MI'KMAW RELATIONAL VALUES: LESSONS FOR ENVIRONMENTAL VALUATION FROM INDIGENOUS LITERATURES AND L'NUWEY ALONG THE BAY OF FUNDY COAST

by

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LIST OF ABBREVIATIONS

CRediT	Contributor Roles Taxonomy
CANZUS	Canada, Australia, New Zealand, and the United States
COVID-19	Coronavirus disease of 2019
LKH	Local Knowledge Holder
ES	Ecosystem Services
KMKNO	Kwilmu'kw Maw-klusuaqn
MEW	Mi’kmaw Ethics Watch
MTK	Mi’kmaw Traditional Knowledge
NCP	Nature’s Contributions to People
NRM	Natural resource management
NSERC	Natural Science and Engineering Resource Council
OCAP®	Ownership, Control, Access, and Possession®
REB	Research Ethics Board
SSHRC	Social Science and Humanities Research Council
SRES	School of Resource and Environmental Studies
TCPS-2 CORE	Tri-council Policy Statement Course on Research Ethics
TRC	Truth and Reconciliation Commission
UNDRIP	United Nations Declaration on the Rights of Indigenous People

ABSTRACT

The Mi'kmaq are a First Nation whose traditional, unceded, and contemporary territories, called Mi'kma'ki, are situated in the eastern regions of Turtle Island (North America). L'nuwey, generally meaning the way Mi'kmaq think or act, has been co-developing with Mi'kma'ki since time immemorial and reflects a deep relationality with the land and non-human beings. Such relationality is not meaningfully articulated in frameworks like ecosystem services, which is a cornerstone of Western conservation that prioritizes instrumental and intrinsic conceptualizations of value. A "third class of values" called relational values has recently emerged in conservation and environmental valuation discourses to describe those that stem from people's relationships with and responsibilities towards nature. This study aims to enrich relational value discourses by first engaging with literatures on Indigenous values and subsequently considering the emergent descriptions and classifications of relational values in a community-based case study on how the Mi'kmaq navigate coastal adaptation decision-making on the Bay of Fundy coast.

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CHAPTER 1 INTRODUCTION

1.1 Background, Purpose, and Research Questions

Conservation is shifting alongside global and local movements to foreground Indigenous rights, resilience, and resurgence (Artelle et al., 2019; Hessami et al., 2021; M'sit No'kmaq et al., 2021; Wong et al., 2020). Embedded within conservation study, policy, and practice are frameworks reflecting Western conceptualizations of nature, which frequently posit nature as mechanistic and humans as separate from and superior to their surroundings (Hessami et al., 2021; Holling & Meffe, 1996; Howitt & Suchet-Pearson, 2006). To honor Indigenous rights and mitigate imposing colonial power relations, conservation must address and move beyond these "problematic assumptions" and meaningfully center Indigenous people and Indigenous ways of knowing and being (Howitt & Suchet-Pearson, 2006, p. 323; Muller et al., 2019).

Ecosystem services (ES) is a cornerstone framework stemming from conservation scholarship that is used to ascribe value to nature (Millennium Ecosystem Assessment, 2005). ES has principally relied on instrumental and intrinsic conceptualizations of value (Díaz et al., 2015; Pascual et al., 2017): instrumental values consider how nature benefits people, whereas intrinsic values consider the value of nature independent of people (Chan et al., 2016). The values of Indigenous people are highly diverse and there is no comprehensive set of pan-Indigenous values. Certain phenomena are considered common among Indigenous people, such as highly relational and place-based values, which are not comprehensively represented by prevailing ES value framings (Cajete, 2000; Chan et al., 2012; Himes & Muraca, 2018; Pascua et al., 2017; Stoeckl et al., 2021). Literatures that engage with ES in the context of Indigenous values emphasize that scholars,

practitioners, and researchers must "move beyond" ES to comprehensively represent Indigenous values (Himes & Muraca, 2018; Normyle et al., 2022; Satterfield et al., 2013; Stoeckl et al., 2021).

Relational values, meaning those rooted in relationships with or responsibilities towards nature, have existed since among Indigenous peoples time immemorial (Cajete, 2000; Eyster et al., 2023; Gould et al., 2019; Muller et al., 2019; Sheremata, 2018). Relational values are emerging only recently in ES discourses as a "third class of values" (Chan et al., 2016, 2018). Chan et al. (2016, 2018) explain how relational framings better capture how individuals and collectives truly value, think of, and make choices around nature, which includes preferences, principles, and virtues. Rather than benefits provided by nature to people (instrumental) or value entirely independent of people (intrinsic), relational values derive from the interrelations between people and place (Chan et al., 2016, 2018; Díaz et al., 2015; Pascual et al., 2017).

This study engages with relational values in a case study of climate change adaptation in Mi'kma'ki, the ancestral, contemporary, and unceded territories of the Mi'kmaq or L'nu[1]. Mi'kmaq are a First Nation who have resided on the east coast of Turtle Island[2] since

[1] L'nu is the original, self-declared name of the Mi'kmaq. Young (2016) explains "[L'nu] means 'The People of the Same Tongue.' It denotes a group of people who have experienced the same forces of the ecology and have a shared cognitive solidarity. The L'nu are also known as the Micmac or Mi'kmaq, words derived from the word Ni'kmaq, which means 'My Kin-Friends'" (p. 76).

[2] Turtle Island refers to the continent of North America (Robinson, 2018). The Canadian Encyclopedia explains "The name comes from various Indigenous oral histories that tell stories of a turtle that holds the world on its back. For some Indigenous peoples, the turtle is therefore considered an icon of life, and the story of Turtle Island consequently speaks to various spiritual and cultural beliefs" (Robinson, 2018, para. 1).

time immemorial. This study unfolds specifically in the Siknikt, Sipekne'katik, and Kespukwik districts of Mi'kma'ki, which encompass the Bay of Fundy (Figure 7). Many Mi'kmaw stories and teachings are tied to the Bay of Fundy, and the coasts are significant territories for seasonal fishing and hunting (Gloade, n.d.; Hornborg, 2016). Acadian (French) settlers began constructing coastal embankments, known as dykes, throughout the region in the 1600s to prevent tidal intrusion and create farmland (Butzer, 2002; Rudin, 2022). These dykes persist and the lands they protect, known as dykelands, have more diverse uses than originally envisioned, such as residential, industrial, and commercial areas with tourism and recreational amenities (Sherren et al., 2021). In many areas, sea level rise and increased storm surges associated with climate change mean the agricultural dykeland system can no longer be maintained at its current scale (Nova Scotia Department of Environment and Climate Change, 2022; van Proosdij et al., 2018). Decision-makers are navigating complex options for dyke adaptation: restoring dykelands to tidal wetlands, realigning (pulling back) dykes, and/or raising dykes in their current footprint (Sherren et al., 2021). Using an ES framework, Sherren et al. (2021) presented a baseline of this context that emphasizes the complex trade-offs entangled in each adaptation option. Among the overlapping environmental, political, and cultural factors, they suggest the most significant omission thus far as understanding how the Mi'kmaq use and value the dyke and tidal wetland systems as well as how they navigate coastal adaptation trade-offs and decision-making.

This thesis arises as part of a pan-Canadian research network called Natural Science and Engineering Research Council (NSERC) ResNet. The project monitors, models, and manages various ES across Canada to assess the utility of ES thinking for sustainably

managing working landscapes – those used to produce food, energy, or fibre (Bennett et al., 2021). Nova Scotia's Bay of Fundy coast is one of its six case study landscapes. The research team spans social and natural science fields and is based at Dalhousie and Saint Mary's Universities, with several academic, government, and not-for-profit partners. This thesis arose as a collaboration between Dalhousie University and the Confederacy of Mainland Mi'kmaq, a Tribal Council not-for-profit partner, to assess how the Mi'kmaq navigate coastal adaptation decision-making in the Bay of Fundy. As part of this undertaking, there was an emergent need to articulate Mi'kmaw values in a salient way by moving beyond Western approaches to environmental valuation.

The purpose of this research is to enrich descriptions and classifications of Indigenous relational values by first engaging with literature on Indigenous values and subsequently considering the emergent findings in a case study on how Mi'kmaq navigate adaptation decision-making along Nova Scotia's Bay of Fundy dykelands and tidal wetlands. We were guided by three research questions:

1. How do literatures of Indigenous values contribute to the descriptions and classifications of relational values?
2. How do Mi'kmaq navigate adaptation decision-making along Nova Scotia's Bay of Fundy coast? Specifically, how do Mi'kmaq use, relate to, and value the dykeland and wetland systems, and how do they navigate decision-making?

3. What insights does Mi'kmaw ways of thinking (L'nuwey[3]) about the dykes and tidal wetlands provide for characterizing Indigenous relational values?

1.2 Research Approach

We align with a constructivist paradigm, which understands knowledge as constructed or interpreted by people (Moon & Blackman, 2014; Patel, 2015). Constructivism posits that there is no single, discoverable knowledge or reality external to people, as assumed under a positivist paradigm. Rather, individual people interpret reality in different ways based on their own experiences, meaning multiple realities can exist across different people (Moon & Blackman, 2014; Patel, 2015).

For our first objective, enriching descriptions and classifications of Indigenous relational values, we conducted a scoping review of peer-reviewed studies using Scopus. We identified terms corresponding to relational values, nature, and Indigeneity to include a query of titles, abstracts, and keywords for publications between 2002-2021. We identified terms corresponding to relational values and a range of related synonyms from Chan et al. (2016), as the foundational publication on relational values in environmental valuation that likewise acknowledges the existing prominence of relational values among Indigenous people. We limited the search results by subject area, location, type of publication, and year of publication to achieve a feasible breadth for a scoping review. We used a bigram methodology in R to automatically filter the query results (Gerl, 2021; R Core Team, 2022). The R code identifies bigrams, which are two-word sequences,

[3] Citing Young (2016) and Deblois (1996), M'sit No'kmaq et al. (2021) explain, "L'nuwey translates roughly as 'It belongs to the L'nu' or 'The way the L'nu think, behave or do something'" (p. 848).

which are filtered and used to replace the original, single relational value terms. Bigrams still feature the original word, but they increase its specificity with the addition of another word before or after it. Using this methodology, we narrowed the query results to scale manageable for manual filtering. We ultimately identified 27 articles as a corpus for full text analysis. These articles were thematically coded in NVivo using a blended inductive and deductive approach 12 (QSR International Pty Ltd., 2018): we deductively coded occurrences of relational values originally described by Chan et al. (2016) and inductively coded any other occurrence of relational values or relevant themes. We created co-emergence matrices to assess the extent of overlapping codes and, by proxy, the degree of co-emerging relational values.

For our second objective, articulating how the Mi'kmaq navigate adaptation decision-making along Nova Scotia's Bay of Fundy coast, we conducted community-based research. Our approach emphasized relationship building and reciprocity between research partners, the Confederacy of Mainland Mi'kmaq and Dalhousie University, and between researchers and interview participants (Castleden et al., 2012; Israel et al., 1998); however, this project was proposed by Dalhousie University through NSERC ResNet and did not emerge from community. At the time of this thesis, the primary collaborator from the Confederacy of Mainland Mi'kmaq, Kara Pictou, was conducting a climate change monitoring project with overlapping objectives; the Dalhousie University team was invited to join her interview process to reduce the burden on community members. Kara led purposive sampling of recognized community Mi'kmaw Traditional Knowledge (MTK) holders from the Confederacy of Mainland Mi'kmaq's constituent communities for MTK interviews. MTK interviews differ from standard semi-structured interviewing

by adopting culturally relevant practices (e.g., gifting tobacco) and additional supports (e.g., translation services) (K. Pictou, personal communication, November 18, 2022). Five MTK holders were asked a series of low-risk questions, first by Kara about all of Mi'kma'ki, and then by Emily about the Bay of Fundy, tidal wetlands, dykes and dykelands, and decision-making. Only the responses to Emily's questions were considered for this research project.

Independent of the Confederacy of Mainland Mi'kmaq, the Dalhousie team recruited settler key informants. Two participants were recruited specifically to fill gaps in content that were identified in Sherren et al. (2021) that were not resolved via MTK interviews. The participants were asked a similar range of questions as the MTK holders with additional questions that targeted their area of expertise.

All seven interviews were recorded with consent and transcribed. The participants were given the option to review their transcriptions through member checking. The transcripts were then deductively coded for themes that align with the relational value classifications identified in the scoping literature review and with instrumental service classifications described in ES. We inductively coded any other relevant descriptions of Mi'kmaw experiences in dyke, dykelands, and tidal wetland systems and descriptions of how Mi'kmaq navigate coastal adaptation decision-making. The initial results of thematic coding were prepared into a short video, which was reviewed by participants and the Confederacy of Mainland Mi'kmaq, some of whom provided feedback. The refined themes were then presented at a gathering with recognized Mi'kmaw Water Protectors,

Grassroots Grandmothers[4], and Elders, who demonstrated their support for the research findings. The validated results were prepared into this thesis; they will also be prepared into a plain language summary for the Confederacy of Mainland Mi'kmaq, a peer-reviewed manuscript, and a publicly available summary video.

