

THE FUTURE OF SUSTAINABLE AND EQUITABLE FISHERIES AND OCEANS GOVERNANCE IN CANADA: FROM STOCK-TAKING TO COLLABORATIVE VISIONING

Social Science and Humanities Research Council Knowledge Synthesis Grant Report

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EXECUTIVE SUMMARY

Challenge

Canada has made strong international commitments to sustainable, equitable fisheries and oceans including in the UN Sustainable Development Goals. Yet Canada's current governance system was built for a different era, in which state agencies assume management responsibility and fishers and other stakeholders are “the governed”. It has limitations in the modern world, especially for small-scale fishers, Indigenous rightsholders, and coastal communities across the Atlantic and the Pacific coasts who are asking, and in some cases have rights, to participate in fisheries and oceans governance.

Small-scale and Indigenous fisheries are the foundation of coastal life in Canada. They support food security and sovereignty, cultural identity, and local economies. Yet, they are often poorly considered in a governance system designed around industrial fleets and centralized federal authority. Such shortcomings weaken recent efforts towards co-management with Indigenous Peoples and collaborative advisory councils with small-scale fisheries and other community leaders who have interests in just and equitable fisheries and oceans. On both Canada's Atlantic and Pacific coasts, where this study is based, there is a wide gap between stated commitments to equity and sustainability and the realities faced by small-scale and Indigenous fisheries, and coastal communities.

This study looks at the gap from a governance perspective. In the context of the study, governance focuses on how decisions get made related to fisheries, who has a say, whose knowledge counts, and how power and benefits are distributed. It is society's best mechanism for advancing equity and sustainability, which is what this synthesis report seeks to advance understanding about, specifically what is working, what is not, and what needs to change.

Research Questions and Methods

This study provides a comprehensive synthesis of social science and humanities (SSH) research on fisheries and ocean governance in Canada, with a focus on small-scale and Indigenous fisheries, and coastal communities. It addresses four core questions:

1. What is the state of SSH knowledge about governance for Atlantic and Pacific fisheries and oceans?
2. How does the current governance system manifest across Canada's coastal regions in terms of equity and sustainability for fishers and coastal communities?
3. What alternative governance approaches have been introduced in Canada and beyond that provide new models for advancing sustainability and equity, particularly for small-scale and Indigenous fisheries, and coastal communities?
4. What can we learn from these alternatives to reimagine Canada's governance system, including the interventions, enabling conditions, and next steps required to foster transformation?

To answer the questions, this study involved a systematic review of 204 peer-reviewed SSH records published between 2015-2025, as well as a workshop with governance researchers who discussed findings and contributed to further direction for the review. The systematic review used a dual-coast search strategy to create and assess Atlantic and Pacific databases, with both human and LLM-assisted classification. Interactive governance theory served as the foundational analytical framework. It enabled the review to examine governing systems, governance orders, and modes across the two bioregions and guide the workshop to interpret findings into five actionable pathways for advancing Canadian fisheries and oceans governance.

Key Findings

1. The current governance system is not delivering. 61% of the records adopt a critical framing, documenting institutional failures and fragmentation, and reporting the persistent exclusion of small-scale fishers, Indigenous rightsholders, and coastal communities in the governance process.
2. Most governance limitations documented in the literature are systemic challenges about who makes decisions, whose knowledge counts, and who is included.
3. Alternative governance models exist and may work. Co-governance, collaborative planning, and adaptive governance are most frequently recommended. Indigenous self-governance, equity and access reform, community-based governance, and knowledge co-production are also suggested.
4. Five thematic areas and pathways for research and practice were identified in the workshop: (i) agency and power; (ii) intergenerational, gender-diverse, and youth co-leadership; (iii) Indigenous wisdom and local knowledge; (iv) transdisciplinary capacity and relational accountability; and (v) community-embedded innovation and institutions. The literature review has guidance for the first, third, and fourth themes, and the second and fifth are the least developed.

Contributions

The central contribution of this review is a credible, evidence-grounded foundation for governance transformation in Canadian fisheries and ocean governance. It moves beyond diagnosing the problems to identifying why they exist and what a more equitable and sustainable system could look like in practice. By applying interactive governance theory across both bioregions, it connects structural problems to innovative solutions, and translates that evidence into five actionable pathways co-developed with researchers and practitioners at the frontier of governance change. The result is both a state-of-knowledge assessment and a forward-looking research agenda that takes seriously Canada's obligations to the coastal and Indigenous communities from a governance perspective.

Insights for Decision-Making

The review identifies five essential conditions for governance transformation from a research perspective:

1. Trust and sustained relationships are the foundation of credible and durable governance. Arrangements built on one-off consultations do not last, and meaningful change requires long-term relationship investment.
2. Legal recognition is the primary barrier on the Pacific coast, where Indigenous governance systems are sophisticated and well-documented but have yet to be formally embedded in the formal governance architecture in ways that are legally and institutionally binding.
3. Fragmented, species-based, spatially specific governance cannot address the interconnected challenges facing Canada's coastal communities and marine ecosystems. Bio-regional governance that coordinates decisions across ecosystems, communities, and governance levels is an essential enabling condition for transformation.
4. The voices most essential to transformation, such as Indigenous women, youth, and intergenerational knowledge holders, are systematically absent from both the governance literature and the governance practice, representing a critical equity gap.
5. SSH research must shift from critical examination and diagnosing of what is wrong to evaluating what works - the next generation of research should be longitudinal, comparative, and explicitly oriented toward governance transformation and innovation.

INTRODUCTION

Canada has made commitments to sustainable and equitable futures for its fisheries and oceans through several international conventions (Andrews et al. 2022; Stephenson et al. 2019, 2021). For example, Canada was the first country to develop a national-level counterpart to the Code of Conduct for Responsible Fisheries in 1995 (Fisheries and Oceans Canada [DFO], 2020). In 2014, Canada joined member states of the Food and Agriculture Organization (FAO) of the United Nations (UN) in adopting the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines), with principles and guidance in support of human rights, equity and sustainability for small-scale fisheries communities (Jentoft et al. 2017). A year later, Canada endorsed the UN Sustainable Development Goals (SDGs), including SDG 14 (Life Below Water), which has as one of its targets, a call for secure access for small-scale fishers to marine resources and markets (United Nations, 2024). In 2018, Canada emphasized equitable and sustainable economic development of fisheries and the ocean through a Blue Economy Strategy, as a member of the High-Level Ocean Panel (DFO, 2022). Most recently, at the UN Biodiversity Conference COP16 held in Colombia in November 2024, Canada reaffirmed its commitments to meeting marine conservation goals in its Marine Conservation Targets, as part of the international 30x30 commitment to protect 30% of land and ocean by 2030 (Environment and Climate Change Canada, 2024).

However, the governance system currently in place in Canada was built for an era long past. Governance is understood as the whole of public and private interactions taken to solve societal problems and create societal opportunities (Kooiman et al., 2005), and is central to how fisheries systems are steered and sustained. One key shortcoming of the current system is its insensitivity to the unique circumstances of small-scale fisheries (e.g., Knott et al. 2024; Hutchings et al. 2020; Kourantidou et al. 2021), which are often marginalized compared to large-scale fleets. Small-scale fisheries are vital for the sustainability of coastal communities in Canada, contributing to cultural identity, local economies, and marine conservation (Andrews & Knott 2023). Canada's fisheries and coastal communities are deeply connected, involving, in many instances, Indigenous rightsholders who have lived in harmony with the ocean since time immemorial and have constitutionally protected fishing rights. These connections position coastal fishing communities as stewards of aquatic ecosystems (Neis 1999; Charles et al. 2024). In practice, however, Canada's fisheries governance landscape remains limited in advancing these multiple aims, and is critiqued for frequently overlooking the needs of small-scale, coastal, and Indigenous fisheries (Pinkerton et al., 2018; Jeanson et al., 2025; Moffat et al., 2025).

New thinking about fisheries and oceans governance – one that reflects diverse characteristics and voices in fisheries, such as marginalized sectors like small-scale and Indigenous fisheries - is imperative for achieving sustainability. The Canadian and global literatures focus on what effective governance might look like, aligning with a broader movement from focusing on what governments do to understanding what governance entails (Chuenpagdee & Jentoft, 2018), and recognizing that collaborative governance results in better sustainability and equity outcomes locally (Bennett et al. 2021; Bundy et al. 2017). A governance perspective implies navigating multiple operational scales and legal frameworks simultaneously. This includes operation of different types of small-scale and industrial fisheries (Bennett et al., 2021), as well as the recognition of Indigenous Food, Social, and Ceremonial and treaty rights as foundational governance obligations (Denny & Fanning, 2024; Sloan Morgan & Castleden, 2025). Meanwhile, it also includes responsiveness to fisheries governance with the goals and principles outlined in Canada's commitments to equity and sustainability (Andrews et al. 2022).

Alternatives are being proposed with multi-stakeholder arrangements offering new possibilities to broaden the sectors involved in decision-making (Campbell et al. 2016; Partelow et al. 2022). These include those identified as key actors in anticipatory governance (Kelly et al. 2022), legal pluralism (Denny 2022), or community-based management (Charles and Berkes 2021). While approaches like these have strong potential for advancing small-scale fisheries and community involvement, they still have not been adopted outside of isolated interventions. Advancing more responsive governance requires a vision for moving transformation forward.

Governance transformation toward just and equitable fisheries, particularly for small-scale and Indigenous fisheries, is rarely rapid or linear. Transformation is frequently slowed by fragmented institutions, inflexible mandates, strong corporate interests, and isolated decision-making across fisheries, conservation, and climate policy (Armitage et al., 2007; Jentoft & Chuenpagdee, 2009, 2022). Poor coordination across agencies and jurisdictions, limited institutional capacity, and consultation fatigue can undermine the trust that co-governance arrangements depend on, while constraining the opportunities for learning and innovation that governance transformation requires (Feist et al., 2020; Ommer & Team, 2007; Chuenpagdee & Jentoft, 2009; Swerdfager & Armitage, 2023). Effective fisheries governance develops over long periods through the co-evolution of institutions, ecosystems, and community relationships, rather than through short-term reforms (Charles, 2018; Plummer et al., 2022). Further, co-management is most durable when it is embedded within supportive governance systems rather than operating as an isolated arrangement (Pinkerton, 2009; Jentoft, 2017).

In the Canadian context, governance transformation matters most where fisheries governance has limitations, including for responding to the needs of small-scale and Indigenous fisheries, and for the coastal and Indigenous communities that depend on these fisheries for food security, cultural continuity, and economic resilience (Andrews et al., 2022; Squires & Wiber, 2018; Sloan Morgan & Castleden, 2025; Popken et al., 2023). Attention is needed to design and implement pathways through which governance systems actually transform to embody these characteristics, including interventions, enabling factors, and next steps that may be needed to support governance transformation.

To address this gap, this knowledge synthesis focuses on the social science and humanities (SSH) foundations for fisheries and ocean governance in Canada, with a particular focus on small-scale and Indigenous fisheries, and coastal communities as the sectors where the alignment between governance commitments and governance realities is most in question. The review examines the structure, function, and institutional frictions in the current governance system, and synthesizes lessons about alternative governance models and pathways forward for the Atlantic and the Pacific coasts. It is guided by four core research questions:

1. What is the state of SSH knowledge about governance for Atlantic and Pacific fisheries and oceans?
2. How does the current governance system manifest across Canada's coastal regions in terms of equity and sustainability for fishers and coastal communities?
3. What alternative governance approaches have been introduced in Canada and beyond that provide new models for advancing sustainability and equity, particularly for small-scale and Indigenous fisheries, and coastal communities?

