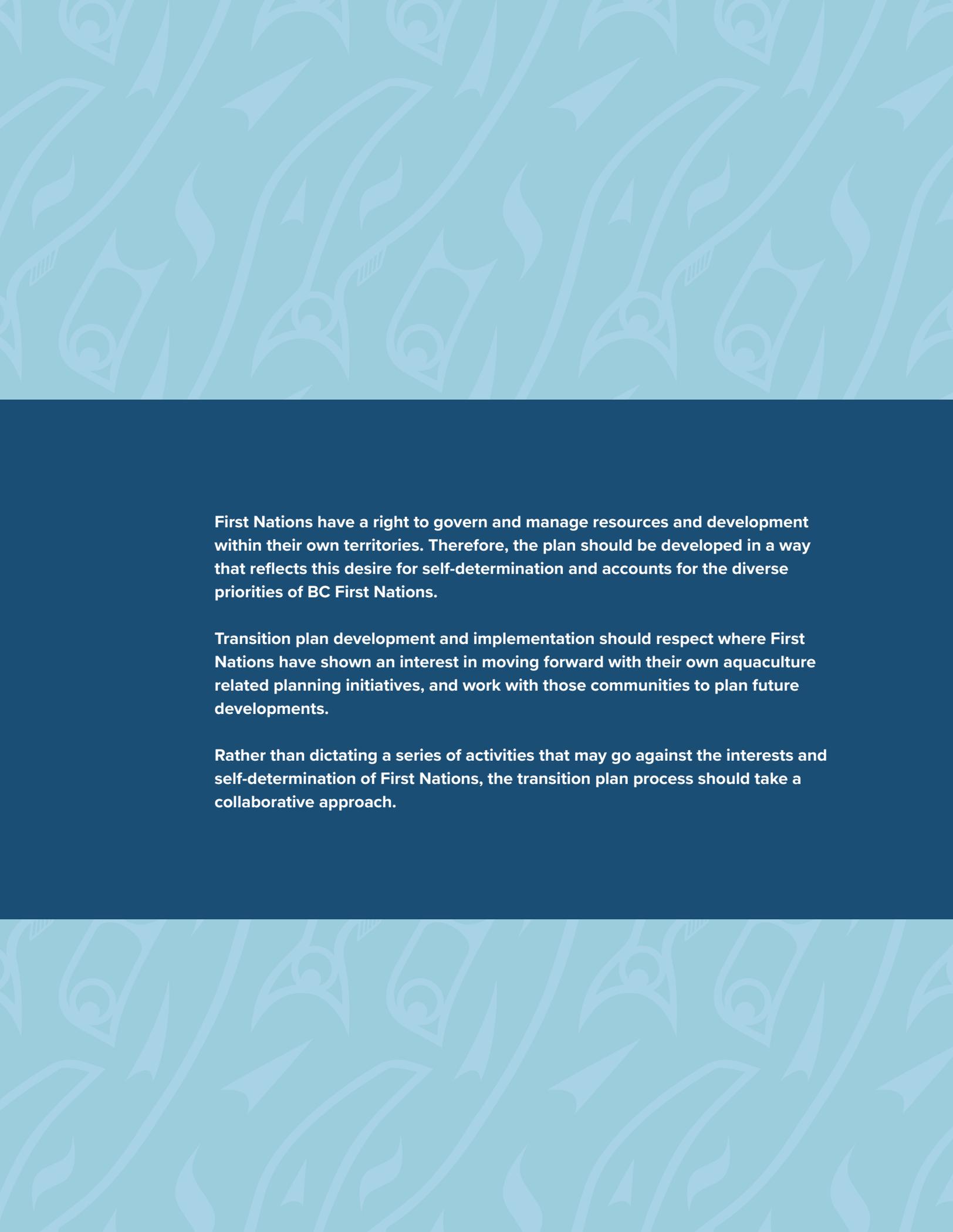
A series of technical considerations were provided to inform the development of the transition plan.

Five primary considerations were outlined including **economic, environmental/biological, social, and regulatory** factors. A summary of SWOT analysis of various species and technologies that First Nations may wish to consider is presented.

As this report illustrates, there are many different pros and cons of the various species and technology options that may be available as part of the transition and as a whole-of-aquaculture approach. Similarly, these pros and cons will not translate identically among the geographically and culturally distinct First Nation communities across BC. **Therefore, it is important that the transition plan not be implemented as a one-size-fits-all, but instead provides various options and information to enable First Nations to evaluate the net benefits relative to their unique circumstances, and to select an option that works best for their community.**

It will be important that the net pen transition plan recognize that not all First Nations are of the same mind or are within habitats that would support various options. The transition process should support First Nations in evaluating information to make decisions about transition options that are in line with their own path of self-determination and self-governance; these decisions should not be assumed to all be the same. It will be important to First Nations that key themes found within this report be reflected within the open-net pen transition plan.





**First Nations have a right to govern and manage resources and development within their own territories. Therefore, the plan should be developed in a way that reflects this desire for self-determination and accounts for the diverse priorities of BC First Nations.**

**Transition plan development and implementation should respect where First Nations have shown an interest in moving forward with their own aquaculture related planning initiatives, and work with those communities to plan future developments.**

**Rather than dictating a series of activities that may go against the interests and self-determination of First Nations, the transition plan process should take a collaborative approach.**



**First Nations  
Fisheries Council**  
of British Columbia