1.3 Thesis Structure

The core content chapters of this thesis (Chapters 2 and 3) are written to be individually submitted for peer-reviewed publication. They have not yet been submitted; however, the thesis structure reflects our intentions to present each chapter as stand-alone studies. Some elements would have been repetitive among the chapters (e.g., positionality, core content introductions). These were brought into the introductory chapter to present a cohesive thesis. Following this introductory chapter, we discuss the scoping review on relational values in greater detail. We engage with the descriptions and classifications emerging from this review in the subsequent chapter (Chapter 3), where we discuss the Mi'kmaw approaches to Bay of Fundy adaptation decision-making. We synthesize the collective outcomes of these chapters, addressing the third research question around insights from Mi'kmaw relational values, in Chapter 4 Discussion and Conclusion. We also provide an in-depth summary of our research findings. 2e were intentionally extensive in the research summary so that future readers of this thesis (e.g., future master's students) could refer to the concluding chapter as an in-depth overview of the entire work. While this thesis may be of broader interest, we have written it with the

[4] Mi'kmaw Grassroot Grandmothers are a collective of Mi'kmaw women, elders, and allies who advocate for justice for the people, the land, and the waters (K. Pictou, personal communication, February 14, 2023).

intention of reaching specific audiences, including: scholars, practitioners, and decision-makers in the Bay of Fundy context; those beyond the Bay of Fundy in comparable valuation and decision-making contexts; and those engaged in relational values and environmental valuation, especially in Indigenous contexts.

1.4 Researcher Contributions

We use "we" rather than "I" when narrating in the first person throughout this thesis, except when deliberating Emily's positionality, to reflect that this work is result of the thoughtful contributions of many people. To articulate these contributions, we use the Contributor Roles Taxonomy (CRediT) (Allen et al., 2019). At the time of writing, Emily Wells is a graduate student in the School for Resource and Environmental Studies (SRES) in the Master of Environmental Studies program at Dalhousie University in Halifax, Nova Scotia. Emily contributed to this thesis' conceptualization, methodology, software, formal analysis, investigation, resources, data curation, writing (original draft), visualization, project administration, and funding acquisition. Dr. Kate Sherren is a Full Professor in SRES at Dalhousie University. Dr. Sherren contributed to this thesis' conceptualization, methodology, formal analysis, validation, resources, writing (review and editing), supervision, project administration, and funding acquisition. Kara Pictou is the Community-Based Climate Monitoring Coordinator in the Department of Environment and Natural Resources at the Confederacy of Mainland Mi'kmaq. Kara contributed to this thesis' methodology, resources, and validation. Dr. Melanie Zurba is an Associate Professor and the Graduate Coordinator in SRES at Dalhousie University. Dr. Zurba contributed to this thesis' validation, writing (review and editing), and supervision.

1.5 Researcher Positionality

Qualitative researchers use the lenses of their experiences when making meaning; as such "it is necessary for the reader to evaluate the extent to which an author identifies and explicates their involvement and its potential or actual effect upon the findings" (Horsburgh, 2003, p. 309). Such reflexivity is crucial strategy for conducting research that is rigorous and ethical (Berger, 2015; Finlay, 2002; Guillemin & Gillam, 2004; Horsburgh, 2003; Moon et al., 2016). The reflection on positionality that follows is written in the first person by Emily as she is the primary contributor to data curation, analysis, and original drafting.

I, Emily Wells, am a settler of predominantly German, Irish, and English descent. My ancestors began settling in the early 1700s on the eastern coasts of the nation colonially known as Canada. I spent my youth with my mother, father, and two brothers on the lands and waters of ancestral Beothuk territory, east coast Newfoundland. The island of Newfoundland is also the ancestral homelands of the Mi'kmaq, while the Inuit of Nunatsiavut and NunatuKavut and the Innu of Nitassinan are the original people of Labrador. I currently reside as a grateful visitor in the Sipekne'katik district of Mi'kma'ki, the unceded, ancestral, and contemporary territories of the Mi'kmaq. I am cognizant that, as a settler, I directly benefit from the dispossession of Indigenous lands. I align with several co-authors of M'sit No'kmaq et al. (2021) as "peace and friendship allies who also value the land, all peoples and their Treaty agreements and obligations" (p. 840).

I anticipate my settler identity nuances this research in numerous ways. It may impact my ability to build trust with Mi'kmaw interview participants and research partners given the

harmful and extractive history of research imposed by settler researchers on Indigenous people (Guillemin et al., 2016; Panel on Research Ethics, 2022). Building trust makes participants more comfortable in the interview process, contributing to more meaningful research (e.g., 'Yotti' Kingsley et al., 2010). I also approach this research with explicit and implicit biases that reflect my upbringing among predominantly Western worldviews. Most notably, I have been taught that knowledge is external, discoverable through rigorous methods, and articulated primarily through writing, rather than something that is embodied, relational, and shared through narrative, as is more common among Indigenous peoples (Cajete, 2000). I was primarily concerned that, as a result, I may misrepresent the participants' knowledge through my curation, analysis, and writing of this research. Toombs et al. (2019) present a compelling example on this point – the initial results of a qualitative health study did not reflect the values of the focal First Nation, partly because the data duration was conducted by non-Indigenous stakeholders that engaged with a non-Indigenous, deficit-based model of health. The results were rendered more meaningful when re-analyzed with frameworks and ways of knowing that came from the focal Nation.

I engaged in multiple processes that aimed to bolster my awareness of my biases and to help build relationships with Mi'kmaw participants and partners. These are outlined in Table 1. Though these processes deepened my knowledge of the Mi'kmaq, Indigenous research methodologies, and ethical partnership, I speak inherently as a settler. I apologize for the limitations this thesis imposes on Mi'kmaw voices and encourage the reader to visit direct sources of Mi'kmaw voices, such as podcasts like Story-telling/Story-listening (Hum, 2020) and Trails, Tales and Spruce Tea (joudry, 2018),

blogs and poems (joudry, 2020a, 2020b; Thomas, 2020), and videos such as Ancestors Live Here series (Gloade, n.d.), We Story the Land (Steigman & Pictou, 2010), and Re-emergence of Netukulimk in Mi'kma'ki: Awakening the Sleeping Giant (Marshall & Young, 2020). There are many literature sources that are authored or co-authored by L'nu; in this thesis, we include: Marshall et al. (2007); McMillan & Prosper (2016); M'sit No'kmaq et al. (2021); Prosper et al. (2011); and Young (2016).

Table 1. Processes conducted throughout this thesis that aimed to bolster Emily's awareness for her biases and help her build relationships with Mi'kmaw participants and partners.

Process	**Description**	**Outcomes**
Indigenous Research Methodologies course (INDG3050 by Dr. Margret Robinson, Associate Professor, Department of Sociology and Social Anthropology)	Offered through Dalhousie's Indigenous Studies program; "This course examines methods and practices for conducting research with Indigenous Peoples, and explores their ethical and political aspects" (Dalhousie University, n.d., para. 1)	• Understanding the history of research with Indigenous people • Learned about ethical research practice, including partnership, data collection methods, and analysis • Learned about Indigenous research principles such as OCAP® • Learned about Mi'kmaw culture • Improved familiarity with L'nuwey
Canada's Panel on Research Ethics TCPS-2 CORE	This course "provides ethics guidance that applies to all research involving human participants" (Panel on Research Ethics, 2022); Chapter 9 is specifically on Research Involving Indigenous Peoples	• Understanding the history of research with Indigenous people • Learned about ethical research practice, including guidance on community protocols, research agreements, mutual benefit, capacity building, data protection, and other relevant topics
NSERC ResNet *Learning Collective on Indigenous Research and Research with Indigenous Peoples*	Monthly discussions with researchers from across Canada on topics like enacting reconciliation in research and delineating decolonization and indigenization	• Learned about the literature on topics relevant to research and Indigenous people • Practiced how to respectfully discuss a variety of issues around research and Indigenous people

Mi'kmaq Language Lessons	Informal Mi'kmaq lessons led by one of Emily's mentors based on publicly available learning curricula and resources	• Learned about Mi'kmaw culture • Improved familiarity with L'nuwey
Intentional time on the land	Spending time on the land, such as learning names for wildlife in the Mi'kmaw language while hiking	• Developed embodied attachments and sense of meaning for the locations relevant to this research and Mi'kmaw culture
Talks from Mi'kmaw speakers	Attended talks from Mi'kmaw speakers, such as Cathy Martin, Director of Indigenous Community Engagement, Dalhousie University, on topics like reconciliation and Two Eyed Seeing	• Learned about Mi'kmaw culture • Improved familiarity with L'nuwey
Mi'kmaw stories	Read and listened to Mi'kmaw stories, such as Hum (2020) and Whitehead (2013)	• Learned about Mi'kmaw culture • Improved familiarity with L'nuwey

It is likewise important to explain that I am able-bodied and middle-class. As such, I have easier access to formal education, physical and mental health care services, financial support, and other privileges than those who are marginalized by class and ability. I have a growing awareness that, because of these privileges, I tend to expect that every problem has a solution, and I become uncomfortable when a topic appears unresolved. I may therefore be prone to simplifying and seeking succinct, tidy resolutions when, as with many of the topics emerging within this study, no such resolutions are possible or necessary.

I would next like to elaborate on my identity as a queer person. I approach research much more critically since unlearning the binaries I once understood as rigid and have a

stronger commitment to equity and justice for marginalized communities more generally because I witness and experience the resistance associated with being queer. However, my experience as a queer person is intersected by those as white, able-bodied, and middle-class person. Experiences of queerness are intersectional and unfathomably diverse; I am privileged among them. I have also learned how many queer, racial, economic, and other inequities are highly intersected and associated with colonization and therefore approach this work as an intersectional feminist with a commitment to decolonization.

To conclude my reflection on positionality, I want to highlight my motivations for conducting research related to conservation. My core memories from my upbringing involve fishing, harvesting berries, rabbit hunting, and generally spending time in the woods and on the water gathering food with people. I logically pursued an undergraduate degree in conservation biology, during which time I worked as a researcher in multiple natural science disciplines. My most influential research experience was with Civic Laboratory for Environmental Action Research ("Who We Are," n.d.) where I learned, among countless other lessons, how to foreground equity and justice in research. It was these experiences that encouraged me to approach this thesis research with the intentions of addressing colonial harms in the field I currently know best, conservation.

1.6 Language and Definitions

For this study, we consider Indigenous peoples the original inhabitants of a land who collectively have historical continuity in that place. We echo the following clarification from M'sɨt No'kmaq et al. (2021): "Though particular to the specific people and place,

most Indigenous worldviews share commonalities, such as conceptual, experiential, and linguistic attunement to intersecting life forces and realms in ecology" (p. 845).

We use the words "nature" and "resources" throughout. Western conceptions of these terms imply that human beings are separate from the "natural world", but we recognize that this is not salient in Indigenous views (Cajete, 2000). We use *land* or *the land*, which is common in Mi'kma'ki and other places across Turtle Island to encompass terrestrial environments as well as "air, rivers, lakes, and sea" (M'sɨt No'kmaq et al., 2021). We follow the convention of using Mi'kmaq as a noun to refer to a single person or a collective of people who are Mi'kmaq, while Mi'kmaw is used as an adjective. Using Indigenous language and terms is a small and feasible action to support reconciliation in science and research more broadly (Wong et al., 2020). For this reason, we use Mi'kmaw words when possible.

CHAPTER 2 ENRICHING RELATIONAL VALUES WITH INDIGENOUS LITERATURES FROM CANZUS NATIONS

2.1 Introduction

Human values of nature have principally been classified in conservation according to instrumental and intrinsic conceptualizations. ES is a cornerstone, economically driven framework that originally sought to deduce human values of nature according to these two framings (Díaz et al., 2015; Millennium Ecosystem Assessment, 2005; Pascual et al., 2017): what does nature provide to people (i.e., instrumental value)? What is the worth of nature itself, independent of people (i.e., intrinsic value)? As ES gained prominence, many scholars highlighted that cultural and intangible values, which are critical in shaping and understanding human-nature relationships, are often incommensurable with instrumental and intrinsic framings (Chan et al., 2012; Gould et al., 2015; R. Russell et al., 2013; Satterfield et al., 2013). ES considered "nature's services" discrete (i.e., only classifiable under one of four master categories) and amenable to market valuation, whereas recent scholarship demonstrates that human values of nature are often interwoven (e.g., fishing is both provisioning and cultural) and cannot be translated to economic terms (Chan et al., 2012; Gould et al., 2015; Klain et al., 2014; Satz et al., 2013).

These shortfalls of ES are well demonstrated and highly significant in the context of Indigenous peoples. Many Indigenous peoples have deeply held relational and place-based values, which are not comprehensively represented by the prevailing value framings (Cajete, 2000; Chan et al., 2012; Eyster et al., 2023; Himes & Muraca, 2018; Pascua et al., 2017; Stoeckl et al., 2021). Moreover, many provisioning practices are more significantly cultural and spiritual for Indigenous peoples (Chan et al., 2012; Gould

et al., 2015; Stoeckl et al., 2021). There are numerous calls for re-centering Indigenous ways of knowing and being, especially in processes that involve the resources and management of their respective territories (e.g., United Nations Declaration on the Rights on Indigenous People [UNDRIP]; United Nations, 2007); accurately representing Indigenous values is an essential step to achieving these goals (Normyle et al., 2022) and is therefore important in our aim to understand Mi'kmaw values in the Bay of Fundy.