4. What can we learn from these alternatives to reimagine Canada's governance system, including the interventions, enabling conditions, and next steps required to foster transformation?

The synthesis draws on two complementary sources of knowledge. The first is a systematic scoping review of 204 peer-reviewed SSH records on fisheries and ocean governance in Canada published between 2015 and 2025, building on and updating an existing Atlantic database developed by Andrews et al. (2025) and extending that approach through a new, purpose-built Pacific database using comparable methods. The second is a workshop held at Royal Roads University in December 2025, which brought together researchers and practitioners to envision pathways forward for governance transformation in Canadian marine contexts, with particular attention to small-scale and Indigenous fisheries, and coastal communities.

To deepen the analysis of the synthesized literature, the study employs interactive governance theory as its foundational analytical framework (Kooiman, 2003; Kooiman et al., 2005; Jentoft & Chuenpagdee, 2015). The theory highlights the importance of structures, interactions, and elements that shape the overall capacity and the quality of governance, known as governability (Kooiman et al. 2005). Interactive governance distinguishes between governance as the broader steering mechanism that defines how decisions are made and who makes them, and management as a set of operational practices and tools through which governance is executed (Jentoft, 2006; Kooiman & Jentoft, 2005). Interactive governance theory provides a framework for examining what governance arrangements exist, and how well equipped they are to address the diversity, complexity, dynamics, and scale of the social and the ecological systems they aim to govern. Together, the systematic review and the Royal Roads workshop ground the analysis in evidence from the literature and in the perspectives of those working at the frontier of governance transformation in Canadian fisheries and ocean. The study draws on insights from applying interactive governance to the literature and perspectives shared in the workshop to advance pathways for governability.

As briefly stated, governability is the overall capacity and the quality of the governance system (its institutions, knowledge, and resources) to address the challenges of the system to be governed (due to its diversity, complexity, dynamics, and scalar issues) (Kooiman et al. 2008). It also takes into consideration the diversity, complexity, dynamics and scale of the governing system, which could foster or inhibit governance, making the system more or less governable, respectively (Chuenpagdee & Jentoft 2009). For example, governability helps assess whether existing governance arrangements are adequate to the challenges posed by the system: low governability signals the need for institutional reform, capacity building, or a re-scoping of governance (Jentoft 2008; Jentoft & Chuenpagdee 2009). Meanwhile, governability offers a generative lens for context-sensitive governance transformation. It can help understand the conditions under which equity and sustainability become achievable through governance, including the interventions, enabling factors, mechanisms, and interactions that may be needed (Chuenpagdee & Jentoft 2013; Jentoft, & Chuenpagdee 2022). By assessing governability across Canada's Atlantic and Pacific fisheries, this study identifies where governance arrangements are well-matched to the systems they serve and where transformative change is needed to advance equity, sustainability, and the recognition of Indigenous rights (see Chuenpagdee & Jentoft, 2018).

BACKGROUND

Fisheries systems encompass the ecological dynamics of fish populations and their habitats, alongside the social, cultural, and economic dimensions of human communities, institutions, and governance arrangements that shape how aquatic resources are accessed, managed, and distributed (Charles, 2001). Extending well beyond the point of harvest, they link aquatic ecosystems to processing, distribution, and consumption across a value chain, connecting harvesters, processors, markets, and coastal communities (Jones & Stephenson, 2019; Mussells & Stephenson, 2020). Fisheries serve as food security, cultural continuity for coastal communities and Indigenous Peoples, and drivers of export economies (Frost, 2021; Lowitt et al., 2020; Sayles et al., 2025).

In Canada, fisheries operate across diverse spatial contexts in increasingly crowded, multi-use marine environments shared with sectors such as aquaculture, energy development, and shipping (Murphy et al., 2024; Tulloch et al., 2024; Andrews et al., 2025). Governing these systems therefore requires navigating between multiple scales and legal frameworks (Bennett et al., 2021), recognizing Indigenous rights as foundational governance obligations (Denny & Fanning, 2024; Sloan Morgan & Castleden, 2025), and aligning with broader equity and sustainability objectives (Andrews et al. 2022).

Fisheries on the Atlantic and the Pacific Bioregions

Canada's fisheries governance operates across three ecologically and institutionally distinct bioregions, including the Atlantic, the Pacific, and the Arctic coasts. However, this study focuses only on the Atlantic and the Pacific, where an established literature base exists, and where the gap between governance commitments and practice for small-scale, Indigenous, and coastal community fisheries has been well documented. Canada's Atlantic region encompasses Newfoundland and Labrador, Nova Scotia, New Brunswick, Prince Edward Island, and Quebec, while the Pacific region includes British Columbia and the Yukon.

On the Atlantic coast, governance is shaped by the legacy of the 1990s groundfish collapse and a subsequent shift to shellfish species such as lobster, Northern shrimp, and snow crab. These fisheries sustain rural communities in the Maritimes and Newfoundland and Labrador, while navigating persistent pressures of capitalization and access inequality (Barnett et al., 2017; Squires & Wiber, 2018; Davis, 2015). Indigenous fishing rights in Atlantic Canada have also shaped governance in the region. These rights are constitutionally protected, anchored by landmark Supreme Court of Canada decisions including *R. v. Sparrow* (1990), which affirmed Aboriginal rights to fish for food, social, and ceremonial purposes, and *R. v. Marshall* (1999), which recognized Mi'kmaw treaty rights to fish and trade for a moderate livelihood under the Peace and Friendship Treaties of 1760-61. Commercial fisheries and seafood processing account for approximately 2.4% of Atlantic Canada's total economic output and support tens of thousands of jobs across the region, with the sector providing a critical foundation for rural coastal communities in the provinces (Government of Canada, Job Bank 2024). Central to Atlantic governance is the Owner-Operator Policy and Fleet Separation Policy, enshrined in federal regulation, which protect the independence of the inshore fleet by preventing corporate concentration of fishing licences and ensuring that licence holders actively participate in the fisheries (DFO, 2024).

On the Pacific coast, governance is structured at the intersections of Indigenous self-determination and cultural continuity, commercial and recreational fisheries economies, regional biodiversity, and multi-stressor habitat challenges that have made co-managed restoration efforts both urgent and contested (Correia et al., 2024; Ulaski et al., 2025;

Chalifour et al., 2022). Indigenous fishing rights are grounded in Section 35 of the *Constitution Act* (1982) and affirmed through *R. v. Van der Peet* (1996), which established the test for Aboriginal rights, and *Haida Nation v. British Columbia* (2004), which confirmed the Crown's duty to consult and accommodate Indigenous Peoples prior to decisions affecting their rights and title. Declining salmon populations and intensifying competition have produced a governance landscape, shaped by decades of regulatory shifts that progressively concentrated commercial access rights away from independent harvesters and Indigenous communities (Haas et al., 2016). The expansion of Individual Transferable Quotas (ITQs) in Pacific groundfish and other commercial fisheries has deepened these concentration dynamics, raising persistent concerns about equity, community viability, and the displacement of small-scale and Indigenous fishers from meaningful participation in commercial fisheries. Current modernization efforts, including the Pacific Salmon Strategy Initiative and the ongoing review of the Salmon Allocation Policy, signal a commitment to reform, and represent an unprecedented level of federal investment in salmon recovery and Indigenous co-governance. The first phase of the initiative retired 538 commercial salmon licences and supported over 40 First Nations and Indigenous fisheries organizations on realizing more than 60 Indigenous Harvest Transformation projects (DFO, 2026).

Across both coasts, large-scale industrial fleets dominate national export markets and policy frameworks (Haas et al., 2016; Davis, 2015). Yet, the social and ecological foundations of coastal life rest disproportionately on small-scale and Indigenous fisheries (Andrews et al., 2022; Squires & Wiber, 2018; Foley & Mather, 2016). These sectors represent a substantial share of coastal employment, food security, and cultural identity in rural and Indigenous communities, and their low-impact, selective harvesting practices align more closely with long-term marine conservation objectives than their industrial counterparts (Bennett et al., 2021; Lowitt et al., 2020; Foley & Mather, 2016; Ban et al., 2020).

Nonetheless, the road ahead in the Atlantic and the Pacific regions remains contested and complex. Deep disagreements exist between commercial and Indigenous interests over allocation priorities, and about the structural conditions that have historically marginalized small-scale fisheries and Indigenous rightsholders. These divergent histories produce governance systems that are institutionally distinct and ecologically differentiated, and are characterized by persistent tensions between federal authority, market forces, and the rights and needs of small-scale and Indigenous fisheries, and coastal communities.

Fisheries Governance in Canada

Understanding the current state of Canadian fisheries governance requires distinguishing between governance and management as analytically distinct concepts. Management refers to the technical toolkit through which governance is executed, like the implementation of rules, quotas, gear restrictions, and monitoring systems that deliver policy objectives in practice (Jentoft, 2006; Kooiman et al., 2005). Governance, by contrast, is the broader steering mechanism that defines how decisions are made, who participates in making them, and on what terms power and authority are exercised and distributed (Kooiman, 2003; Jentoft & Chuenpagdee, 2015). This distinction matters because many of the limitations documented in the Canadian fisheries literature do not address management shortcomings alone. Rather, the literature addresses challenges and constraints within governance, reflecting how authority is organized, whose knowledge counts, which communities are included or excluded from the decisions that shape their lives, and how these shape the management systems. This implies a need for transition from management to governance for Canadian fisheries and oceans.

At the federal level, Fisheries and Oceans Canada (DFO) plays the lead role in administering Canada's marine resources under the Fisheries Act and the Oceans Act (1996), which established the foundation for an integrated management and the precautionary approach. Ocean-based industries, including small-scale fisheries, contribute approximately \$31.7 billion annually to Canada's GDP and support over 300,000 jobs (Ganter et al., 2019), but federal policy has historically prioritized industrial efficiency and maximum sustainable yield over the ecological, social, and cultural dimensions of fisheries governance (Long et al., 2015). Contemporary policy development is undergoing a partial shift toward ecosystem-based management, which requires accounting for climate change impacts, habitat degradation, and predator-prey dynamics rather than managing target species in isolation. This shift is operationalized through Integrated Fisheries Management Plans, which serve as the functional blueprints for specific fisheries, outlining biological context, socio-economic considerations, and management measures. However, these plans have evolved slowly toward shared stewardship, with nation-to-nation agreements and the integration of Indigenous legal orders and traditional ecological knowledge, albeit still far from consistently embedded in their design and implementation (Reid et al., 2021; Pinkerton, 2019).

Fisheries science has historically been dominated by biological and quantitative approaches, with stock assessments and bio-economic models providing the primary framing for management decisions. This technical orientation has systematically underrepresented the human dimensions of fisheries: the governance relationships, knowledge systems, community dynamics, and social and cultural values that shape how fisheries are experienced, contested, and sustained (Barnett et al., 2017; Eger & Courtenay, 2021). SSH research addresses this gap in three interconnected ways. First, it examines the structures and processes through which authority is exercised in fisheries governance, including whose knowledge informs decisions and how institutional arrangements distribute power across actors (Hamelin et al., 2023; Klenk et al., 2025). Second, it interrogates the normative frameworks that legitimize or challenge governance arrangements, including questions of equity, justice, and the values that underpin resource access and distribution (Knott et al., 2024; Weitzman et al., 2023). Third, it centres the lived realities of coastal communities and Indigenous Peoples navigating governance systems that are rarely designed with their priorities in mind (Mombourquette et al., 2025; Daly & Chuenpagdee, 2021). It is this body of literature, spanning the Atlantic and the Pacific coasts and covering the decade from 2015 to 2025, that this synthesis maps, analyzes, and mobilizes in order to advance governability in Canadian marine contexts.

METHODS

This study synthesizes knowledge through two complementary approaches. The first is a systematic scoping review of peer-reviewed SSH literature on fisheries and oceans governance across Canadian Atlantic and Pacific bioregions. The second is a stakeholder workshop held at Royal Roads University in Victoria, BC in December 2025, which engaged researchers and practitioners in a structured discussion of governance transformation. The systematic review developed the literature base for both bioregions corresponding to Research Questions 1, 2, and 3, while the workshop contributed perspectives on emerging governance alternatives relevant to Research Question 3 and co-developed the transformative pathways addressed in Research Question 4. Those pathways were subsequently reassessed and further developed in dialogue with the full review database. The following sections describe each approach in turn, beginning with the four phases of the systematic scoping review: (1) planning and development, (2) searching and screening, (3) analysis and classification, and (4) interpretation and reporting.

Systematic Scoping Review

Systematic scoping reviews are a rigorous method for assessing an emergent body of literature in a transparent and replicable manner (Petticrew & Roberts, 2006). Unlike traditional systematic reviews, which focus on a well-defined empirical question and assess evidence quality, scoping reviews aim to identify and characterize new, emergent, or under-defined bodies of literature, clarify conceptual boundaries, highlight knowledge gaps, and define literature trajectories (Levac et al., 2010; Munn et al., 2018). Systematic scoping reviews combine the rigor of systematic search and screening procedures with the breadth of a scoping approach, establishing a foundation for future research and enabling replication across different geographic or disciplinary contexts. This study applies a structured coding and classification process to characterize the scope, orientation, and governance relevance of the resulting sample across both bioregions.

Phase 1: Planning and Development

The review was designed to cover all SSH research relevant to fisheries and oceans governance across Canada's Atlantic and Pacific bioregions, focusing on the decade from 2015 to 2025. A dual coast strategy was developed in relation to an existing literature database for the Atlantic region originally constructed by Andrews et al. (2025), and the need to develop a new, comparable database for the Pacific. This approach ensured methodological consistency across the two bioregional components of the synthesis while allowing the Pacific database to be purpose-built to reflect the governance contexts and research priorities of that coast.

The Atlantic database was originally developed as part of a systematic scoping review investigating the challenges and opportunities for SSH research to inform ecosystem-based management (EBM) in Atlantic Canada (Andrews et al., 2025). That review applied the Fisheries and Oceans Canada Maritimes Region EBM Framework, which organizes objectives across ecological, economic, social/cultural, and governance pillars (Daly et al., 2020; Bundy et al., 2021). The original database has 176 peer-reviewed SSH papers on marine systems in Atlantic Canada published between 2000 and 2021, screened from an initial pool of 1,993 records retrieved from Scopus and Web of Science. Full coding was completed through a collaborative, interdisciplinary team process involving two DFO natural and social scientists, one environmental NGO scientist, and two academic social scientists, with disagreements resolved by consensus to achieve strong inter-coder reliability (Andrews et al., 2025).

For the Pacific, an analogous process was designed to generate a new database of SSH papers on fisheries and oceans governance for the same period. The search strategy, screening criteria, and classification guide were adapted to the Pacific governance context while maintaining consistency with the Atlantic approach, enabling cross-bioregional comparison across all four research questions.

Phase 2: Searching and Screening

Both the Atlantic and the Pacific searches were conducted using the Web of Science and Scopus databases. The Atlantic search string, originally developed for Andrews et al. (2025), combined three categories of terms using Boolean AND operators: marine environment terms (Marine OR Fisher* OR Coastal OR Ocean); social science and governance terms (Social OR Cultural OR Governance OR Institutional OR Economic OR Gender OR 'Human dimensions' OR Indigenous OR Management OR Ecological OR Aboriginal OR 'First Nations' OR Netukulimk); and Atlantic Canadian geographic terms ('Atlantic Canada' OR

Newfoundland OR ‘Newfoundland and Labrador’ OR ‘Nova Scotia’ OR ‘Prince Edward Island’ OR ‘New Brunswick’ OR ‘Atlantic Canadian’ OR ‘Canadian Maritime’ OR Mi’kmaw). For the Pacific, an equivalent search string was developed that replaced the geographic terms with Pacific Canadian references (Pacific Canada OR Canadian Pacific OR British Columbia) while retaining the same marine environment and social science logic and databases.

For the present study, the original Atlantic database from Andrews et al. (2025) was filtered to retain only records classified as relevant to the governance pillar of the EBM Framework. Records published before 2015 were then removed to align with the study’s temporal scope, producing an initial subset of 62 records. The original search strategy was re-applied to capture records published after 2021, updating the database through 2025. This supplementary search yielded 468 records, which were screened to 60, with a further 9 removed during full-text review, producing an addition of 51 records. Together, the final Atlantic database was 113 records. The Pacific search produced an initial pool of 1,686 records which, after de-duplication and full-text screening, yielded a final Pacific sample of 91 records. Combined with the Atlantic sample, a combined database of 204 records was created.

Both searches applied consistent inclusion and exclusion criteria, summarized in Table 1. Key inclusion criteria were the following: that records had to be published in peer-reviewed academic journals in English, include a geographic focus on the relevant Canadian bioregion, and engage substantively with SSH-related concepts in both the abstract and the full text. Articles were excluded if they focused exclusively on natural science without meaningful engagement with social, cultural, economic, institutional, or governance dimensions. Full-text screening confirmed that SSH theory, methods, or concepts were substantively leveraged in the body of the article rather than merely referenced in framing or concluding statements. These criteria were applied consistently across both databases to support a unified analytical sample.

Table 1: Inclusion and Exclusion Criteria

Type	Criterion	Purpose/rationale
Inclusion	Published in English	English is an official language in Canada and the primary language of this research
	Published in a peer-reviewed academic journal	Peer review supports methodological rigor and credibility; contains scope to primary scientific communication
	Geographic focus includes Atlantic Canada or Pacific Canada	Aligns record with study bioregion and research questions
	Abstract refers to SSH-related concepts (e.g., society, social, cultural, economic, institutions, governance, policy, behaviour, political, historical)	Ensures articles come from disciplinary fields outside natural science (e.g., Sociology, Anthropology, Economics, Geography)
	Full text reflects SSH study in relation to marine environment, fisheries, or coastal communities	Ensures article aims, objectives, or methods relate to SSH disciplines substantively

	Full text engages with SSH theory, methods, or concepts in the main body (e.g., methodology, analysis, or results)	Ensures articles substantively leverage SSH rather than only referencing it in framing or implications
Exclusion	Focuses exclusively on natural science without meaningful engagement with social, cultural, economic, institutional, or governance dimensions	Maintains SSH focus of the review
	SSH engagement is limited to introductory framing or concluding statements only	Ensures substantive rather than superficial SSH engagement across the article body

Phase 3: Analysis and Classification

Coding and classification followed a structured guide adapted from the approach employed in Andrews et al. (2025), revised to reflect the objectives of the present study (Table 2; for further details, see Supplementary Table 1). The guide was organized around the four research questions and covered bibliographic, methodological, thematic, and governance-relevant dimensions for each record. A key innovation in this study’s classification approach was the addition of “WHY” columns as explanatory variables alongside each primary classification. Rather than recording only whether a paper addressed a particular governance objective, dimension, or recommendation type, the WHY columns captured the substantive reasons, arguments, or mechanisms through which it did so. This enriched the analysis and supported thematic synthesis across all four research questions, enabling the review to move beyond counting classifications toward characterizing the governance knowledge each record contributed.

Table 2: Classifications used to guide coding according to research questions

Research Question	Classifications	Further Explanation
RQ1: State of SSH knowledge for Atlantic and Pacific fisheries and oceans governance	Authorship discipline; Discipline type; Publication year; Peer-reviewed journal; Research subject and WHY; Research focus and WHY; Scale of research; Geographical focus; Type of aquatic system; Methodology; Data type; Data sources; Main and other types of analysis; Community-engaged or collaborative (and WHY); Focus on specific communities (and WHY)	WHY columns capture substantive rationale alongside each primary classification
RQ2: How the current governance system manifests across Canadian bioregions, including equity and sustainability	Relevance to Governance EBM Pillar (and WHY); Type of governance objective (and WHY)	WHY used to deepen depiction of governance systems and identify equity and sustainability themes
RQ3: Governance approaches providing alternative models for sustainability and equity	Presence of practical recommendations (and WHY); Type of recommendation (and WHY); Presence of recommendations for future research (and WHY)	WHY used to deepen understanding of recommended alternatives and future research directions

Research Question	Classifications	Further Explanation
RQ4: What alternatives tell us about interventions, enabling conditions, and next steps for governance transformation	Inputs from Royal Roads Workshop on five key transformative pathways; Research subject (WHY); Research focus (WHY); Practical recommendations (WHY); Type of recommendation (WHY); Recommendations for future research (WHY)	Papers with pathway insights were coded to relevant pathway; insights then used to further develop and ground each pathway

For the 62 governance-relevant Atlantic records carried forward from Andrews et al. (2025), full classifications had already been completed through a rigorous human-coding process by a diverse interdisciplinary team, achieving a high standard of inter-coder reliability. The classification conventions established through that process served as the training set and quality benchmark for subsequent classification of the expanded database (Than et al. 2025; Dunivin 2025), an approach well substantiated in the literature on systematic reviews (Joos et al. 2026; Balt et al. 2025). For all remaining records in the Atlantic and the Pacific databases, a large language model (LLM) was used to assist with extraction and preliminary classification. Article texts were first extracted using either PDFMiner v20191125 (<https://pypi.org/project/pdfminer/>) or the Tesseract v5.4.0 optical character recognition engine (<https://github.com/UB-Mannheim/tesseract>), depending on the source document format. Three Python scripts then deployed the open-source application Ollama v0.19.0 running the LLM qwen3.5:27b to analyse extracted texts and populate the classification spreadsheet, with each row representing a unique record and each column a distinct classification.

The first script established an LLM workflow by using the pre-coded training set records as reference examples: the model was instructed to read each article, answer the classification questions, compare its responses with the human-coded entries, and iteratively refine its answering style to match established conventions. The second script applied the resulting workflow to classify all new records in the database. The third script extended this process to a new set of classification questions not included in the training set, reading each article in the context of previously generated responses before producing final classifications. To ensure accuracy, all LLM-generated outputs were then subjected to rigorous human verification (Balt et al. 2025), with researchers manually reviewing and refining classifications to capture disciplinary nuances and resolve discrepancies with the logic of the human-coded training set (Tai et al. 2024).

Classification data were exported to a centralized database for frequency and percentage distribution analysis. The “WHY” classifications were coded thematically using a hybrid inductive-deductive approach, drawing on both the objectives of the study and patterns emerging from the data.

The credibility of the LLM-assisted classification is grounded in the way the model was trained. Rather than applying a generic prompt to the full database, the LLM first learned from the 62 human-coded Atlantic records carried forward from Andrews et al. (2025), iteratively refining its classification logic against established human judgments before being applied to new records. This approach meaningfully anchors the LLM outputs in validated, interdisciplinary coding. To assess reliability, spot-checks were conducted across straightforward classification categories, and a subset of records were subject to deep-dive verification where classifications were cross-checked against full-text readings. This process

generated high confidence in the overall classification. No major classifications required revision, though minor adjustments were made in a small number of cases. This suggested that the LLM produced outputs consistent with the logic and conventions of the original human-coding process.