A more recent iteration of ES, called Nature's Contributions to People (NCP), includes a "third class of values" entitled relational values, meaning values that stem from relationships with or responsibilities towards nature (Chan et al., 2016; Díaz et al., 2015; Pascual et al., 2017). Relationality is integral to many Indigenous peoples (Muller et al., 2019; Wilson, 2008), and Indigenous relational values have existed since time immemorial (Cajete, 2000; Eyster et al., 2023; Gould et al., 2019; Sheremata, 2018). Chan et al. (2016) adopted the concept from peripheral socio-cultural disciplines into conservation scholarship to better capture how individuals and collectives truly value, think of, and make choices around nature, which includes "preferences, principles, and virtues". Rather than benefits provided by nature to people (instrumental) or value entirely independent of people (intrinsic), relational values derive from the practiced relationship between people and nature (Chan et al., 2016, 2018; Díaz et al., 2015; Pascual et al., 2017). For example, people engage in stewardship not only to reap the instrumental benefits of a healthy environment but to also have a sense of purpose and to express care for other people (Jax et al., 2018). Personal and collective identity are not delivered unidirectionally from nature to people but are instead relationally developed between them (Chan et al., 2016).

As a relatively new contribution to environmental valuation discourses (Chan et al., 2018), there are limited studies that engage with relational values in Indigenous contexts (e.g., Bataille et al., 2021; Gould et al., 2019; Russell & Ens, 2020; Sheremata, 2018). Concepts of relational values, like stewardship, identity, and others, have a long, ongoing, and more diffuse presence in literatures on human values of nature. This study aims to review and characterize Indigenous relational value concepts within literature that describes Indigenous people's values of nature within Canada, Australia, New Zealand, and the United States (CANZUS nations[5]). In so doing, we aim to enrich descriptions and classifications of Indigenous relational values in these contexts and identify contributions to ongoing discourses. This scoping review is guided by the following research questions:

1. What relational values are present in literature that describes Indigenous values of nature? What is the prevalence of relational values established by Chan et al. (2016), and do other values emerge that are not yet part of relational values conversations?
2. What is the nature of relational values in these contexts? What are the facets that characterize Indigenous experiences of relational values?
3. How do 1 and 2 contribute to relational value discourses?

[5] We limited the scope of this study to places that have generally comparable settler-colonial dynamics as our own in the Siknikt, Sipekne'katik, and Kespukwik districts of Mi'kma'ki (Eastern Canada). These are generally rich nations that were British colonies and that still maintain close economic and cultural ties with the United Kingdom (e.g., Gover, 2015).

2.2 Background

2.2.1 Relational Values: Clarifying the concept and its contributions

The concept of relational values is a significant and evolving contribution to environmental valuation discourses. Though all values are relational in origin (Maier & Feest, 2016), and thus socially constructed, relational values are relational in content, meaning value is derived from the relationship process rather than the relationship output (e.g., fishing with a friend makes you feel bonded [relational value, social cohesion] and provides food [instrumental, provisioning service]) (Chan et al., 2018). Relational values are distinct from the dominant value conceptualizations because they are anthropocentric and non-instrumental: they describe human values beyond utility (Chan et al., 2018; Himes & Muraca, 2018; Klain et al., 2017). Chan and colleagues introduced the concept to environmental valuation discourses in 2016, explaining that people rarely make choices based on ideas of inherent worth or personal gain; rather, they consider preferences, principles, and virtues, such as individual and collective quality of life or a responsibility towards nature. These are examples of relational values, which Chan et al. (2016) describe on collective and individual scales, encompassing the human collective or an individual, respectively.

Approaching values relationally expands environmental valuation in multiple ways. It broadens valuation to capture more diverse values and worldviews (Chan et al., 2018; Gould et al., 2019; Himes & Muraca, 2018; Klain et al., 2017; Pascual et al., 2017; Tadaki et al., 2017). Dominant value framings have been criticized for failing to articulate plural and non-Western values; relational values address both issues. Stålhammar & Thorén (2019) state, "…[relational values] provide a conceptual basis

flexible enough to encompass the plurality of values and worldviews necessary for the ES framework to do its job" (p. 1201). Relational values have been equally praised as a bridging concept and boundary object to facilitate collaboration across disciplines and worldviews (see Enqvist et al. [2018] for information on boundary objects and relational values; Chan et al., 2018; Chan et al., 2016; Chapman et al., 2019). Given their qualitative nature, relational values may be "powerful leverage" to bypass contested quantification and monetization of nature as well as meaningfully motivate sustainable choices (Chan et al., 2016; Eyster et al., 2022; Himes & Muraca, 2018; Klain et al., 2017; Riechers et al., 2021).

2.2.2 Indigenous Relational Value in Environmental Valuation Discourses

Several studies have engaged with the definitions of relational values from Chan et al. (2016) in contexts with Indigenous people (Bataille et al., 2021; Gould et al., 2019; S. Russell & Ens, 2020; Sheremata, 2018). These studies supported the contributions of relational values to environmental valuation discourses for articulating plural values and bridging disciplines. They also presented meaningful insights on capturing and representing principles that are integral to Indigenous peoples. Most notably, the concept of relational values allowed researchers to articulate the deeply connected, social relationships among people, place, and (non-human) beings that are based on reciprocal respect and responsibility (Comberti et al., 2015; Gould et al., 2019; Jax et al., 2018; Pascua et al., 2017; Salmón, 2000). This deep connectedness reflects placed-based ways of knowing and being that embody culture, spirituality, traditional and other forms of knowledge, and many other interwoven aspects of life. Relational values make space for ways of knowing and being that are fundamental to many Indigenous peoples, but that are

otherwise overlooked when only considering value in terms of utility for humans or worth independent of humans (Bataille et al., 2021; Gould et al., 2019; S. Russell & Ens, 2020; Sheremata, 2018).

The studies also emphasized a connectedness among values that are considered separate under instrumental and intrinsic framings (Bataille et al., 2021; Gould et al., 2019; S. Russell & Ens, 2020; Sheremata, 2018). When describing Indigenous values, these studies underscored that provisioning practices were also inherently relational and cultural practices. This observation aligns with other studies on ES that criticize disentangling values and instead emphasize their bundled nature (Chan et al., 2012; Gould et al., 2015; Klain et al., 2014). Notably, relational and intangible aspects of values may be considered equally or more significant than substantive, tangible values (e.g., the relational value of fishing is more significant than the provisioning service) (Chan et al., 2012; Gould et al., 2019; Normyle et al., 2022). This may be exemplified by the Mi'kmaw language, a verb-centered language, which inherently embodies animacy and "relationships between the life forces" (Young, 2016, p. 81).

2.2.3 Characterizing Indigenous Relational Values

Many scholars have contributed to and clarified relational values since Chan et al. (2016). Some have illuminated general qualities of relational values, such as how language mediates values (Inglis & Pascual, 2021) and how they may emerge from relationships that impede flourishing, rather than contribute to it, which are considered disvalues (Lliso et al., 2022). Others have expanded from Chan et al. (2016) in their value classification: Klain et al. (2017) present an expanded set of relational values, which was adopted in several other studies (Chapman et al., 2019, 2020; Eyster et al., 2022; Kreitzman et al.,

2022; Olmsted et al., 2020); Gould et al. (2019) describe values in Indigenous Hawaiian languages that resonate with relational values; Russell & Ens (2020) present a framework that classifies relational values into value domains, which echoes approaches to ES valuation (e.g., Martín-López et al., 2014); and Ono et al. (2021) present acculturation as a potentially novel value. Despite the attention they receive, relational values have not yet deeply engaged with Indigenous values as a way of enriching their descriptions and classifications or better representing Indigenous ways of knowing and being.

Bowker & Star (2000) underscore the "potency" (p. 3) of classification – whether intentional or tacit, these systems of segmentation have tremendous impact on who/what is included and who/what is not. To include Indigenous ways of knowing and being in environmental valuation discourses, we first need comprehensive classifications that represent them (Normyle et al., 2022). Relational values, as an additional conceptualization of values, has been an important step towards this comprehensiveness within environmental valuation discourses. It is now important to enrich the variety and descriptions of relational values with lessons from Indigenous relational values, which have been evolving since time immemorial.

We align with Bowker and Star's (2000) definitions and principles of classification. Classification systems, as segmentations of the world, aim to: (i) have mutually exclusive categories, (ii) be representative, and (iii) have a consistent classificatory principle (Bowker & Star, 2000). It is important to remember, however "No real-world working classification system… meets these 'simple' requirements and we doubt that any ever could," (Bowker & Star, 2000, p. 11). Classification systems are contextually useful and important for doing "some kind of work" (Bowker & Star, 2000, p. 10) – in the case of

environmental valuation, this work may be characterizing how humans value place and their surroundings. However, these systems are ultimately simplifications of a nuanced, interconnected world and are inevitably incomplete.

As such, we want to underscore that the classifications described here are not rigid; rather, they aim to expand and enrich descriptions of relational values and contribute to better describing Indigenous values in such terms. Importantly, our goal is not to present a complete classification system for Indigenous values of nature; there is no complete classification system for values, and there is no singular set of "Indigenous values of nature". Indigenous peoples, including those who reside within CANZUS nations, are diverse communities and individuals with situated understandings and experiences of value. Relatedly, we want to clarify that we are not "discovering" novel relational values but attempting to document endogenous themes that contribute to our current understandings of relational values in environmental valuation.

2.3 Methods

This study is a scoping review of peer-reviewed research studies published between January 2002 and November 2021. The literature search was completed between October 20th and November 15th, 2021, using Scopus. Scopus supports the sophisticated query and filtering tools required to conduct research synthesis and has been recognized as a suitable tool for doing so (Gusenbauer & Haddaway, 2020). No database tools capture all literature on a subject, but Scopus is more complete in the disciplines relevant to this study (Gusenbauer & Haddaway, 2020). It is nonetheless limited by the decisions of the Scopus Content Selection and Advisory Board, with a potential conflict of interest as a subsidiary of a major journal publisher (Elsevier).

Throughout this thesis, we say "corpus" to reference all articles included in the scoping review, we say "article" when referring to articles included in the review, and we say "studies" to indicate those not in the review or to speak generally about research studies.

2.3.1 Developing the Query

To be considered for inclusion, the studies had to describe relational values of nature among Indigenous people, whether directly (i.e., through an intentional value or service assessment) or indirectly (i.e., values emerged through studies with other intentions). We identified terms describing relational values, nature, and Indigeneity to include as search words in titles, abstracts, and keywords. Relational value terms were derived from Chan et al. (2016) as the foundational publication on relational values in environmental valuation and which acknowledges the existing prominence of relational values among Indigenous people (e.g., they cite salmon fishing on the west coast of North America as a rich example of relational values). We identified key words directly and a range of related synonyms, which included: "stewardship", "identity", fellowship", "kinship", "cohesion", "eudemonic" and "eudaimonic", "responsibility", "altruism", "connection", "relationship", and "belonging" (Box 1). "Environment", "nature", and "ecosystem" were used as terms to narrow the search to nature-based values. We used "Indigenous", "Aboriginal", and "First Nation" to limit the studies to Indigenous people. There is a large diversity of terms for Indigenous people, and these terms and their spellings may be dynamic and evolve in the process of decolonizing and realignment with Indigenous self-determination. Studies that only include specific terms (e.g., Inuit, Māori) and do not include broader, generic terms (i.e., Indigenous, Aboriginal, or First Nation) may have been omitted from this study (see Section 2.5.4 Limitations of Study and Future

Directions). We limited the publication years between 2002-2021. The initial query with these conditions yielded more than 10,000 results (Box 1).