Phase 4: Interpreting and Reporting

Interpretation of the review findings was guided by interactive governance theory (Kooiman, 2003; Kooiman et al., 2005; Jentoft & Chuenpagdee, 2015). Within this framework, the literature was classified and interpreted across three dimensions: governing systems (state, market, Indigenous, coastal community, and civil society); governance orders (first-order operational management, second-order institutional governance, and meta-governance addressing the normative principles and legitimacy foundations of governance); and governance modes (hierarchical, co-governance, and self-governance). Finally, the study focuses on governability pathways to understand research trajectories that support governance transformation. The appropriateness of this framework for the dataset was initially tested on a random sample of 12 governance-relevant records from the Atlantic database before being applied to the full combined sample of 204 records.

Interactive governance served three analytical functions in this study. First, it structured the examination of how governance currently manifests across Canada's Atlantic and Pacific bioregions, including how different governing systems, orders, and modes interact to enable or constrain equity and sustainability outcomes, corresponding to Research Question 2. Second, it provided a lens for characterizing the alternative governance approaches documented in the literature and understanding their structural differences from the status quo, corresponding to Research Question 3. Third, it was used to organize and interpret the governance transformation pathways developed during the December 2025 Royal Roads workshop, as well as situate those pathways within the broader patterns of the synthesized literature base, corresponding to Research Question 4.

December 2025 Royal Roads Workshop

In December 2025, a 2-day workshop was convened at Royal Roads University in Victoria, BC to complement and deepen the systematic review. Participants were drawn from five universities (Royal Roads, University of British Columbia, St. Thomas University, St. Mary's University, and Memorial University) and one environmental non-governmental organization (Georgia Strait Alliance), spanning expertise across Atlantic and Pacific governance contexts, Indigenous governance, small-scale fisheries, and ocean policy. The workshop served two interconnected functions within the overall research design. First, preliminary findings from both the Atlantic and the Pacific systematic reviews were presented and discussed, allowing participants to interrogate emerging analytical themes, identify gaps, and contribute practice-based knowledge that the published literature does not yet fully capture. Second, participants engaged in structured deliberation on what effective governance would need to look like to meaningfully support small-scale and Indigenous fisheries, and coastal communities in the future—drawing on both the synthesized literature and participants' own experiences at the frontier of governance transformation in Canadian contexts.

This deliberation produced five transformative governance pathways oriented toward greater governability in Canadian fisheries and oceans, organized through the lens of interactive governance. These pathways were subsequently applied as a secondary analytical framework to re-examine the full review database: relevant “WHY” classifications were coded to identify which records offered substantive insights for each pathway, and those records’

insights were used to further develop and ground the pathways in the published literature. The resulting pathways thus integrate systematic evidence from the scoping review with practitioner and researcher perspectives contributed through the workshop, which are presented and examined under Research Question 4.

Limitations

Several limitations of this study should be acknowledged. The review was restricted to peer-reviewed journal articles, meaning that SSH research communicated through book chapters, monographs, reports, and grey literature was not captured. This is particularly consequential for humanities disciplines, where book-length publishing remains a dominant scholarly form (Mrva-Montoya, 2021), and for Indigenous knowledge, which is frequently documented through community-produced materials and oral tradition rather than peer-reviewed venues. The search strings were designed to be broadly representative, but may not capture all relevant Indigenous-related terminology, given the diversity of terms used across communities and time periods. The use of LLM-assisted classification, while enabling coverage of a larger database than fully manual coding would allow within the study's timeframe, introduces the possibility of classification inconsistencies that human verification sought to minimize. Finally, the study's focus on the period 2015–2025 and on two national bioregions means that its findings reflect the particular configuration of the SSH literature in that decade, rather than the full historical or global scope of relevant scholarship.

RESULTS

The synthesis results are organized around four dimensions of the knowledge base: the publication and disciplinary profile of the literature, its methodological orientation, patterns of community engagement, and the subjects and thematic foci of inquiry. Across all four dimensions, the SSH literature on Canadian fisheries and ocean governance is interdisciplinary in authorship, qualitative in method, and oriented toward the governance of small-scale, community-based, and Indigenous fisheries as a central concern. Regional differences between the Atlantic and the Pacific cohorts are present throughout, reflecting the distinct institutional histories, ecological realities, and governance trajectories of each coast, as well as differing circumstances and rights between Indigenous and settler fisheries.

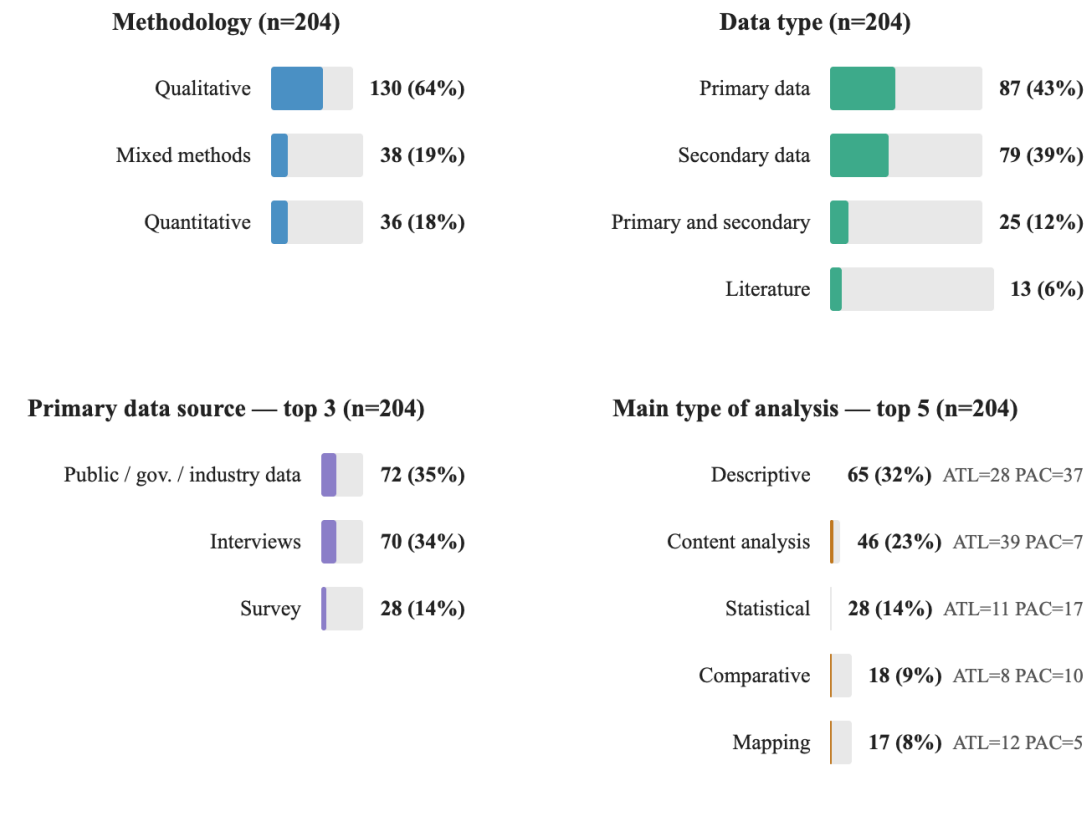
RQ1: What is the state of SSH knowledge about governance for Atlantic and Pacific fisheries and oceans?

Publication output across the 204 records is relatively consistent over the decade, with the highest-output years being 2015 (n=25) and 2018 (n=23), and notable peaks in 2022 (n=21) and 2025 (n=22). Atlantic records drove the 2022 peak, when a cluster of papers engaged with the Blue Economy Strategy and the legacy of the cod moratorium (e.g., Knott et al., 2024; Andrews et al., 2022), while Pacific records were proportionally higher in 2015, coinciding with the launch of Marine Plan Partnership for the North Pacific Coast (MaPP) (e.g., Diggon et al., 2021), and again in 2019, when Indigenous-led governance and climate scholarship peaked (e.g., von der Porten et al., 2019; Whitney & Ban, 2019). The literature is concentrated in a small number of interdisciplinary outlets, with *Marine Policy* dominating at 56 records (28%), followed by *Ecology and Society* (n=19, 9%) and *Frontiers in Marine Science* and *Ocean and Coastal Management* (each n=8, 4%). The top 10 journals account for approximately 65% of the dataset. The top 10 lead-author disciplines are presented in Table 3. Notably, Environmental Science leads in authorship (n=37, 18%), concentrated in the Pacific cohort (PAC=28, ATL=9), showing increasing interest of SSH to natural science authors.

Table 3: Top 10 Disciplines of Authors in the Sample, with Regional Counts

Lead-Author Discipline	Total (n)	% of Sample	ATL (n=113)	PAC (n=91)
Environmental Science	37	18%	9	28
Environmental Studies	21	10%	9	12
Marine Social Science	16	8%	10	6
Environmental Social Science	16	8%	7	9
Anthropology	15	7%	10	5
Human Geography	11	5%	7	4
Marine Management	11	5%	8	3
Environmental Economics	9	4%	5	4
Geography	8	4%	4	4
Marine Biology	8	4%	6	2

Figure 2 summarizes the methodological profile, showing a field that is predominantly qualitative (n=130, 63%), with mixed methods (n=38, 19%) and quantitative approaches (n=36, 18%) constituting smaller shares. Primary data are the most common data type (n=87, 43%), and the leading data sources are public, government, or industry data (n=72, 35%) and interviews (n=70, 34%). Regional differences are most pronounced in analytical approach: content analysis is heavy in the Atlantic (ATL=39, PAC=7), while descriptive analysis is strong in the Pacific (PAC=37, ATL=28).



Note: Bar lengths are proportional to percentage of total sample. ATL = Atlantic coast (n=113); PAC = Pacific coast (n=91).

Figure 2: Methodological overview of sample. Bar lengths are proportional to percentage of total sample.

A little over half of records are not community-engaged (n=112, 55%), with non-engaged research concentrated in the Atlantic cohort (ATL=76, PAC=36). Of the 92 records involving some form of engagement, 41 are community-engaged (ATL=11, PAC=30), 45 involve other collaborative forms such as stakeholder partnerships or industry co-design (ATL=25, PAC=20), and 6 involve both community engagement and other collaborative forms (ATL=1, PAC=5). The nature of engagement differs markedly by region. Pacific community-engaged research is predominantly co-designed with and led by Indigenous Nations, involving Indigenous co-authorship, Nation-approved research protocols, and community data ownership (e.g., Frid et al., 2016; Gauvreau et al., 2017). Atlantic community-engaged research encompasses two streams. First, the research involves Mi'kmaw knowledge holders and governance bodies as central partners, often grounded in Etuaptmumk (Two-Eyed Seeing) (see Reid et al., 2021; Wells et al., 2025). Second, the research includes coastal fishing communities as co-designers or co-owners of the research process, including independent harvester organizations, outport communities, and co-management bodies such as the Torngat Joint Fisheries Board (see Laver et al., 2024; Neis et al., 2022).

Fisheries are the dominant subject of inquiry (n=108, 53%), with Ocean Spaces second (n=48, 24%), followed by Coastal Zones (n=31, 15%), Aquaculture (n=14, 7%), and Markets (n=3, 1%). Of the 96 records without fisheries as the dominant subject, 91 engage directly with fisheries-related themes in their abstracts or objectives. For example, Ocean Spaces papers routinely address MPA governance with implications to fisheries or cumulative effects on fish habitats.