Box 1. The search queries used in Scopus between October 20th and November 15th, 2021, including a) original query, b) a more refined query, and c) the final bi-gram-driven query.

a. Original Query (N=13,698)

TITLE-ABS-KEY ((indigenous OR aboriginal OR "first nation") AND (environment OR natur* OR ecosystem) AND (stewardship OR identity OR fellowship OR kinship OR cohesion OR eudemon* OR eudaimon* OR responsibil* OR altruis* OR connect* OR belonging OR relat*)) AND PUBYEAR > 2001 AND PUBYEAR < 2022 AND PUBYEAR > 2001 AND PUBYEAR < 2022

b. Query with added limitations on subject area, location, and publication type (N=1,582)

TITLE-ABS-KEY ((indigenous OR aboriginal OR "first nation") AND (environment OR natur* OR ecosystem) AND (stewardship OR identity OR fellowship OR kinship OR cohesion OR eudemon* OR eudaimon* OR responsibil* OR altruis* OR connect* OR belonging OR relat*) AND (canada OR USA OR "united states" OR "new zealand" OR australia)) AND DOCTYPE(ar) AND PUBYEAR > 2001 AND PUBYEAR < 2022 AND PUBYEAR > 2001 AND PUBYEAR < 2022 AND (EXCLUDE (SUBJAREA,"NURS") OR EXCLUDE (SUBJAREA,"HEAL") OR EXCLUDE (SUBJAREA,"VETE") OR EXCLUDE (SUBJAREA,"DENT") OR EXCLUDE (SUBJAREA,"MEDI") OR EXCLUDE (SUBJAREA,"BIOC") OR EXCLUDE (SUBJAREA,"IMMU") OR EXCLUDE (SUBJAREA,"PHAR") OR EXCLUDE (SUBJAREA,"NEUR") OR EXCLUDE (SUBJAREA,"PHYS") OR EXCLUDE (SUBJAREA,"MATE") OR EXCLUDE (SUBJAREA,"CHEM") OR EXCLUDE (SUBJAREA,"CENG") OR EXCLUDE (SUBJAREA,"ENGI") OR EXCLUDE (SUBJAREA,"ENER") OR EXCLUDE (SUBJAREA,"COMP") OR EXCLUDE (SUBJAREA,"EART") OR EXCLUDE (SUBJAREA,"MATH") OR EXCLUDE (SUBJAREA,"BUSI"))

c. Bigram Query (N=243)

TITLE-ABS-KEY ((indigenous OR aboriginal OR "first nation") AND (environment OR natur* OR ecosystem) AND (canada OR USA OR "united states" OR "new zealand" OR australia) AND (("cultural belonging" OR "indigenous belonging") OR ("cultural connect*" OR "environment* connect*" OR "spiritual connect*") OR ("aboriginal identit*" OR "collective identit*" OR "community identit*" OR "cultural identit*" OR "ecological identit*" OR "environment* identit*" OR "human identit*" OR "identit* indigenous" OR "identit* construction" OR "identit* formation" OR "indian identit*" OR "indigenous identit*" OR "place identit*" OR "soci* identit*" OR "territorial identit*" OR "traditional identit*" OR "tribal identit*") OR ("cultural relation*" OR "ecological relation*" OR "environment* relation*" OR "human relation*" OR "indigenous relation*" OR "inter related" OR "nature relation*" OR "reciprocal relation*" OR "relational value" OR "relational approach*" OR "respectful relation*" OR "social relation*" OR "strong relationality") OR ("cultural responsib*" OR "environment* responsib*" OR "ethical responsib*" OR "moral responsib*" OR "responsib* reciprocity" OR "social* responsib*") OR ("biocultural stewardship" OR "community stewardship" OR "ecosystem stewardship" OR "environment* stewardship" OR "human stewardship" OR "indigenous stewardship" OR "resource stewardship" OR "sustainable stewardship"))) AND DOCTYPE(ar) AND PUBYEAR > 2001 AND PUBYEAR < 2022 AND PUBYEAR > 2001 AND PUBYEAR < 2022 AND (EXCLUDE (SUBJAREA,"NURS") OR EXCLUDE (SUBJAREA,"HEAL") OR EXCLUDE (SUBJAREA,"VETE") OR EXCLUDE (SUBJAREA,"DENT") OR EXCLUDE (SUBJAREA,"MEDI") OR EXCLUDE (SUBJAREA,"BIOC") OR EXCLUDE (SUBJAREA,"IMMU") OR EXCLUDE (SUBJAREA,"PHAR") OR EXCLUDE (SUBJAREA,"NEUR") OR EXCLUDE (SUBJAREA,"PHYS") OR EXCLUDE (SUBJAREA,"MATE") OR EXCLUDE (SUBJAREA,"CHEM") OR EXCLUDE (SUBJAREA,"CENG") OR EXCLUDE (SUBJAREA,"ENGI") OR EXCLUDE (SUBJAREA,"ENER") OR EXCLUDE (SUBJAREA,"COMP") OR EXCLUDE (SUBJAREA,"EART") OR EXCLUDE (SUBJAREA,"MATH") OR EXCLUDE (SUBJAREA,"BUSI"))

To achieve a more feasible breadth, we further limited the search results by subject area, location, and type of publication (Box 1b). We excluded health sciences (medicine, health professions, nursing, dentistry, and veterinary); certain life sciences (biochemistry, immunology, neuroscience, and pharmacology, toxicology, and pharmaceutics); all physical sciences except environmental science; and, among social sciences, we only excluded business, management, and accounting. We found terms related to these field in the search results that were not relevant to our scope. Relational values in studies pertaining to these disciplines may not have been captured. We limited the publications to CANZUS nations, which have comparable settler-colonial contexts to our own in eastern

Canada. We only considered peer-reviewed studies that are empirical (including literature review).

We further narrowed the scope using an automated R script that identifies bigrams, which are two-word sequences, among titles and abstracts (Gerl, 2021; R Core Team, 2022). We replaced the original, single relational value terms with corresponding bigrams (Figure 1). Bigrams still feature the original word, but they increase its specificity with the addition of another word before or after it (e.g., "connection" could yield "environmental connection" and "internet connection"). The bigram code omits certain common words that are not relevant to textual analysis (e.g., "to" and "the" are omitted, so "connection to the land" becomes "connection land"). We reviewed the bigrams and determined which increased the specificity of an original term in a way relevant to our inclusion criteria (e.g., we would include "environmental connection" and omit "internet connection"). We assumed that any bigrams that occurred fewer than three times among all the studies were not relevant; they were not screened, to make the task more manageable.

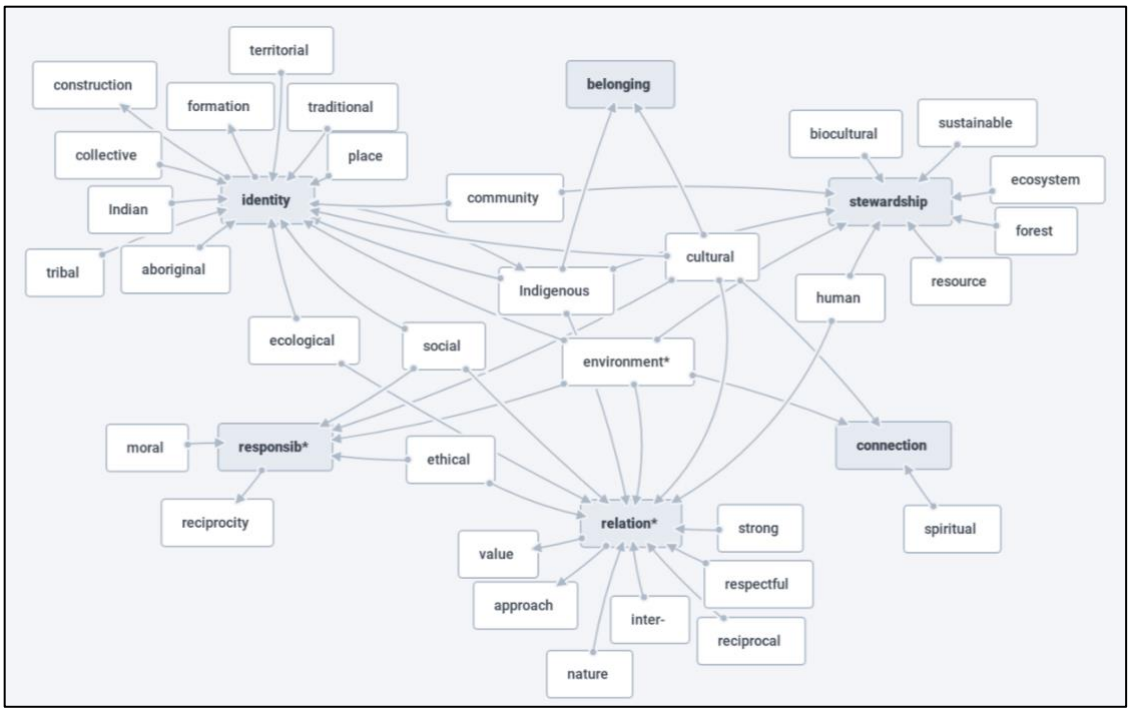


Figure 1. Plot of relational value bigrams used in the final query. The original relational value terms are bolded and in darker grey/blue boxes. These single terms were replaced with corresponding bigrams in the literature search query. The first term in a bigram is at the origin of the arrow and the second term is at the end of the arrow

The following terms and their roots did not yield any relevant bigrams and were omitted from the search query: “fellowship”, “kinship”, “cohesion”, “eudaimonic”, “eudemonic”, and “altruism”. These terms are important in discussions of relational values, but they did not present relevant bigrams among the titles and abstracts of studies corresponding to the antecedent terms of relational values. The terms “stewardship”, “identity”, “responsibility”, “connection”, “relationship”, and “belonging” were replaced by corresponding bigrams in the search query (Figure 1). The bigram query yielded 243 studies for manual screening (Box 1c).

The inclusion and exclusion criteria for the scoping review with corresponding filtering methods are summarized in Table 2. We consider the search conditions to have provided a reasonable proxy of our domain of interest, balancing the risks of exclusion and subjectivity while producing a feasible study scope. We consider the bigram approach useful for a scoping review, though it may incidentally omit studies that meet the inclusion criteria if they happen to not include key words in direct sequence.

Table 2. Inclusion and exclusion criteria of the review. Filtering that occurred in the search query is enclosed in grey rectangles.

Inclusion	Exclusion	Filter
Articles containing terms corresponding to relational values in the article title, abstract or keywords	Articles that do not contain terms corresponding to relational values in the article title, abstract or keywords	**TITLE-ABS-KEY** Relational value bigrams + Environment terms + Indigenous terms
Articles containing terms corresponding to nature in the article title, abstract or keywords	Articles that do not contain terms corresponding to nature in the article title, abstract or keywords	
Articles containing terms corresponding to being Indigenous in the article title, abstract or keywords	Articles that do not contain terms corresponding to being Indigenous in the article title, abstract or keywords	
Only research articles published in peer-reviewed journals	Research works published somewhere other than journals, such as books, book chapters, book reviews, technical reports, conference proceedings, technical reports and working papers	+ **LIMIT-TO** Peer reviewed journal articles + Australia, Canada, New Zealand, the United States + Publications between 2002 -2021
Research that was conducted in "commonwealth countries"	Research that was outside of "commonwealth countries"	
Research papers published during 2001-2021	Research papers published earlier than 2001 or later than 2021	
Research with topics that fell into one or multiple disciplines outside of those included in the exclusion criteria, such as social sciences, environmental sciences, and art and humanities	Research that were classified as health sciences; biochemistry; immunology; neuroscience; pharmacology, toxicology, and pharmaceutics; physical sciences (except environmental science); or business, management, and accounting.	+ **EXCLUDE** Certain subject areas around health, natural, and life sciences
Empirical research studies that directly gather research evidence from Indigenous peoples	Conceptual, theoretical, or other forms of research that do not directly gather research evidence from Indigenous peoples	↓ **MANUAL FILTERING**

2.3.2 Manual Filtering and Analysis

Emily screened the studies at a title- and abstract-level to identify instances that aligned with the inclusion criteria described above. Emily's supervisor, Dr. Kate Sherren, validated the screening process throughout. Emily also consulted the Indigenous Services Librarian at Dalhousie University for support on identifying relevant literatures. The dominant reasons for exclusion were that the studies described human values in other contexts (e.g., health care), they studied Indigenous plant or animal species, not people, and the studies did not empirically demonstrate relational values.

There were 102 studies identified for full-text screening, of which 99 were accessible for download. These were manually screened by Emily, who focused especially on the introduction, result, and discussion sections. The primary reasons for excluding studies at this stage were that relational values were discussed as an introductory piece but not as an empirical outcome of the study, and relational values were described for populations that were not Indigenous. This produced a corpus of 27 articles for synthesis (listed in Appendix A).

The articles were thematically coded in NVivo 12 using a blended approach (QSR International Pty Ltd., 2018): we deductively coded occurrences of relational values originally described by Chan et al. (2016) and inductively coded any other occurrence of relational values or relevant themes. We created a co-emergence matrix to assess the extent of overlapping text-based and article-level codes and, by proxy, the degree of co-emerging relational values.

2.4 Results

2.4.1 Data Description

Figure 2 outlines the number of records corresponding to each stage of literature screening. We identified three studies in the literature that appear to meet the in/exclusion criteria yet they were omitted from the corpus because the geographical terms we used in our query did not align with those used in the study's title, abstract, and key words (Gould et al., 2014, 2015, 2019). Despite its omission from the review corpus, these texts are referenced in the introduction and discussion given their highly relevant contributions to relational value discourses involving Indigenous peoples. Three articles also appear to meet the in/exclusion criteria but were likely omitted because of the key terms corresponding to Indigeneity (see 2.5.4 Limitations of Study and Future Directions; Cunsolo Willox et al., 2013; McCreanor et al., 2006; Witten et al., 2009).