For all subjects, 114 records (56%) connect explicitly to small-scale, community-based, or Indigenous fisheries, with Indigenous fisheries themes concentrated in the Pacific (PAC=62, ATL=24) and small-scale fisheries (SSF) and community themes predominantly Atlantic (SSF: ATL=17, PAC=5; Community: ATL=16, PAC=5). Policy and governance is the leading thematic focus (n=58, 28%), followed by Indigenous fisheries and ways of knowing (n=40, 20%), management (n=32, 16%), political economy and political ecology (n=23, 11%), and environmental change and conservation (n=23, 11%). Taken together, these patterns confirm that the literature is structured around a common concern about who governs marine resources, through what institutional arrangements, and with what consequences for coastal communities and Indigenous Nations, with a consistent connection to fisheries.

RQ2: How does the current governance system manifest across Canada's coastal regions in terms of equity and sustainability for fishers and coastal communities?

All 204 records are relevant to governance. This analysis focused on (a) governance structures and processes (n=127, 62%), (b) legal obligations and commitments (standalone n=9, in combination n=42), and (c) governance outcomes (standalone n=11, in combination n=15). Governance structures and processes dominate, including how decision-making authority is organized, who participates, and how institutional frameworks enable or constrain management action (e.g., Eger et al., 2021; Jeanson et al., 2025). Legal obligations constitute the most rights-oriented body of literature, with Atlantic records examining the Marshall Decision, treaty rights to a moderate livelihood, and occupational health and safety obligations for small-scale harvesters (Bodwitch et al., 2024; Shan, 2022), while Pacific records interrogate shortcomings in DFO's approach to uphold modern treaty obligations, UNDRIP commitments, and constitutional rights across herring, abalone, salmon, and sea otter management (Sloan Morgan & Castleden, 2025; Carver et al., 2024). Governance outcomes are predominantly Atlantic in origin, focusing on the distributional consequences of access and allocation systems and outcomes for rural coastal communities (Barnett et al., 2017; Squires & Wiber, 2018).

Responding to equity and sustainability commitments and concerns

Of the 204 records, 125 (61%) adopt a critical framing, identifying gaps, barriers, or limited governance responses for equity and sustainability, while 97 (48%) include constructive assessments of emerging co-governance models or community-led initiatives to support equity and sustainability.

The 47 records most directly evaluating governance responses to formal commitments reveal a consistent pattern: Canadian governance frameworks adopt sustainability and equity language at the policy level while demonstrating limited capacity to translate those commitments into community-level outcomes (Weitzman et al., 2023; Morris et al., 2025). On the Atlantic, this is most evident in scholarship on the Canada-Europe Trade Agreement (CETA), MSC ecolabelling, Blue Economy planning in Newfoundland and Labrador, and the absence of equity criteria in existing governance frameworks (Daly & Chuenpagdee, 2021; Foley et al., 2018). On the Pacific, critical assessments focus on DFO's limited responsiveness to treaty obligations under the Maa-nulth Treaty, the exclusion of Indigenous food sovereignty from sea otter management, and inadequate MPA frameworks (Popken et al., 2023; Sloan Morgan & Castleden, 2025). The literature identifies two primary sites of limited response. First, it identifies the disconnect between rights-based commitments and operational governance realities. Second, it highlights the limited visibility of small-scale and coastal community fisheries within sustainability frameworks (Bennett et al., 2021; Lowitt et al., 2020).

Interactive Governance analysis

Applied through an interactive governance lens, the 204 records show how five governing systems operate, interact, and come into tension across Canada's marine bioregions. The state system is most frequently engaged in the literature (n=106, ATL=53, PAC=53), appearing in records on DFO's institutional authority, the Fisheries Act and Oceans Act, and federal management through integrated fisheries management plans (Hamelin et al., 2023; Soomai, 2017). Market systems appear in 90 records (ATL=55, PAC=35), with a stronger Atlantic concentration reflecting the shellfish and quota-driven economy of that coast, including related to licenses, corporate concentration, and the commodification of access (Barnett et al., 2017; Haas et al., 2016). Indigenous governing systems appear in 86 records, overwhelmingly in Pacific scholarship (PAC=64, ATL=22), engaging hereditary governance structures and Indigenous legal orders as systems in their own right (Lee et al., 2019; von der Porten et al., 2016). Coastal community systems appear in 38 records (ATL=28, PAC=10), concentrated in Atlantic scholarship on harvester organizations and community-based fisheries (Foley & Mather, 2016; Pinkerton et al., 2018). Civil society systems appear in 28 records, engaging ENGOs, fisher associations, and advocacy organizations across both coasts (Eckert et al., 2025; Roozee et al., 2024).

Second-order governance dominates the literature (n=171, ATL=94, PAC=77), suggesting that SSH scholarship is primarily concerned with institutional design and reform rather than operational management (VanderZwaag et al., 2023; Dehens & Fanning, 2018), and that there is transition in research from management to governance. First-order governance appears in 66 records, typically as the context within which second-order failures are diagnosed (Dao et al., 2025; Kourantidou et al., 2021). Meta-governance, engaging the normative images, principles, and legitimacy foundations that underpin governance systems, is present in 57 records, including records on moral economy, rights-based frameworks, and the epistemological basis of decision-making (Kahmann et al., 2015; Knott et al., 2024). Cross-order and multi-level governance appears in only 21 records, disproportionately Pacific (PAC=16, ATL=5), reflecting the acute jurisdictional complexity of BC's marine governance landscape (Roozee et al., 2024; Ulaski et al., 2025).

Co-governance is the most frequently engaged governance mode (n=55, PAC=34, ATL=21), encompassing formal co-management arrangements, tripartite agreements, and Indigenous-provincial joint planning processes, including MaPP (Diggon et al., 2022; Puley & Charles, 2022). Self-governance appears in 19 records (PAC=14, ATL=5), concentrated in Pacific scholarship on hereditary clan-based management and First Nation-led marine spatial planning (Artelle et al., 2018; Correia et al., 2024). The examination of friction between multiple governance modes appears in 13 records (ATL=10, PAC=3), where the coexistence of federal state authority, Mi'kmaw treaty rights, and harvester-based governance creates layered institutional tensions (Denny & Fanning, 2024; Parlee & Wiber, 2015). Hierarchical top-down governance appears as the primary mode under critique in 12 records, predominantly Pacific, where DFO's assertion of centralized management authority over Indigenous territories is directly challenged (Moffat et al., 2025; Ritts & Simpson, 2023).

Taken together, results point toward governability as an underlying concern. The literature most directly informs governability in two areas. First, it documents misalignments between governing capacity and the lived realities of coastal and Indigenous communities. Second, it identifies the structural conditions, including institutional fragmentation, rights recognition

failures, and the exclusion of local and Indigenous knowledge, that constrain effective and equitable governance (Klenk et al., 2025; Bodwitch et al., 2024).

Four limitations in the current knowledge base are apparent from an interactive governance perspective. In terms of diversity, most records examine a single governing system in isolation, with limited attention to how state, market, Indigenous, civil society, and community systems interact as a whole. In terms of complexity, governance problems tend to be located within a single order rather than examining how failures compound across orders and scales. In terms of dynamics, the literature is predominantly static, capturing governance as it currently exists rather than tracking how arrangements adapt over time. In terms of scale, most records are scaled smaller than the bioregional scale, with only 21 records engaging cross-order or multi-level interactions at the bioregional scale (e.g., Tulloch et al., 2024; Murphy et al., 2024). Addressing these four limitations is essential if SSH research is to move from documenting what is wrong with governance to informing visions of what a more governable system would look like across Canada's Atlantic and Pacific bioregions.

RQ3: What alternative governance approaches have been introduced in Canada and beyond that provide new models for advancing sustainability and equity, particularly for small-scale and Indigenous fisheries, and coastal communities?

Of the 204 records, 169 (83%) include explicit practice recommendations to inform alternative modes, with Pacific records marginally more likely to do so (PAC=86, ATL=83). The 35 records without recommendations are predominantly Atlantic and tend toward historical, descriptive, or theoretically oriented analyses. Among records with recommendations, governance recommendations are most prevalent (n=67, PAC=48, ATL=19), reflecting the Pacific cohort's orientation toward structural reform of co-governance arrangements and Indigenous decision-making authority. Policy recommendations skew towards the Atlantic (n=37, ATL=25, PAC=12), consistent with the Atlantic literature's focus on fisheries legislation, licensing reform, and equity-oriented policy analysis (Mombourquette et al., 2025; Knott et al., 2024). Records with multiple recommendation types account for 31 records (ATL=25, PAC=6), decision-making recommendations appear in 23 records (PAC=16, ATL=7), and science recommendations in 11 (ATL=7, PAC=4).

Re-envisioning governance models

Based in these recommendations, the literature documents six types of alternative governance models, each grounded in specific regional examples and advancing distinct dimensions of sustainability and equity.

Co-governance and collaborative planning are the most frequently recommended models (n=47, PAC=30, ATL=17). MaPP emerges as the most extensively documented Pacific example, demonstrating that governance succeeds when Indigenous rightsholders move from merely advisory roles to co-decision-making authority, with Indigenous knowledge treated as a legal framework shaping what activities can occur in specific areas (Diggon et al., 2022; Short et al., 2023; McGee et al., 2022). On the Atlantic, the Southwest New Brunswick Marine Advisory Committee documents how diverse stakeholders can be brought together through a bottom-up, consensus-driven process, while formalized Indigenous co-management in MPA governance is a recurring recommendation (Jones & Stephenson, 2019; Eger et al., 2021; Puley & Charles, 2022).

Anticipatory, adaptive, and reflexive governance is the second most prevalent type (n=34, PAC=21, ATL=13), calling for governance frameworks capable of responding to ecological change and cumulative effects at the bioregional scale. Pacific records recommend Indigenous-led cumulative effects monitoring tools allowing First Nations to assess development impacts within their territories (Tulloch et al., 2024; Whitney et al., 2020). Meanwhile, Atlantic records call for reflexive frameworks adaptable to shifting stock distributions and market shocks, with coastal social innovations in southern Newfoundland cited as place-based examples of community resilience-building (Foley & Mather, 2016; Andrews et al., 2022).

Indigenous self-governance and legal pluralism constitute the third type (n=26, PAC=23, ATL=3), which is overwhelmingly Pacific in origin. Records call for Indigenous legal orders to be treated as governance systems in their own right, rather than inputs to state-led management. Indigenous-led abalone restoration on BC's northwest coast, where hereditary clan leaders govern access through culturally grounded accountability structures, demonstrates that such models produce both ecological resilience and social legitimacy (Lee et al., 2019). Documentation of KITASOO/XAI'XAIS marine governance systems and the reassertion of Heiltsuk and Haida authority over herring governance further evidence the sophistication and durability of Indigenous marine tenure in the northeast Pacific (Ban et al., 2019; Ban et al., 2020; Gauvreau et al., 2017; von der Porten et al., 2016). On the Atlantic, Two-Eyed Seeing is documented as a framework for epistemic pluralism in fisheries governance, treating Mi'kmaw and Western knowledge as co-equal rather than hierarchical systems (Reid et al., 2021; Denny & Fanning, 2024).

Equity and access reform appears in 18 records (ATL=9, PAC=9). Atlantic records recommend structural individual transferrable quota (ITQ) reform, community-held licence banks, and equity metrics for monitoring allocation outcomes, drawing on Bay of Fundy community-based management as a model for keeping the right to fish anchored at the local level (Barnett et al., 2017; Squires & Wiber, 2018; Pinkerton et al., 2018). Pacific records call for governance frameworks centring Indigenous food sovereignty and document licence bank instruments as tools for mitigating corporate concentration in BC groundfish fisheries (Edwards & Edwards, 2017; Bennett et al., 2021).