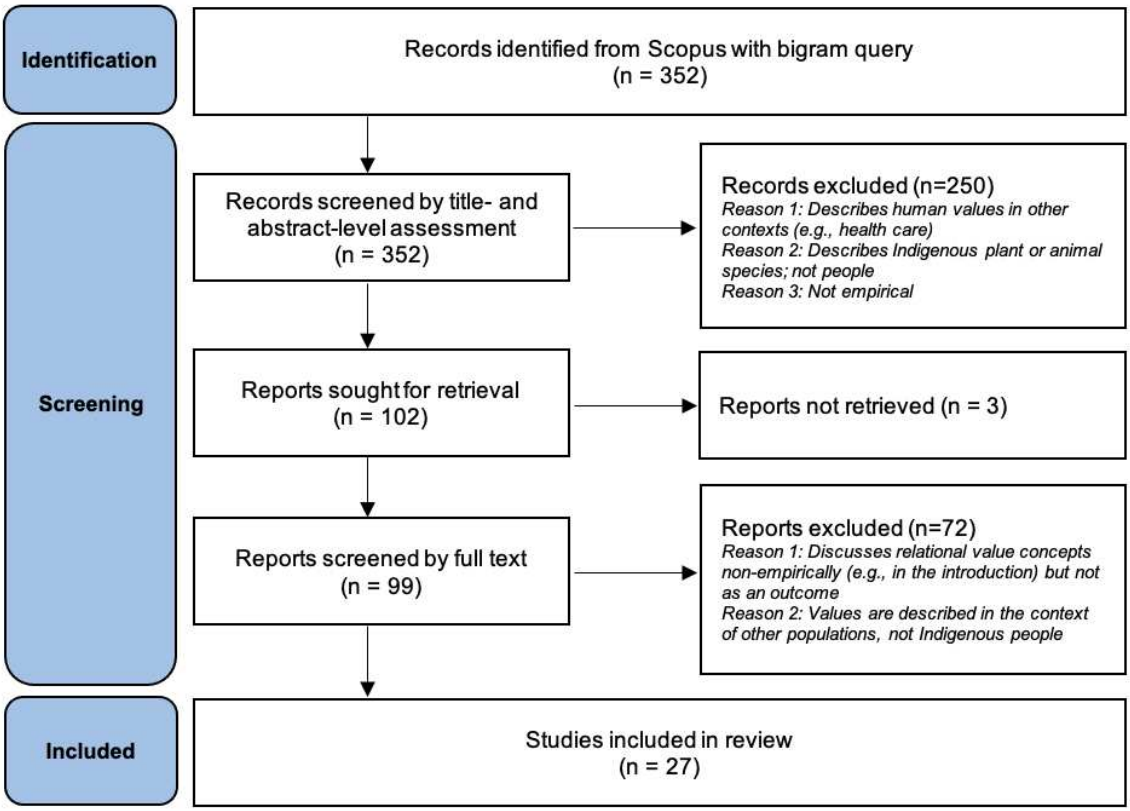


Figure 2. Flow diagram for screening database search results.

Fifteen of the articles feature authors with Indigenous affiliations and/or authors who explicitly state their Indigenous identity. Four articles linked to established relational values literature. One article argued for the inclusion of relational values but did not link to the established relational values literature, likely because of its timing (Lee, 2016). Five of the articles explicitly employed ES in their research, though many other articles mentioned but did not explicitly employ it in their approach. The methods used in the articles include interviews (n=10), ethnography (n=6), literature review (n=4), mixed methods (n=3), participatory methods (n=3), and case study analysis (n=1). The articles had variable substantive foci, the most common of which were water or water systems (e.g., water rights, water planning, billabongs) and fire or burning.

Two articles took place in more than one country: Daigle et al. (2019) did research in Canada and the United States, while Noble et al. (2016) did research in Canada, the United States, and Australia. Including the two articles that span multiple countries, twelve articles took place in Australia, nine articles in Canada, seven in the United States, and three articles in New Zealand. There were more articles (n=21) published in the latter decade (between 2011-2021) than between 2002-2011 (n=6) (Figure 3). The year with the greatest number of publications is 2020 (n=4).

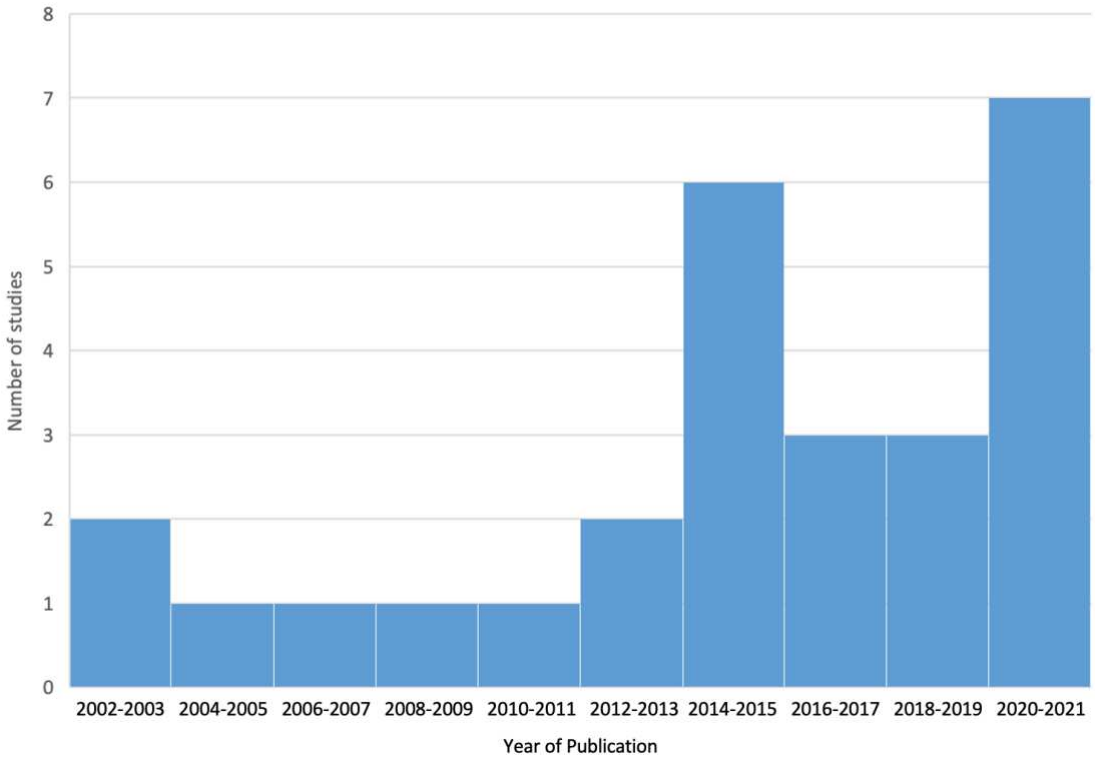


Figure 3. Distribution of publication year for the articles within the review.

2.4.2 Analysis

We use the following language to discuss relational values within the scoping review:

- Relational value *concepts*: Individual values that are relational (i.e., stewardship, identity, etc.; Table 3).
- *Source relationships*: Describing the relationships with which relational values are associated (Table 4).
- Relational value *characteristics*: How the values arise (i.e., temporal and spatial scale, co-emergence of multiple values, etc.; Table 4).
- *Embodiments* of relational values: Actions or things (nouns) that embody, reinforce, and/or mediate relational values (Table 4).

2.4.2(a) Relational Value Concepts

Several relational value concepts previously described by Chan et al. (2016) emerged in this review, including social responsibility, moral responsibility, eudaimonic stewardship, social cohesion, individual and cultural identity, and belonging (Table 3). Virtuous stewardship was the only established relational value that was not present in the corpus (Chan et al., 2016). We identified four relational value concepts that were not among the original concepts, indicated throughout in italics: *cultural responsibility, reciprocal stewardship, cultural cohesion,* and *social structuring* (Table 3). Like social and moral responsibility, *cultural responsibility* is an obligation to protect, steward, or care for nature; however, for *cultural responsibility*, this obligation is a characteristic of a person's culture. Most commonly, *cultural responsibility* presented as a duty originating from the Creator (i.e., a power who created Earth and beings), from laws, or from shared

cultural practices. *Reciprocal stewardship* describes humans caring for nature as a response to nature's care for humans. *Reciprocal stewardship* depicts mutual care among humans and the land as well as other beings on the land, whereas eudaimonic stewardship emphasizes caring for land to achieve personal fulfillment and virtuous stewardship implies caring for moral reasons (i.e., "it's the right thing to do"). *Cultural cohesion* represents place as a mediator between people and culture. Just as people connect with each other while on the land (social cohesion), people connect with and enliven culture through place, as captured by *cultural cohesion*. *Social structuring* describes how elements of place moderate social structures among human beings. Social hierarchies or the roles people play in their communities is informed by their relations to billabongs, rivers, and other natural features, such as the proximity of their home or their inherited intergenerational knowledge of a feature. Overall, individual identity and social responsibility, both existing relational value concepts, were the least commonly discussed in the corpus, each mentioned in five articles (Figure 4a). Virtuous stewardship was not present in any of the articles. *Cultural cohesion* was, by an extensive margin, the most described value, found in 26 of the articles. Social cohesion was second most described value, found in 18 articles, followed by cultural identity, found in 16 articles.

The emergent concepts suggest an additional scale for relational values, which we have called universal. Beyond individual (i.e., a single person) or collective (i.e., multiple people) scales, the universal scale considers non-human beings (e.g., wildlife, plants, spiritual forms). Chan et al. (2016) may have intended non-human beings to be considered as part of the collective scale; for example, moral responsibility to non-human beings is an original relational value concept from Chan et al. (2016) that they described

as collective scale. However, we are choosing to add the universal scale because kinship among people and non-human beings was highly important and distinct within the literature corpus. To demonstrate, an obligation to care is considered “social responsibility” when pertaining to other people (collective scale), but a similar obligation is considered “moral responsibility to non-human beings” when pertaining to non-human beings (universal scale).

Table 3. Relational values present in the literature corpus. Emergent values are in italics and highlighted in colors corresponding to the scale on which they arise, green for universal and yellow for collective. This color scheme continues in Figure 5. The remaining values are based on Chan et al. (2016).

Relational value concept		Scale	Description	Example statement
Responsibility	Social Responsibility	Collective	An obligation to people of the present, future, and past to protect, steward, or care for place	"The area was cared for from generation to generation, and accountability was both to the ancestors and future generations" (Stevens, 2019, p. 2572).
	Moral responsibility to non-humans	Universal	An obligation to non-human beings to protect, steward, or care for place	"A principle of moral responsibility emerges from this social relationship between humans and animals, whereby humans are beholden to animals…" (Roué & Nakashima, 2002, p. 345).
	Cultural responsibility	Universal	An obligation stemming from culture to protect, steward, or care for place	"The source of our guiding principles comes from the Creator who entrusted the land, water and natural resources to us. We are required to take care and protect the land, water, fish and wildlife and harvesting game in order that they are sustainable for future generations" (Beckford et al., 2010, p. 243).
Stewardship	Eudaimonic stewardship	Individual	Caring for the land leads to personal fulfillment, a good life	"Throughout, many of the interviewees talked of their love, pride and fierce determination to protect and restore their local place" (McCarthy et al., 2014, p. 374).
	Reciprocal stewardship	Universal	Caring for the land because the land cares for human beings	"One non-ranger (female, 45 years) explained that the 'country is paying us back when we keep it healthy and strong' while another female

				non-ranger (40 years) stated that 'when we look after country, the country will give us fish'" (Zander et al., 2013, p. 149).
Cohesion	Social cohesion	Collective	Place as a vehicle to connect with people (present, future, and past)	"Ongoing muskrat harvesting in the Delta provides a powerful focal point for sustaining cultural traditions and fostering healthy communities" (Turner et al., 2018, p. 609).
	Cultural cohesion	Collective	Place as a vehicle to connect with and enliven culture	"Burning and associated stewardship practices maintain culturally important traditions including intergenerational learning and place-making" (Long et al., 2021, p. 5).
Identity	Cultural identity	Collective	Relationship with place is a defining aspect of a people, as important and integral to a collective of people	"Facilitating Aboriginal landscape burning can also be conceptualised as inherent to Aboriginal people's identity" (Robinson et al., 2016, p. 27).
	Individual identity	Individual	Relationship with place is a defining aspect of a person, as important and integral to an individual person	"…the country from which they come 'grows them up' and constitutes their identity" (Strang, 2005, p. 99).
Belonging		Individual	A connection to place; a sense of home or fit in a place	"'I went through life, at a young age not knowing where I fitted into society; land management let me know'" (Kingsley et al., 2009, p. 295).
Social structuring		Collective	Elements of place moderate social relationships and structures among human beings	"Environmental kinship, ceremony and social dynamics are constructed through billabongs and relate to Indigenous Law" (Russell et al., 2020, p. 8).

2.4.2(b) Sources of Relational Values

Within the corpus, a foundational aspect of many of the human-nature relationships from which relational values emerge is that they are based in kinship, seeing all beings, including other species, the lands, and waters, as relatives (Table 4). This kinship was sometimes described directly: "… connection to whole wetland ecosystems was seen from an ecological but also from a social perspective, which was expressed by all tangata tiaki [Māori environmental guardians] as whanaungatanga, kinship" (Bataille et al., 2021, p. 947). It was also evident when humans were described as part of the ecosystem or when species were called non-human beings or relatives: "We are connected by our love of the land, for she is a living being, a relative" (Spiegel et al., 2020, p. 8).

Physical, natural, and spiritual beings were described as kindred with humans. This kin-relationship nurtured and underpinned many of relational values that emerged within the review. Roué & Nakashima (2002) directly demonstrate how the relational value, moral responsibility to non-human beings, emerges from the kinship among humans and animals, saying, "a principle of moral responsibility emerges from this social relationship between humans and animals, whereby humans are beholden to animals who provide them with food … and from this homology between living human and non-human beings" (p. 345; Ellipsis in original text). As a more general example, in the pan-Indigenous worldview, Indigenous peoples are responsible for protecting other beings (moral responsibility), and they gather a sense of identity and belonging from that interconnectedness because humans and non-human beings are part of a kin network.

The articles described that kin-relationships from which certain values arise may be maintained through reciprocity. There was a generalized assumption of exchange among

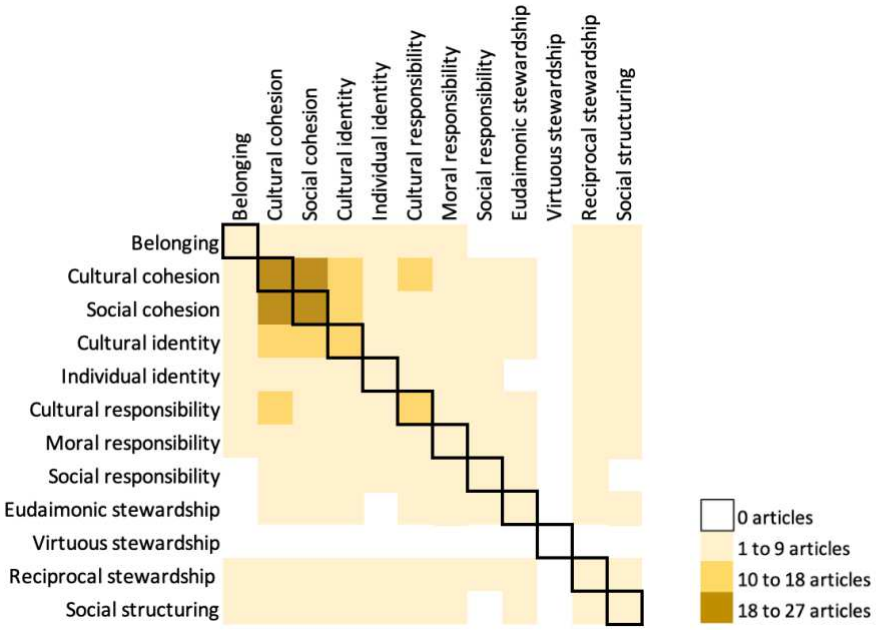
nature and people as well as tangible examples of such exchanges. McCarthy et al. (2014) describe a general reciprocal care among beings, stating, “An overarching reciprocity is recognized between people and the natural world where each nurtures the other” (p. 384). Stevens (2020) demonstrates a specific example of reciprocity among humans and plants, describing how tending white root maintains human culture, and maintaining human culture helps care for white root.

2.4.2(c) Characteristics of Relational Values

The review demonstrated an interconnectedness among human and non-human entities that are often separated or dichotomized in Western conceptualizations of values. Cultural, natural, social, physical, and spiritual realms of life are non-separate in many Indigenous paradigms of nature (Cajete, 2000). Consequently, multiple Indigenous relational values may co-emerge from a single relational exchange. Stoeckl et al. (2013) explain how social cohesion, *cultural cohesion*, and cultural identity all co-emerge from fishing and hunting: “wild resources constitute part of a socially and culturally significant landscape and the act of hunting and fishing performs a critical role in maintaining social relations and the transfer of cultural practices is influential in affirming Indigenous identities” (p. 219). We created co-occurrence matrices to assess the extent of article-level co-occurrences of relational value codes (Figure 4a) and the text-based co-occurrence of codes (Figure 4b). By proxy, this assesses the degree of co-occurring relational values (Figure 4). The article-level matrix elucidated clearer themes than the text-level matrix likely because values may be discussed separately in a study and would, as such, not be evident in a text-level co-occurrence matrix, but would be evident from an article-level perspective (e.g., cultural identity, *cultural responsibility*, and *reciprocal*

stewardship may all be associated with the relationship between humans and fish [Noble et al., 2016] but they may not all be stated in close proximity in text). The matrices demonstrated that *cultural cohesion* and social cohesion have the highest extent of overlap: they are coded together in 18 articles. *Cultural cohesion* and cultural identity, cultural cohesion and *cultural responsibility*, and cultural identity and social cohesion had a moderate degree of co-occurrence (coded together in 10 to 16 articles). All other values had fewer than 10 or no occurrences of overlap.

a.



b.

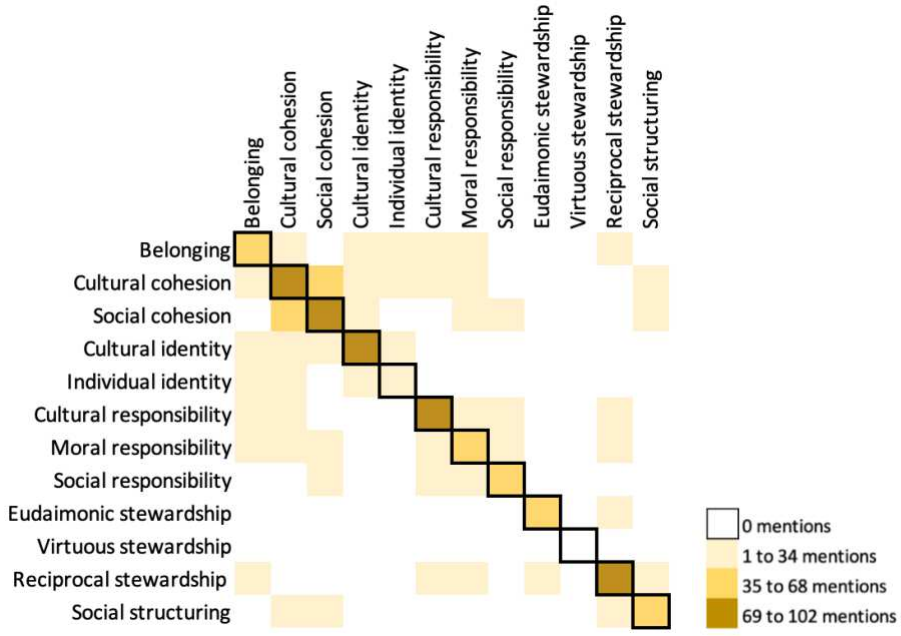


Figure 4. Relational value co-occurrence matrices at (a) paper and (b) code levels.

Relational values were often specific to place. Rather than any land or water, values often stemmed from specific lands or waters, such as the traditional territories of the Indigenous people involved in the research. Robinson et al. (2016) explain how the connections and responsibilities associated with caring for country "…relate to specific animals, specific people and the specific relationships embedded in their specific country" (p. 26).

Relational values arose in contexts where they were desirable or fulfilling, but also where they were depleting or being threatened, known as disvalues. Disvalues may emerge in opposition to values that lead to flourishing (e.g., habitat degradation impacts a person's stewardship value) or they may exist independent of existing values (e.g., "wildlife attacks may lead to long-lasting emotional and psychological trauma, fostering relationships of fear, dread, phobia, or insecurity with respect to the natural environment" [Lliso et al., 2022, p. 4]). This review only observed the former variety of relational disvalue. The articles described loss of territory, depletion of resources, and other forms of negative environmental effects, which caused the depletion of certain values. McCarthy et al. (2014) exhibit this in the context of Māori identity, saying, "The decline in the availability of some traditional marine foods has cultural consequences. These include impacts on Māori identity" (p. 377).

Relational values encompassed time scales that extended deep into the past and future. Beyond living communities, Indigenous people in the review emphasized ancestors and seven generations into the future. Stevens (2020) explained how provisioning maintains a spiritual relationship with ancestors and future generations (social cohesion), stating, "Tending traditional materials helps to maintain … a spiritual relationship of world

renewal and connection to plants, animals, community, the ancestors and future generations" (p. 2472).

2.4.2(d) Embodiments of Relational Values

The articles emphasized that language embodies and exemplifies how people understand nature. Relational values and their various facets were embodied in individual words or general language structure within the review. Roué (2006) describes when Cree youth learn to hunt "the learning is also linguistic in nature" because Cree language is connected to the land: "They must even learn to recognise words that exist only in land" (p. 23).

A subset of studies considered for this review were Indigenous-centered critiques and frameworks of natural resource management (NRM). These studies were excluded from the review because they did not empirically demonstrate relational values; instead, the critiques and frameworks embodied relational values and their associated characteristics. For example, Suchet-Pearson et al. (2013) present a narrative-style account of gathering and sharing turtle eggs (miyapunu mapu) that demonstrates how a Yolŋu relational ontology can be integrated into NRM. They argue for a "beyond-human understanding of the human–Country relationship" (p. 185) that includes elements of moral responsibility for non-human beings, *reciprocal stewardship*, and other relational value themes.

Relational values were likewise articulated within stories, metaphors, place names, and other manifestations of peoples' worldviews and culture. Noble et al. (2016) discuss Murray cod, their role in Australian Aboriginal dreamtime creation stories, and their subsequent role in cultural identity: "Being part of the dreamtime creation story of the

Murray-Darling system, Murray cod play a significant role in Indigenous cultural identity" ("Other finfish", para. 2).

Table 4. Characterizing the different facets of Indigenous relational values based on the themes emerging from this review.

Facet of Relational Values	Description
Source relationships	• The relationship may be based in kinship with all beings • The relationship may be maintained through reciprocity
Characteristics	• Relational values may co-emerge from one relational exchange (bundled) • Relational values are place-based; they tend to be derived from relationships with specific lands or lands, rather than any lands or waters • Relational values may be experienced desirably or undesirably (relational disvalues) • Relational values span deep time and may involve ancestors from the distant past or seven generations into the future
Embodiments	• Relational values are embodied in language; it is a central medium through which relational values are expressed, reinforced, and mediated • Relational values are part of Indigenous-centered critiques and frameworks of NRM • Relational values are expressed in and reinforced by stories, ceremonies, metaphors, place names, and other manifestations of peoples' worldviews and culture

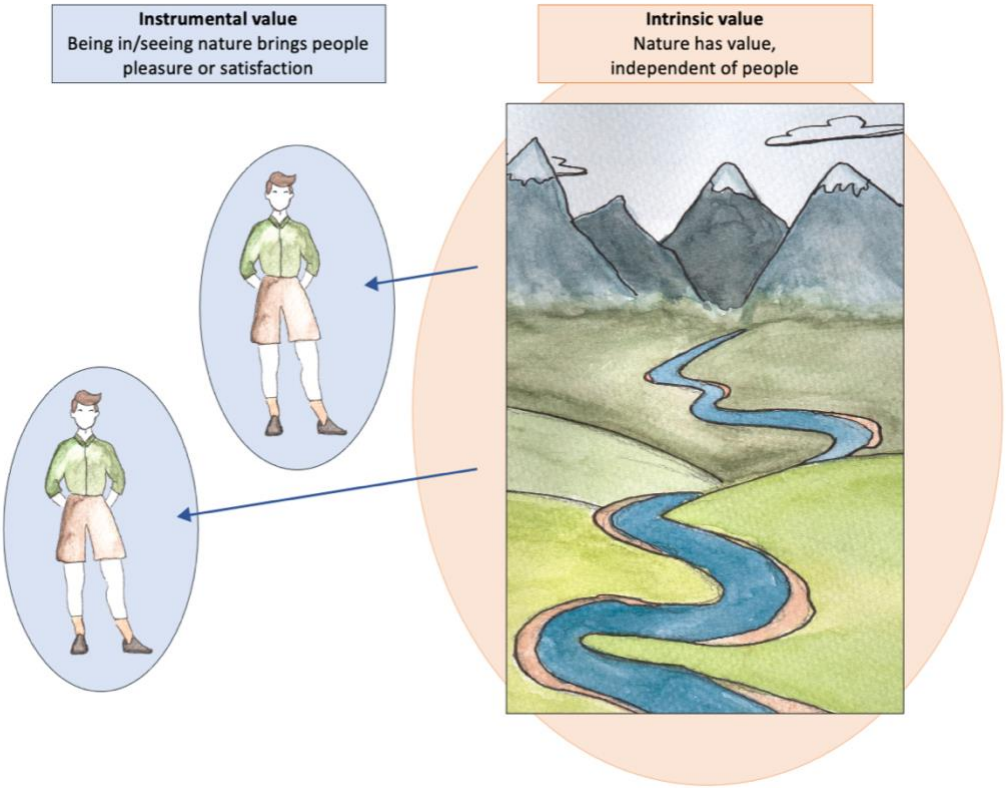
2.5 Discussion

2.5.1 Describing and Classifying Indigenous Relational Values

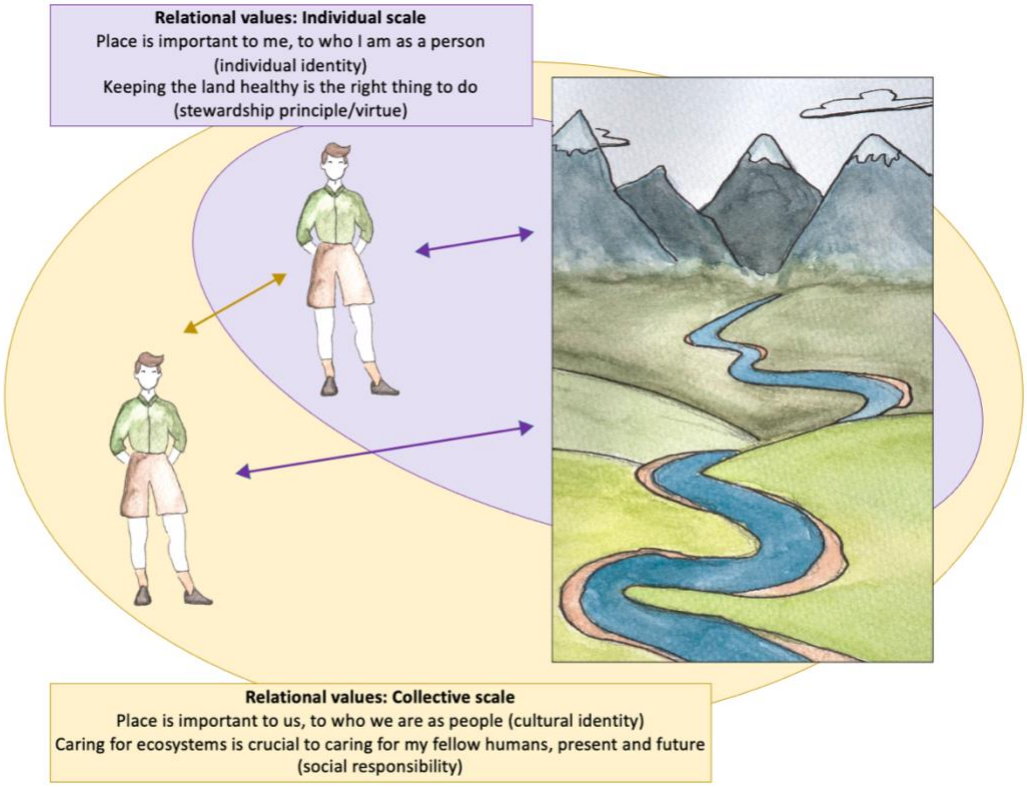
By referencing the antecedent concepts to relational values and their expressions within Indigenous contexts, we have empirically grounded the relational values found in established literature and identified endogenous classifications that meaningfully embody

principles that are integral to many Indigenous peoples. The review also articulates the nuances of Indigenous relational values in CANZUS nations. Figure 5, adapted from Chan et al. (2016), illustrates (a) dominant value classifications, (b) relational values, and (c) how this review expands on relational values. Figure 5a shows unidirectional flow of benefit from nature to people as depicted by instrumental values (blue), while an intrinsic lens (orange) depicts nature as having its own value, independent of people. Figure 5b demonstrates the collective (yellow) and individual scale (purple) values that stem from a relational lens. As identified within the review, Figure 5c depicts a universal scale (green) of values where people are part of the land and in mutual kinship with non-human being.

a.