Community-based and small-scale fisheries governance appears in 15 records (ATL=8, PAC=7), calling for models that anchor authority and economic benefit at the local level. The Heiltsuk Guardian Watchmen program demonstrates that community-led spatial closures under Indigenous law can produce rapid ecological recovery while building governance legitimacy (Frid et al., 2016). On the Atlantic, community-based marine aquaculture governance and small-scale fisheries food systems frameworks are recommended as mechanisms for keeping capital circulating locally (Bradford et al., 2020; Lowitt et al., 2020).

Knowledge co-production and epistemic pluralism is the sixth type (n=13, ATL=6, PAC=7), calling for governance architectures that treat Indigenous and community knowledge as foundational rather than supplementary. Records converge on a common argument: governance systems capable of advancing sustainability and equity are not those that manage fisheries more efficiently, but those that restructure the terms on which different knowledge systems, governance orders, and community voices are recognized as legitimate (Klenk et al., 2025; Bingham et al., 2021; Alexander et al., 2019).

RQ4: What can we learn from these alternatives to reimagine Canada's governance system, including the interventions, enabling conditions, and next steps required to foster transformation?

The 169 records with practice recommendations describe the structural nature of governance changes that are argued to be necessary to advance sustainability and equity. On the Pacific, this means embedding Indigenous legal orders, including hereditary governance principles and Nation-to-Nation decision-making frameworks, within federal and provincial governance architecture rather than treating them as inputs to DFO-led management (Popken et al., 2023; Sloan Morgan & Castleden, 2025). On the Atlantic, structural change is focused on reforming ITQ and licensing systems that have produced ocean grabbing, corporate concentration, and the erosion of small-scale fishing communities, alongside formalizing Mi'kmaw governance authority in MPA governance and fisheries decision-making (Mombourquette et al., 2025; Bodwitch et al., 2024). Across both coasts, equity and access reform, including community-held licence banks, owner-operator protection policies, and community use rights frameworks, are identified as practical instruments for anchoring the economic benefits of fisheries at the local level (Foley & Mather, 2016; Bradford et al., 2020).

The literature identifies several enabling conditions for governance transformation. Trust is the most consistently identified prerequisite, with durable governance arrangements depending on sustained relationships rather than short-term or project-specific collaborations (Eckert et al., 2025; Correia et al., 2024; Puley & Charles, 2022). Legal and institutional recognition is a second enabling condition, with the absence of formal legal recognition identified as the primary barrier to operationalizing alternative governance models, particularly on the Pacific coast (Ban et al., 2019; von der Porten et al., 2016). Bioregional rather than species-specific governance architecture is a third enabling condition, with fragmented single-species management frameworks identified as structurally incapable of addressing the multi-actor, multi-order governance challenges documented across the dataset (Diggon et al., 2022; Eger et al., 2021). The literature also identifies leadership diversity, including the meaningful involvement of Indigenous women, youth, and intergenerational knowledge holders, as a critical but systematically underrepresented enabling condition (Harper et al., 2018; Laver et al., 2024).

Next steps: Pathways for governability

The results now turn to five thematic pathways which combine the literature analysis above with pathways co-developed during the December Royal Roads workshop. Informing these pathways is a particular focus on stronger responsiveness to equity and sustainability commitments for small-scale fisheries, Indigenous fisheries and Nations, and coastal communities.

1. Agency and Power. Agency and power is the most extensively documented pathway (n=52, ATL=29, PAC=23), reflecting the centrality of authority redistribution to any meaningful advance in fisheries and ocean governability. On the Atlantic, records call for equity criteria in licensing and quota policy, community viability objectives in fisheries management plans, and structural reform of ITQ systems (Barnett et al., 2017; Mombourquette et al., 2025; Squires & Wiber, 2018). On the Pacific, records call for the structural recognition of Indigenous decision-making authority, resolution of jurisdictional overlaps, and Indigenous data sovereignty within ocean monitoring governance (Popken et al., 2023; Jeanson et al., 2025; Bodwitch et al., 2024). The literature is strong in diagnosing structural constraints on agency, but weaker in documenting how authority redistribution is

sustained over time and whether it produces measurable equity improvements for coastal and Indigenous communities.

2. Intergenerational, Gender-Diverse, and Youth Co-Leadership. This is the second least represented pathway (n=10, ATL=2, PAC=8) and one of the most significant gaps in the current knowledge base relative to its importance for long-term governability. The meaningful involvement of youth, women, and gender-diverse actors in fisheries governance is recognized in the broader literature as essential to leadership renewal, cultural continuity, and the regeneration of place-based knowledge systems (Charles, 2012; Galappaththi et al., 2022). Pacific records document Indigenous women's leadership as a catalyst for governance transformation in the Pacific herring fishery (Harper et al., 2018; von der Porten et al., 2019), while a stewardship education program in Nunatsiavut represents one of the few Atlantic examples of intergenerational co-leadership in practice (Laver et al., 2024). The near-absence of this pathway in Atlantic scholarship and the almost complete absence of youth-focused governance research across both coasts represents a critical gap in the current knowledge base.

3. Indigenous Wisdom and Local Knowledge. This pathway is also under-represented, documented in 12 records (PAC=10, ATL=2) that are concentrated overwhelmingly in Pacific scholarship. The Pacific literature provides strong documentation of Indigenous marine governance systems as active, place-grounded regulatory frameworks capable of producing ecologically resilient and socially legitimate outcomes, including hereditary clan-based abalone governance (Lee et al., 2019), Kitasoo/Xai'xais marine stewardship institutions (Ban et al., 2019; Ban et al., 2020), and the reassertion of Heiltsuk and Haida authority over herring governance (Gauvreau et al., 2017; Jones et al., 2017). Records across both coasts call for governance architectures that embed Indigenous legal orders, including Mi'kmaw principles like Netukulimk as crucial frameworks rather than supplementary knowledge inputs to Western science (von der Porten et al., 2016; Sloan Morgan & Castleden, 2025). On the Atlantic, Etuaptmumk (Two-Eyed Seeing) is documented as a framework for epistemic pluralism in fisheries governance (Reid et al., 2021; Denny & Fanning, 2024). The primary gap is legal and institutional: the literature is stronger on documenting Indigenous knowledge systems than on how they can be formally embedded in governance architecture in ways that are legally binding, institutionally durable, and affirming of Indigenous self-determination.

4. Transdisciplinary Capacity and Relational Accountability. This pathway appears in 27 records (PAC=17, ATL=10) and is consistently identified as a prerequisite rather than a complement to governance transformation. Trust, sustained relationships, and cross-sector collaboration are documented as the enabling conditions without which co-governance arrangements and knowledge co-production cannot produce durable governance change (Klenk et al., 2025; Eckert et al., 2025; Correia et al., 2024). Pacific records provide the strongest examples, including the Conservation Conflict Transformation framework applied to the Orca-Salmon-Human system (Eckert et al., 2025), the 25-year cross-cultural collaboration for Syilx Okanagan salmon restoration (Correia et al., 2024), and relational trust-building in inter-organizational fisheries governance networks (Roozee et al., 2024). Atlantic records document relational governance principles drawn from Mi'kmaw land-sea relationships (Wells et al., 2025), co-production diplomacy in contested cod fisheries governance (Klenk et al., 2025), and the role of co-governance networks in enabling small-scale fisheries to respond to disruptions such as COVID-19 (Neis et al., 2022). The primary gap is limited evidence on how relational governance capacity is built and sustained at the bioregional scale, rather than within specific projects or agreements.

5. Community-Embedded Innovation and Institutions. This is the least represented pathway (n=7, ATL=3, PAC=4), yet the workshop engagement and the global literature position it as essential to advancing sustainability and equity in small-scale and coastal community fisheries and charting more bottom-up innovation pathways in light of often top-down Blue Economy agendas (Penca et al., 2025). The literature identifies community-based governance institutions, including community-held licence banks, local co-management boards, and community use rights frameworks, as practical mechanisms for keeping economic benefits anchored in coastal communities (Foley & Mather, 2016; Pinkerton et al., 2018; Bradford et al., 2020). Coastal social innovations including direct sale, pescatourism, and shortened seafood supply chains are documented as place-based resilience strategies in Atlantic communities navigating trade liberalization and quota concentration (Andrews et al., 2022; Lowitt et al., 2020). On the Pacific, values-led management rooted in Indigenous governance principles is documented as an institutional alternative to technocratic resource management (Artelle et al., 2018; Diggon et al., 2021). The primary limitation is that community-embedded innovation is rarely examined in sustained dialogue with higher-order institutional frameworks, and may be concentrated in other disciplines such as business and entrepreneurship, leaving the conditions enabling local innovations to influence second-order governance reform poorly understood on both coasts.

DISCUSSION

This knowledge synthesis was motivated by a well-documented gap between Canada's formal commitments to sustainable and equitable fisheries governance and the governance realities experienced by small-scale harvesters, coastal communities, and Indigenous Nations across the Atlantic and Pacific coasts. Canadian marine governance operates within a context of increasing ecological pressure, unresolved rights conflicts, and persistent institutional friction between federal regulatory authority and the diverse governing systems that operate at the community and bioregional scales (Jentoft & Chuenpagdee, 2015; Pinkerton et al., 2018).

The SSH literature is growing, interdisciplinary, and action-oriented, with 83% of records including explicit practice recommendations. It is also concentrated on diagnosing what is wrong with governance, rather than tracking governance change over time, evaluating what works, or generating the cross-scale, multi-system research needed to advance governability in Canadian marine contexts. Table 4 summarizes the central findings according to the four research questions.

Table 4: Central findings across four research questions

Research question	Key results	Regional contrast	Primary gap
What is the state of SSH knowledge on Atlantic and Pacific fisheries and ocean governance?	The literature is interdisciplinary, qualitative, and action-oriented, with 83% of records including practice recommendations. It is concentrated in a small number of journals and dominated by second-order governance concerns.	ATL literature is stronger on policy, legislative, and regulatory governance. PAC literature is stronger on Indigenous governance, co-governance, and community-engaged research.	Limited longitudinal and comparative research. Intergenerational, gender-diverse, and youth leadership are systematically understudied.
How does the current governance system manifest in diverse	All 204 records are governance-relevant. Governance structures and	ATL governance is characterized by neoliberal market	Cross-order, multi-level, and system interaction research is

Research question	Key results	Regional contrast	Primary gap
coastal bioregions of Canada, including in terms of sustainability and equity for fishers and coastal communities?	processes dominate (n=127, 62%). The state and market systems are most frequently examined. Governance outcomes are underrepresented as a standalone focus (n=11, 5%).	arrangements and regulatory frameworks. PAC governance is characterized by jurisdictional complexity, Indigenous rights conflicts, and advanced co-governance models.	rare (n=21, 10%). The literature diagnoses structural problems more than it evaluates governance effectiveness.
How well does governance respond to sustainability and equity commitments from the perspectives of researchers and practitioners?	125 records (61%) adopt a critical framing. Formal commitments are frequently adopted at the policy level, but demonstrate limited translation to community-level outcomes.	ATL: limited responses to CETA, Blue Economy equity gaps, and ITQ distributional consequences. PAC: limited DFO responsiveness to treaty obligations, food sovereignty exclusion, and inadequate MPA frameworks.	Governance outcomes research is insufficient to determine whether positive governance arrangements deliver measurable sustainability and equity improvements in practice.
What can the literature on alternative governance models and emergent pathways tell us about the interventions, enabling conditions, and next steps needed to foster governance transformation?	Six alternative governance model types are documented, led by co-governance and collaborative planning (n=47) and anticipatory and reflexive governance (n=34). Five governability pathways are identified from the literature and the December 2025 Royal Roads workshop.	MaPP and Indigenous self-governance frameworks dominate PAC. Bay of Fundy CBM, Two-Eyed Seeing, and coastal social innovations lead ATL.	Models are documented in isolation rather than in interaction. Enabling conditions for scaling and sustaining governance innovations are poorly understood. Pathway 2 (intergenerational and gender-diverse co-leadership) is severely underrepresented in the literature.