Instrumental value
Being in/seeing nature brings people pleasure or satisfaction
Intrinsic value
Nature has value, independent of people

b.


Relational values: Individual scale
Place is important to me, to who I am as a person (individual identity)
Keeping the land healthy is the right thing to do (stewardship principle/virtue)
Relational values: Collective scale
Place is important to us, to who we are as people (cultural identity)
Caring for ecosystems is crucial to caring for my fellow humans, present and future (social responsibility)

c.

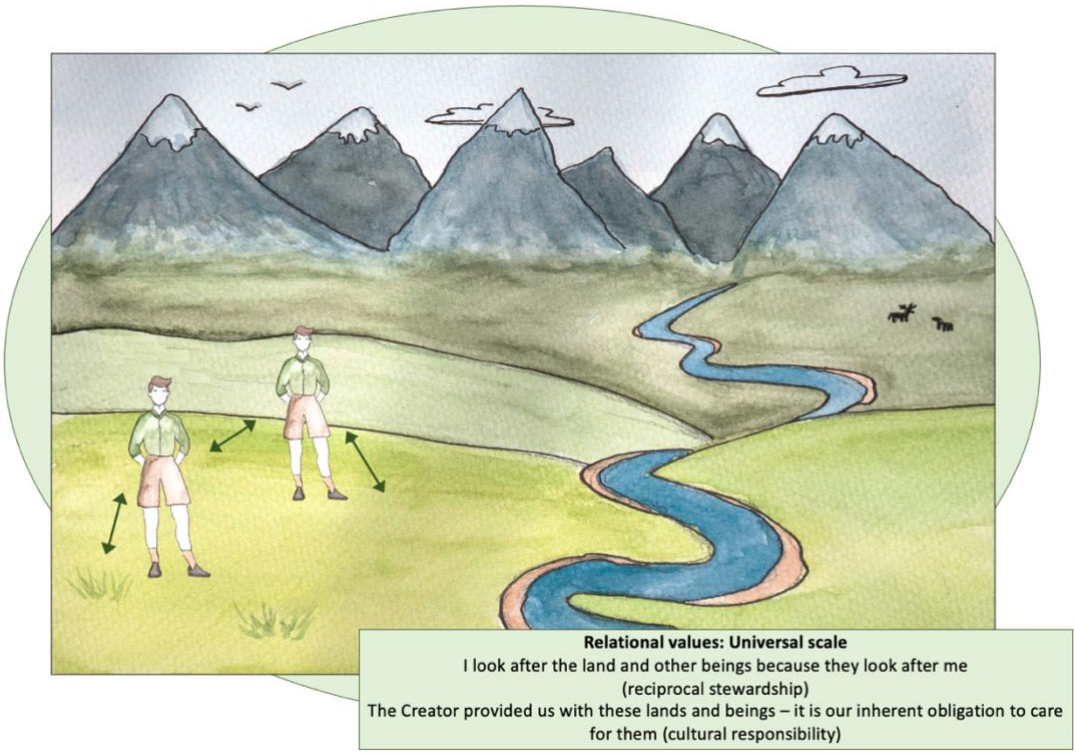


Figure 5. Illustrations (a) and (b) are adapted from Chan et al. (2016). Illustration (a) depicts the dominant values in environmental valuation: instrumental, the value of nature for people (blue), or intrinsic, depicting the inherent value of nature (orange). (b) Relational values arise from relationships between people and the land or between people involving the land. They arise on individual or collective scales. (c) This study posits a universal scale of relational values, which encompasses other beings as animate participants in relationships. This iteration emphasizes human beings are part of nature, and their kin-based relationships with other beings give rise to relational values, such as *reciprocal stewardship* and *cultural responsibility*.

To our knowledge, the relational value concepts that emerged in this study (*cultural responsibility*, *reciprocal stewardship*, *cultural cohesion*, and *social structuring*) are novel to relational value discourses. They are important for understanding the interwoven nature of Indigenous peoples, places, and other beings, which is integral to many Indigenous peoples' ways of knowing and being. *Cultural cohesion* is particularly noteworthy as the most discussed value in the review. It is a clear articulation of how

Indigenous culture is rooted in place; culture is manifested through relations with place and other beings. This is embodied in the concept "cultural keystone species", which are beings who shape the cultural identity of a people (Garibaldi & Turner, 2004). The relational value *social structuring* reiterates the close coupling between Indigenous peoples and place as social hierarchies are rooted and structured through natural features.

The emergent values *cultural responsibility* and *reciprocal stewardship* demonstrate the significance of relationships with non-human beings, which arise on a universal scale. Embedded in many Indigenous peoples' cultures is responsibility to other beings, and there is a cyclic, mutual giving that underlies these relationships. Relational values provide the conceptual space to articulate these immensely significant kin-relationships among humans and non-human beings that are common among many Indigenous peoples (M'sɨt No'kmaq et al., 2021; Salmón, 2000).

The themes in the literature demonstrate that some established relational value concepts are not as salient in Indigenous contexts, however. Individual identity, social responsibility, and virtuous stewardship were the least commonly discussed, two of which are individual scale. *Cultural cohesion*, social cohesion, and cultural identity, all collective scale values, were described extensively. This suggests a prioritization of collective-scale values. Though the relational values discussed here are not comprehensive, they expand our understanding of which values to consider and prioritize in discussions of Indigenous relational values.

The endogenous descriptions and classifications of relational values emphasize the unique and irreplaceable nature of relationships with place. Reducing place-based,

Indigenous relational values to "cultural values", as seen through an ES lens, may frame them as replaceable by other means (Chan et al., 2012; Klain et al., 2017; Lee, 2016). Relational values, especially the endogenous values presented in this review, underscore that values stem from specific places and relationships that are not non-substitutable (Chan et al., 2016; Himes & Muraca, 2018). This is significant for articulating how dispossessing Indigenous peoples of their lands through colonization inherently dispossesses them of their culture.

The endogenous descriptions of relational values also highlight the expansive scale of values, encompassing many generations into the past and future, as well as their bundled nature. These descriptions notably resonate with literature on Indigenous values in other spheres. Indigenous research methodologies, for example, emphasize holism among the physical, mental, emotional, and spiritual, as well as relationality and reciprocity among beings (Hyett et al., 2018; Kovach, 2010; Wilson, 2008). The alignment of relational value themes across disciplines validates their emergence in environmental valuation.

Relational values were described in the articles as embodied in language, stories, ceremonies, place names, and many other manifestations of worldviews and culture. Language is specifically recognized for embodying, reinforcing, and mediating relationships with nature (Inglis & Pascual, 2021; Maffi, 2001; M'sit No'kmaq et al., 2021; Roué, 2006). M'sit No'kmaq et al. (2021) state, "If the language becomes extinct, the knowledge within it also becomes extinct, including knowledge of relating to the land" (p. 849). Many Indigenous languages are in danger of becoming extinct (Moseley, 2010; Truth and Reconiliation Commision [TRC], 2015a); it is critical to honor and

protect these practices that inherently hold Indigenous values and ways of relating to the land.

Embodiments of relational values also provide direction – they emphasize where relational values manifest and, consequently, where to look when attempting to discern them. Because relational values are highly embodied, it is important to prioritize methods that capture embodied means of communicating values (Gould et al., 2019). Relational values are also embodied in Indigenous-led critiques and frameworks of NRM. These demonstrate how to integrate or apply relational values and are, very notably, often authored by Indigenous people. Appendix B lists studies that came from this review process that illustrate how relational values were integrated into critiques and frameworks of NRM.

Ultimately, equitable and effective value assessments and, more broadly, environmental (co)management decisions depend on meaningful representation of peoples' values (Muller et al., 2019; Normyle et al., 2022; Pascua et al., 2017). We begin here to enrich valuation discourses with endogenous language, context, and preliminary characterizations of relational values based on existing, longstanding Indigenous values.

2.5.2 Classifying Indigenous Relational Values

The review supports the growing literature that identifies relational values as more comprehensive when classifying the values of Indigenous peoples than strict intrinsic or instrumental lenses (Bataille et al., 2021; Gould et al., 2019; Klain et al., 2017; Lee, 2016; S. Russell & Ens, 2020; Sheremata, 2018). Stewarding the land, practicing place-based cultural traditions, holding a responsibility to all relations – these, among other

relational values, were deeply important to Indigenous people in the articles of this review, and are not as meaningfully captured through intrinsic or instrumental framings. Russell & Ens (2020) emphasize how beauty is more than an aesthetic, instrumental benefit: "When senior knowledge holders referenced the beauty of billabongs, it wasn't just about aesthetics, it related to custodianship, and the deeply held emotional and cultural connection to place" (p. 5) In Stoeckl et al. (2013), the relational aspects of hunting were declared more important than the provisioning values: "… the social and cultural values associated with traditional hunting were more important to Torres Strait Islanders than were productive (food) values" (p. 219). Discussing values relationally reveals richer significance.

The endogenous descriptions and classifications also expand understandings of Indigenous relational values. To demonstrate, Sheremata (2018) classified "treat everything as alive", depicting mutual kin, as eudaimonic stewardship. Our review observed mutual kin as the root of additional relational values concepts, such as *reciprocal stewardship* and *cultural responsibility*. The literature highlighted diverse relationships and associated diverse values that arise from them.

There were themes within the review that appeared relevant to relational value conceptualizations, yet we were challenged to situate them within our findings as discussed above. Most notably, spirit is manifested in multiple ways throughout the articles and is clearly significant, but it was not clear how it unfolds within relational values. Some descriptions of spirit were evidently relational: articles spoke of spiritual identity, which could be considered an additional scale alongside individual, collective, and universal. Spirit was also described in ways that aligned with value bundling: spirit is

practiced through culture, culture is practiced through provisioning, and these collectively arise from particular relationships. This expression of spirit is demonstrated in Long et al. (2021), where the cultural use of fire is inherently spiritual: “Cultural use of fire is important for sustaining Indigenous spiritual values, including fulfilling obligations in Tribal belief systems and practices” (p. 5).

Spirit is otherwise described as an omnipresence, an additional realm. Articles would directly discuss a spiritual realm as well as indicate this idea through other occurrences: spiritual relationships (with land, Mother Earth, ancestors), spiritual wellbeing, spiritual healing, and spiritual places. A smaller number of articles addressed spirit as a noun, as spiritual beings. Noble et al. (2016) state, “Legends of the Mi’kmaq depict eels as significant in shaping both the earth and human lives, along with interacting with other important spirits” (“Eels and lampreys”, para. 2). Notably, spiritual fulfillment and values are considered a cultural ES (Millennium Ecosystem Assessment, 2005).

It was also challenging to distinguish between scales for certain relational values. This was especially the case for identity; descriptions of identity often implied that individual identity is gathered from a collective. For example, ‘Yotti’ Kingsley et al. (2009) explain how individual people create a sense of identity by connecting to ancestors (part of a collective): “Individuals explained Country as a place to escape, allowing connection back to their ancestors in a stress-free environment. This spiritual and cultural relationship to land increased identity, pride, and self-esteem” (p. 295). The division of scales is further challenged when discussing non-human beings: should they be considered part of the collective scale, in the same scale as humans? Or is the additional universal scale appropriate? Considering non-human beings as equal participants in a

social, collective scale with humans would change the classification of values as they are proposed in this review. Rather than distinct categories describing social responsibility and moral responsibility to non-humans, these would be considered a single social responsibility that expands to include non-human beings. Sheremata (2018) suggest this by saying, “Respecting animals is not only a moral obligation to animals, but a social responsibility because it helps to build attitudes of respect to all other living beings” (p. 77). Similarly, social cohesion may be considered how relationships are nourished between humans as well as between humans and non-human beings. In this review, we distinguish between humans and other beings as a way of emphasizing their significance; however, it may be preferred or appropriate to collapse the human and non-human scales in certain contexts.