Governance systems that do not work

Canadian marine governance is not consistently delivering on its sustainability and equity commitments, particularly for small-scale and Indigenous fisheries, and coastal communities. Of the 204 records, 125 (61%) critically examine governance gaps, institutional friction, and limited responsiveness to the communities most directly dependent on marine resources. On the Atlantic coast, governance arrangements have concentrated the economic benefits of fisheries away from rural coastal communities, producing outcomes that directly contradict equity commitments embedded in Canada's own fisheries legislation and international obligations (Barnett et al., 2017; Mombourquette et al., 2025; Squires & Wiber, 2018). On the Pacific coast, the persistence of hierarchical, DFO-centred management in the face of modern treaty obligations, UNDRIP commitments, and the reassertion of Indigenous governance authority represents a fundamental misalignment between legal obligation and institutional practice (Sloan Morgan & Castleden, 2025; Popken et al., 2023; von der Porten et al., 2016). Applied through an interactive governance lens, these limitations could be more strongly understood if the research more fully addressed the diversity, complexity, dynamics, and scales at which the current governance system operates. For example, most papers focused on a single governing system or order rather than on how state, market, Indigenous,

civil society, and community systems interact to advance or undermine governability as a whole.

Governance systems that might work

Against this backdrop, the synthesized literature documents alternative governance approaches. The practice recommendations converge on six alternative governance model types: co-governance and collaborative planning, anticipatory and reflexive governance, Indigenous self-governance and legal pluralism, equity and access reform, community-based and small-scale fisheries governance, and knowledge co-production and epistemic pluralism. The strongest models are regional in origin, but globally relevant. MaPP demonstrates that bioregional co-governance between Indigenous Nations and provincial government produces more legitimate and ecologically grounded outcomes than top-down federal management (Diggon et al., 2022; Short et al., 2023). Etuaptmumk (Two-Eyed Seeing) demonstrates that epistemic pluralism can transform the terms on which fisheries research and management are conducted (Reid et al., 2021; Denny & Fanning, 2024). Community-based governance in the Bay of Fundy and coastal social innovations in Newfoundland demonstrate that anchoring authority and economic benefit at the local level is both feasible and effective (Pinkerton et al., 2018; Andrews et al., 2022).

The primary limitation of this body of literature is that it documents these models largely in isolation, rarely examining how they interact with higher-order governance, how they scale or transfer across bioregional contexts, or how enabling conditions for their success can be built and sustained over time. The five governability pathways identified through the December 2025 Royal Roads workshop provide a framework for addressing this limitation, while organizing and advancing a transformative governance research agenda.

The SSH literature synthesized here is strongest in advancing Governability Pathways 1, 3, and 4, as explained in Table 5. The literature is also increasingly alert to the dynamics of the systems to be governed, particularly around climate-driven ecological change and cumulative effects on coastal communities. Yet, significant gaps are apparent across all five pathways. The research agenda concentrates on state and Indigenous governing systems, rarely examines how multiple governance orders and systems interact simultaneously, has not yet built a coherent temporal agenda capable of tracking governance change over time, and offers very limited guidance on how local governance innovations can be evaluated or scaled at the bioregional level. Pathways 2 and 5 are the most severely underdeveloped across all four dimensions, a gap that is particularly stark given the centrality of these themes to long-term governance transformation. The research priorities in Table 5 with stronger attention to governance characteristics are designed to directly address these gaps, constituting a focused agenda for the next generation of SSH research on Canadian fisheries and ocean governance.

Table 5: Research Priorities for Advancing Governability Across Five Pathways with Considerations for Diversity, Complexity, Dynamics, and Scale

Pathway	Priority research directions	Diversity	Complexity	Dynamics	Scale
1. Agency and Power	- Longitudinal evaluation on how authority redistribution in co-governance structures advances equity small-scale and Indigenous fisheries. - Comparative analysis of access rights regimes and community viability across Atlantic and Pacific bioregions.	Expand beyond state and Indigenous systems to coastal community and civil society actors	Examine how equity outcomes are shaped by interactions across governance orders	Track access and benefit distribution over time as co-governance matures	Comparative analysis across Atlantic and Pacific bioregional governance contexts
2. Intergenerational, Gender-Diverse, and Youth Co-Leadership	- Research using GBA+ frameworks for fisheries governance on both coasts. - Documentation of youth leadership roles in Indigenous and coastal community fisheries governance. - Comparative study of intergenerational knowledge transmission as a governance capacity. - Research on how gender-diverse leadership shapes governance legitimacy and sustainability outcomes.	Document diverse leadership actors currently absent from the governance literature	Examine interactions between intergenerational knowledge systems and formal governance structures	Track leadership renewal and knowledge continuity over generational timescales	Comparative Atlantic-Pacific study of enabling conditions for diverse co-leadership in both Indigenous and settler contexts
3. Indigenous Wisdom and Local Knowledge	- Research on how Indigenous legal orders can be formally and durably embedded in governance architecture. - Documentation of Indigenous marine governance systems across the northeast Pacific to build the evidence base for formal recognition.	Document the full diversity of Indigenous governance systems operating in each bioregion	Examine how Indigenous legal orders interact with federal and provincial governance orders	Track how Indigenous governance systems adapt to ecological and political change over time	Research on how Indigenous governance frameworks function at bioregional rather than site-specific scales

Pathway	Priority research directions	Diversity	Complexity	Dynamics	Scale
	Research on how epistemic pluralism frameworks function across different institutional and bioregional contexts on the Atlantic coast.				
4. Transdisciplinary Capacity and Relational Accountability	- Research on how relational governance capacity is built and sustained at the bioregional scale beyond individual projects. - Institutional design research on relational accountability frameworks that can outlast specific partnerships. - Evaluation of conflict transformation and trust-building processes across different governance contexts and actor constellations.	Examine relational capacity across diverse actor types, including civil society and coastal communities	Study how relational governance intersects with governance complexity across multiple orders	Longitudinal tracking of trust and relational capacity in co-governance bodies over time	Research on enabling conditions for bioregional relational governance architectures
5. Community-Embedded Innovation and Institutions	- Research on the governance conditions enabling local innovations, including institutional supports and related regulatory reforms. - Comparative analysis of community innovation models across Atlantic and Pacific coastal governance contexts, informed by value chain analysis and inclusive social innovation framing	Document the diversity of community-embedded governance innovations and market-based innovations currently operating in either formal or informal settings	Examine how community-based innovations engage with governance complexity across scales and orders	Track how community institutions sustain innovation capacity over time under changing conditions and evolving stakeholder interactions	Research on conditions enabling community-level innovations to contribute to bioregional governance transformation

The five governability pathways and research priorities synthesized in Table 5 reveal a structural problem the literature cannot resolve on its own. Across all five pathways, the enabling conditions for connecting, scaling, and sustaining governance innovations remain poorly understood, and the research priorities that matter most, including longitudinal, comparative, cross-order, and multi-system approaches, require sustained collaboration and

investment that a synthesis alone cannot produce (Jentoft & Chuenpagdee, 2022; Bundy et al., 2017; Chuenpagdee & Jentoft, 2009). Governance innovation is therefore the value proposition: an applied challenge requiring the bioregional research architecture, relational infrastructure, and institutional grounding that the literature consistently identifies as necessary but underdeveloped (Pinkerton, 2009; Eger & Courtenay, 2021; Correia et al., 2024). The bioregional scale matters because it is where fragmented, species-specific governance has shortcomings, and where the diversity, complexity, dynamics, and place-based conditions shaping sustainability and equity for small-scale and Indigenous fisheries can actually be addressed together.

CONCLUSIONS

This synthesis reviewed 204 peer-reviewed social science and humanities records on fisheries and ocean governance in Canada published between 2015-2025. It assessed the state of knowledge, the manifestation of governance across Atlantic and Pacific bioregions, the responsiveness of governance to sustainability and equity commitments, and the alternative models and pathways available for governance transformation.

The evidence is unambiguous on two points. First, Canada's current fisheries and ocean governance architecture is not consistently delivering for the communities it is most obligated to serve. This is particularly true for small-scale fisheries, Indigenous fisheries, and the coastal communities and Indigenous Nations whose food security, livelihoods, and cultural continuity depend on governance systems that were largely designed without their priorities in mind. Second, the literature documents a coherent and growing body of alternative governance approaches that are regional in origin, but globally relevant. These approaches demonstrate what more equitable, legitimate, and ecologically grounded governance looks like in practice. MaPP, Etuaptmumk, Bay of Fundy community-based management, Indigenous self-governance of abalone and herring, and coastal social innovations in Newfoundland collectively represent an evidence base for transformation that is already present in Canada's coastal communities. This evidence base should be more fully recognized, resourced, and connected across governance scales.

The pathways forward identified through this synthesis and the December 2025 Royal Roads workshop are oriented toward a conception of governance that is multi-level, anticipatory, relational, holistic, plural, and reflexive. Realizing these characteristics in the Canadian marine context requires structural interventions, enabling conditions, and a new generation of SSH research. That research needs to be longitudinal in design, comparative across bioregions, attentive to the full diversity of governing systems, and explicitly oriented toward governance transformation rather than governance critique. The research priorities presented in this synthesis are designed to advance exactly that agenda. Canada's commitments under UNDRIP, the modernized Fisheries Act, the United Nations Sustainable Development Goals, and its 30x30 conservation targets demand governance that delivers equity and sustainability not only in principle but in practice. The evidence synthesized here indicates that the knowledge, the models, and the pathways to get there already exist. Acting on them requires sustained collaboration, coordinated investment, and governance arrangements built to last beyond individual projects.

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Supplementary Table 1: Classification Guide, Definitions, Selections, and Analysis

This table describes all classifications used to structure the coding and analysis of the 204 records in the systematic scoping review. Classifications are organized by research question. For classifications from Andrews et al. (2025) that are carried forward into this study, definitions and selections are adapted from the original classification guide. Interactive governance (IG) classifications — Governing System, Governance Order, Governance Mode, and Governability — are new additions applied in Phase 4 of the present study (highlighted in green). WHY columns, a key innovation of this study, capture the substantive reasoning behind each primary classification and were analysed using a hybrid inductive-deductive thematic approach.

Research Question	Classification	Definition / Description	Selections	Analysis
RQ1: What is the state of social science and humanities knowledge for Atlantic and Pacific fisheries and oceans governance in Canada?				
1	Authorship discipline (Lead author)	The discipline of the lead author, as reported on the article, on professional website, or known to the author team.	Open-ended (e.g., Environmental Science; Marine Social Science; Anthropology), then binned into broader disciplinary groupings	Identified from article, professional webpages, or team expertise; binned iteratively following Olson & Pinto da Silva (2021). Reported as frequency and percentage across the full sample and by region (ATL/PAC).
1	Discipline type	The overall disciplinary orientation of the lead author, binned from authorship discipline.	Natural science; Social science; Indigenous; Policy/governance	Further binning of authorship discipline. Reported as frequency and percentage by region.
1	Publication year	Year that the article was published.	Open (listed on article)	Extracted directly from article metadata. Annual totals reported with regional breakdowns and narrative discussion of peaks.
1	Peer-reviewed journal	The peer-reviewed journal that published the article.	Open (listed on article)	Extracted from article metadata. Top journals by frequency reported; concentration of output assessed.
1	Research subject + WHY	The main research area in which the research focus is explored. WHY captures the substantive rationale for the classification.	Fisheries; Aquaculture; Markets; Coastal Zones; Ocean Spaces	Classified by reviewing abstract, research objectives, and conclusions. WHY column records the reasoning. Frequency reported by region. WHY classifications coded thematically using hybrid inductive-deductive approach to identify connections to small-scale, Indigenous, and coastal community fisheries.
1	Research focus + WHY	The main topic of the research. WHY captures the thematic reasoning behind the classification.	Behaviour; Environmental change and conservation; Food systems and food security; Gender; Indigenous fisheries and ways of	Classified following review of full article; iteratively binned. WHY column captures

			knowing; Innovation; Knowledge; Management; Policy and governance; Political economy/Political ecology; Work and labour	substantive thematic contribution. Frequency reported by region; WHY coded thematically.
1	Scale of research	The spatial unit of analysis of the research setting.	Comparative/International; Inter-provincial; Provincial; Local	Classified from methods and study settings. Reported as frequency by region.
1	Geographical focus	The primary region or province in the research setting.	Atlantic Canada; Newfoundland and Labrador; Nova Scotia; Prince Edward Island; New Brunswick; British Columbia; Pacific Canada	Classified directly from article. Reported as frequency by region.
1	Type of aquatic system	The primary type of aquatic social-ecological system in the research setting.	Coastal; Offshore; Not specified	Classified from article methods and study setting. Reported as frequency by region.
1	Methodology	The orientation of methods to specific types of data and analytical processes.	Qualitative; Quantitative; Mixed methods	Classified from the methods section of each article. Frequency and percentage reported by region.
1	Data type	Whether data were collected for the research and whether they were primary or secondary in nature.	Primary data; Secondary data; Literature	Classified from the methods section. Reported as frequency by region.
1	Data source	The data sources used in articles that included primary or secondary data. Multiple sources recorded per article.	Focus groups; Interviews; Participant observation; Surveys; Workshops; Public/government/industry data; Other	Classified from the methods section; multiple sources recorded per record. Frequency of each source type reported by region.
1	Main type of analysis	The overall analytical approach taken in the research. Multiple types recorded.	Comparative; Content analysis; Descriptive; Ethnographic; Mapping; Modelling; Statistical; Theoretical; Other	Classified from the methods and analysis sections. Frequency reported by region; regional differences in analytical orientation discussed.
1	Community-engaged or collaborative + WHY	The presence and type of engagement used in the research, focusing on rightsholders and/or stakeholder groups. WHY captures the nature and depth of engagement.	1 – Community-engaged; 2 – Other collaborative (e.g., government, ENGOs); 3 – Both; 4 – Not engaged nor collaborative	Classified from the methods section and author descriptions of the research process. WHY records the specific communities, partners, or processes involved. Frequency and regional patterns reported; WHY coded thematically to characterize differences in engagement type and depth between Atlantic and Pacific cohorts.
1	Focus on specific communities + WHY	Whether the research includes a focus on specific geographical communities, First Nations, or municipalities. WHY identifies which communities.	Yes; No	Classified from the methods and study setting. WHY records the specific communities identified. Frequency reported by region.

RQ2: How does the current governance system manifest across Canadian bioregions, including in terms of equity and sustainability for fishers and coastal communities?

2	Governance relevant + WHY	Whether the record is substantively relevant to fisheries and oceans governance. WHY captures the specific governance content of the article.	Yes; No	Classified by reviewing each article's objectives, analysis, and conclusions for governance content. WHY records the specific governance dimensions addressed. All 204 records in the final combined database were confirmed governance-relevant at screening. WHY classifications coded thematically to map how governance relevance is distributed across the EBM governance objectives.
2	Governance type (EBM objective) + WHY	The type of governance objective addressed in the article, aligned to the EBM Framework governance pillar. WHY captures the substantive governance content and reasoning.	Legal obligations and other commitments; Governance structures and processes; Governance outcomes	Classified by reviewing the article's substantive governance content against the EBM Framework governance pillar objectives (Daly et al. 2020; Bundy et al. 2021). WHY records the specific governance structures, processes, obligations, or outcomes addressed. Frequency and regional breakdowns reported. WHY classifications coded thematically to identify dominant governance concerns across the dataset.

RQ2 (continued): Interactive Governance Analysis — Applied in Phase 4 of the systematic review to interpret findings across RQ2, RQ3, and RQ4

2	Governing system + WHY	The governance actor system(s) examined or engaged in the article, as defined in interactive governance theory (Kooiman, 2003; Kooiman et al., 2005). Governing systems are the organized actors and institutions that collectively shape how a system is governed. Five governing systems are relevant in Canadian fisheries and oceans: state, market, Indigenous, coastal community, and civil society.	State; Market; Indigenous; Coastal community; Civil society	Classified by reading the full article and identifying which governing actors or systems are the primary focus of analysis, critique, or recommendation. Multiple systems recorded per record where relevant. WHY captures the specific institutions, arrangements, or communities involved. Framework piloted on 12 records before full application to 204. Frequency reported by system and region. WHY coded thematically to identify the structural dynamics between governing systems documented in the literature.
2	Governance order + WHY	The level or order of governance addressed in the article, as defined in interactive governance theory. First-order governance (operational management) concerns day-to-day decisions about resource access, quota setting, and management implementation. Second-order governance (institutional governance) concerns the rules, institutions, and frameworks that	First-order (operational); Second-order (institutional); Meta-governance; Cross-order / multi-level	Classified by assessing which level of governance decision-making or institutional design the article primarily engages. Articles addressing institutional design, co-management frameworks, and rights structures classified as second-order. Articles examining values, moral economy, and foundational principles classified as meta-governance. WHY captures the specific orders

		structure first-order decisions. Meta-governance concerns the normative images, principles, and legitimacy foundations that underpin governance systems — including rights frameworks, moral economy, and epistemological bases of decision-making.		addressed and their interactions. Framework piloted on 12 records. Frequency reported by order and region. WHY coded thematically to identify patterns of order-specific governance critique and reform.
2	Governance mode + WHY	The mode or style of governing examined or recommended in the article, as defined in interactive governance theory. Hierarchical governance involves top-down state authority and unilateral regulatory decision-making. Co-governance involves shared authority and collaborative arrangements between state, Indigenous, community, or other actors. Self-governance involves actors governing themselves autonomously, including Indigenous self-determination and community-based management independent of state authority. Multiple modes may coexist or come into friction within a single governance context.	Hierarchical; Co-governance; Self-governance; Multiple / friction between modes	Classified by assessing the governance arrangement that the article primarily describes, critiques, or recommends. Articles focused on DFO unilateral authority classified as hierarchical. Articles on co-management, tripartite agreements, and collaborative planning classified as co-governance. Articles on hereditary governance and community-based management independent of state classified as self-governance. Articles examining tension between modes classified as multiple/friction. WHY captures the specific arrangements and their implications for equity and sustainability. Frequency reported by mode and region. WHY coded thematically.
2	Governability (interpretive synthesis)	Governability is the overall capacity and quality of the governance system to address the diversity, complexity, dynamics, and scale of the system to be governed (Kooiman et al., 2008; Jentoft, 2008). It was not applied as a standalone classification column but used as an organizing evaluative concept to synthesize and interpret patterns across governing systems, orders, and modes. Low governability signals misalignments between governing capacity and lived realities; higher governability is associated with inclusive, adaptive, and legally grounded governance arrangements.	N/A — interpretive concept applied in synthesis	Governability was used as an interpretive frame rather than a coded classification. Following the IG analysis of governing systems, orders, and modes across the full database, the WHY classifications were thematically coded to identify the structural conditions — institutional fragmentation, rights recognition failures, exclusion of local and Indigenous knowledge — that constrain or enable effective and equitable governance. Findings from this synthesis are reported under RQ2 and used to organize the five governability pathways developed in dialogue with the Royal Roads workshop (RQ4).

RQ3: What governance approaches have been introduced in Canada and beyond that provide alternative models for advancing sustainability and equity, particularly for small-scale, Indigenous, and coastal community fisheries?

3	Presence of recommendations for practice + WHY	Whether the article includes explicit recommendations for how its findings could be used in governance, management, or policy. WHY captures the specific governance or practice context to which recommendations are directed.	Yes; No	Classified by reviewing findings, discussion, and conclusions for attention to how the research could inform governance or management practice. Articles that only claim relevance without explaining how were classified as No. WHY records the specific governance context, actor, or mechanism to which recommendations are directed. Frequency reported by region. WHY coded thematically to identify the six alternative governance model types documented in the literature (RQ3).
3	Type of recommendation + WHY	The specific category of recommendation for practice. WHY captures the substantive content and mechanism of the recommendation.	Policy; Regulation; Science; Decision-making; Governance; Multiple	Classified once a practical recommendation was confirmed. Multiple types recorded per record. WHY captures the substantive argument or rationale behind each recommendation. Frequency reported by type and region. WHY coded thematically to characterize six alternative governance model types: (1) co-governance and collaborative planning; (2) anticipatory, adaptive, and reflexive governance; (3) Indigenous self-governance and legal pluralism; (4) equity and access reform; (5) community-based and small-scale fisheries governance; (6) knowledge co-production and epistemic pluralism.
3	Presence of recommendations for future research + WHY	Whether the article includes explicit recommendations for future research directions. WHY captures the specific research gaps or questions identified.	Yes; No	Classified by reviewing conclusions and discussion sections for research directions. WHY records the specific research gaps or questions identified. Frequency reported by region. WHY coded thematically to identify knowledge gaps in the literature.
RQ4: What can we learn from these alternatives to reimagine Canada's governance system, including the interventions, enabling conditions, and next steps required to foster governance transformation?				
4	Governability pathway (re-coding of WHY classifications)	Five governability pathways were co-developed with governance researchers and practitioners at the December 2025 Royal Roads workshop. Each pathway represents a thematic direction for advancing governance transformation. Records were subsequently re-examined to identify	Pathway 1 – Agency and Power; Pathway 2 – Intergenerational, Gender-Diverse, and Youth Co-Leadership; Pathway 3 – Indigenous Wisdom and Local Knowledge; Pathway 4 – Transdisciplinary Capacity and Relational	Following the Royal Roads workshop, WHY classifications from Research Subject, Research Focus, Practical Recommendations, Type of Recommendation, and Future Research were re-examined for each record. Records whose WHY content offered substantive insights for one or

		which offered substantive insights for each pathway: (1) Agency and Power; (2) Intergenerational, Gender-Diverse, and Youth Co-Leadership; (3) Indigenous Wisdom and Local Knowledge; (4) Transdisciplinary Capacity and Relational Accountability; (5) Community-Embedded Innovation and Institutions.	Accountability; Pathway 5 – Community-Embedded Innovation and Institutions	more pathways were coded to the relevant pathway(s). Insights were then used to further develop and ground each pathway in the published literature, producing an evidence base for each transformative direction. Frequency and regional distribution reported per pathway.
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