2.5.3 Contributions to Relational Value Discourses

Our findings align with previous studies that describe values as bundled (Chan et al., 2012; Klain et al., 2014). Economic-centred valuation considers services as independent; this review demonstrated that multiple relational values co-emerge from relationships (Figure 4). To demonstrate, fishing may be a singular interaction, but it embodies culture, as well as social cohesion, provisioning, and possibly more (e.g., Noble et al., 2016).

Relational values have been dominantly described in contexts where a value is experienced as fulfilling; however, this review acknowledges the existence of relational disvalues, described as “detrimental to the pursuit of a meaningful, dignified, and flourishing life,” (Lliso et al., 2022, p. 4). Disvalues may be significant for understanding the impacts on Indigenous people because of declining access to their traditional and contemporary territories through land dispossession by settler-colonialism and

disproportionate climate change impacts, which has consequences for land-based, relational practices (Tang & Gavin, 2016). Most commonly in this review, social cohesion, *cultural cohesion*, and cultural identity were decreased by declining access to or degradation of the places where Indigenous people's ancestors reside(d). Disvalues create space to express the estrangement associated with colonial land dispossession, climate change, and other land-based shifts. They importantly contribute to a comprehensive understanding of human-nature relationships in all their varying forms (desirable, undesirable, or otherwise) (Lliso et al., 2022).

Mining the conceptual antecedents of a recent academic term proved to be an enriching process that may be useful in other applications. Only four of 27 articles linked to the recent relational values literature, yet all articles meaningfully contributed to articulating Indigenous relational values. Interestingly, Lee called for relational values in an article on protected areas in 2016 that does not cite any relational values literature. This demonstrates how coining a term may cause parallel literatures to emerge; joining these literatures may be enriching and important.

2.5.4 Limitations of the Study and Future Directions

This is a scoping review; it is therefore limited in breadth. There may have been studies that were erroneously excluded through automated or manual screening. The bigram method was effective for narrowing the study scope, but it may have omitted studies that meet the inclusion criteria if they happen to not include key words in direct sequence. We may have been limited by using a single database, Scopus, that is moderated by the decisions of the Scopus Content Selection and Advisory Board and a subsidiary of a major journal publisher (Elsevier). We used only broad terms in our search query when

referring to Indigenous people (i.e., Indigenous, Aboriginal, and First Nation). To assess whether studies were omitted for this reason, we conducted the same query (Box 1c) but included terms like Māori, Inuit, and Métis, and excluded the original terms using "AND NOT()" Boolean language. The search yielded 23 articles, three of which appeared to meet the inclusion and exclusion criteria of this study (Cunsolo Willox et al., 2013; McCreanor et al., 2006; Witten et al., 2009). These studies reiterated the themes presented in this research. There are also likely meaningful contributions to relational values in grey literature that we did not include in this review. We chose an approach that aimed to balance the depth of thematic findings with the breadth of potentially applicable studies.

This review relies on other studies that document values; we have only a limited lens upon their study methods, which may not have captured more embodied means of communicating values. Notably, values may be more often demonstrated or embodied within Indigenous communities, rather than verbally discussed (Gould et al. 2019). It is important to note that data collection, analysis, and the resulting descriptions and classifications were done by non-Indigenous researchers. Decisions might differ if the work was conducted more collaboratively or carried out by Indigenous people/researchers.

There are many opportunities to enhance and clarify themes emerging from this review. Given its broad significance, spirituality will be a crucial piece to further enrich relational values. We echo Gould et al. (2019): "There has been little work on relational values and spirituality, in all of its varied forms, but spirituality is for many communities fundamental to human-ecosystem relationships" (p. 1228). Moreover, it will be important

to validate and expand on the characterizations proposed here by ground-truthing them, that is, examining and engaging with them in-context. This review was conducted to inform a community-based study on values of a coastal working landscape in Nova Scotia's Bay of Fundy (Chapter 3). Engaging with the classifications in other contexts would further validate and refine them.

2.6 Conclusion

This review enriches relational values as a "third class of values" by engaging with endogenous descriptions of Indigenous relational values in other literatures. These literatures emphasized the kin-relationships among humans and non-human beings, which are based in reciprocal care and responsibilities. This kinship embodied multiple endogenous values (*cultural responsibility* and *reciprocal stewardship*) that are potentially novel contributions to environmental valuation discourses. Other emergent values (*cultural cohesion* and *social structuring*) emphasize the place-based, interwoven relationship between Indigenous peoples and place. In addition to articulating specific values, this review demonstrated various facets of how relational values arise and are experienced. Certain values appear closely associated based on article-level analysis, including *cultural cohesion*, social cohesion, cultural identity, and *cultural responsibility*. Values may occur on expansive timescales, encompassing ancestors from the distant past and generations into the future. They emerge in scenarios where a value may be experienced desirably or undesirably (disvalues) by people, and they are frequently embodied, most significantly through language. Language, creation stories, and other embodiments of relational values are important to consider and approach with suitable methods when attempting to discern values.

Collectively, the classifications and descriptions emerging from this review contribute to a more situated and robust understanding of Indigenous relational values. They enhance the goal of relational values in representing a larger diversity of values than the dominant instrumental and intrinsic conceptualizations. These goals may be further supported if the findings were reviewed and validated by Indigenous peoples and researchers. Equitable and effective environmental (co)management decisions depend on rich and accurate representation of Indigenous peoples (Muller et al., 2019; Normyle et al., 2022).

CHAPTER 3 MI'KMAW LESSONS FOR REALIGNING LAND RELATIONS IN BAY OF FUNDY DYKELANDS AND TIDAL WETLANDS

3.1 Introduction

The Bay of Fundy is a highly dynamic portion of the Gulf of Maine situated among the Siknikt, Sipekne'katik, and Kespukwik districts of Mi'kma'ki (between the eastern Canadian provinces of Nova Scotia and New Brunswick, with a small portion along the U.S. state of Maine). The bay is an ecological phenomenon with the highest tidal range in the world, while it also holds immense cultural and economic significance for Indigenous, settler, and tourist communities alike (Sherren et al., 2021).

The Mi'kmaq, the First Nations people whose territory is Mi'kma'ki, have been living in and adapting to its coast since time immemorial. The Bay of Fundy is the setting of many Mi'kmaw legends (Gloade, n.d.), and the coast is and was significant for seasonal fishing and hunting (Hornborg, 2016). Starting in the 1600s, approximately half of Nova Scotia's tidal wetlands were converted to dykes, a form of coastal embankment (Figure 6), by Acadian (French) settlers (Butzer, 2002; Rudin, 2022). The dykes have associated aboiteaux (one-way drains or sluices) to drain tidal wetlands and prevent tidal intrusion, which generated nutrient-rich agricultural dykeland (Rudin, 2022). Dykes were initially linear along the coast and the banks of tidal rivers; however, between 1950s-1970s, there were dykes constructed as tidal gates or dams across tidal rivers. Damming the water flow reduced the need for upstream dyke maintenance, thereby saving money, but it affected fish passage and water flow (Rudin, 2022). Concerns around these impacts are coming to a head in recent years (Baxter, 2020; see Background).

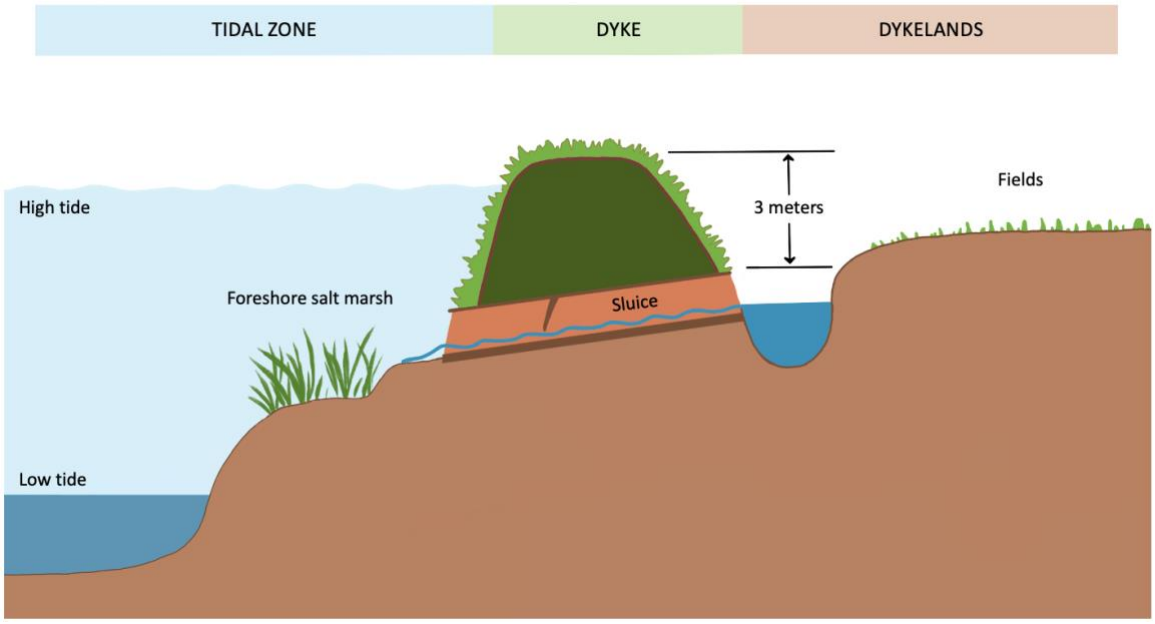


Figure 6. Adapted from *The Acadians and the Creation of the Dykeland 1680–1755* (n.d.). This illustration is a compressed cross section of a typical linear dyke (not tidal gate) along Nova Scotia's Bay of Fundy coast, depicting the tidal range, foreshore salt marsh, sluice, and dykeland fields. The extent of the tidal zone varies along the coast as mudflats may extend for hundreds of metres. Though dykelands were originally fields for agriculture, their uses have diversified to include residential, industrial, and commercial areas with tourism and recreational amenities.

The Acadians and Mi'kmaq had amicable relations, which were slightly aggravated by dyke construction (Rudin, 2022). In the early 1700s, the English colonized mainland Nova Scotia, deported many Acadians, and signed the Peace and Friendship Treaties with the Mi'kmaq and Wolastoqiyik (Maliseet) People (Government of Canada, 2010). These treaties did not involve the ceding of lands but instead recognized Mi'kmaw title and aimed to establish foundations for ongoing relationships between nations. Several scholars, lawyers, Mi'kmaw citizens, and allies contest whether the English have honored Mi'kmaw sovereignty as outlined in the original treaties; they forced the Mi'kmaq onto

13 reserves, many inland (Paul, 2000), and there have been multiple federal trials on Mi'kmaw rights to independent resource use (McMillan & Prosper, 2016; Wicken, 2002).

Dykes persist and the lands they protect have more diverse uses than originally envisioned (Sherren et al., 2021). In many areas, current dyke dimensions are inadequate to protect coastal land uses against climate change impacts, which include more frequent storm surge and increased sea-level rise (Nova Scotia Department of Environment and Climate Change, 2022; van Proosdij et al., 2018). Research teams and multiple decision-makers are evaluating complex adaptation options: restoring dykes to tidal wetlands, realigning (pulling back) dykes, and/or raising dykes in their current footprint. Early discussions surrounding these adaptation approaches have highlighted tensions among the many groups that play a role in the use and management of the coastal zone, including governments, landowners, and other citizens (Rahman et al., 2019; Sherren et al., 2021).

Indigenous accounts of drained agricultural lands describe them as an example and embodiment of colonization: settlers perceived wetlands as barren, took authority over them through drainage, and reaped benefits from agriculture while disenfranchising Indigenous people on their traditional lands (Dillon, 2022; Gasteyer & Flora, 2000). This settler perspective is echoed in accounts of Acadians in the Bay of Fundy: the French "had little to say about the flora and fauna that thrived" because of the tides and nutrient in flows (Rudin, 2022, p. 28).

Accounts of drained agricultural lands emphasize the mutual importance of the pre-drained tidal wetlands for biodiversity and Indigenous subsistence and culture (Haman & Svendsen, 2006; Smith, 2011). This significance is underscored by studies of restored

tidal wetlands that demonstrate that Indigenous people and traditional practices are important for restoring and maintaining wetland health (Harmon et al., 2021; Hemmerling et al., 2022; Waltham et al., 2018). Ecological studies also describe the significance of tidal wetlands and wetland restoration for Indigenous people (Gerwing et al., 2020; Karim et al., 2021).

Sherren et al. (2021, p. 1458) consider "the most significant failure thus far" to be understanding how Mi'kmaq use, relate to, and value the dykeland and wetland systems, as well as how they approach decision-making. This study aims to document how L'nu value, relate to, and use the dykeland and wetland systems, as well as how they approach decision-making along Nova Scotia's Bay of Fundy coast. For this aim, we address the following research questions:

1. What is the significance of tidal wetlands to L'nu? How do L'nu use, relate to, and value tidal wetlands on Nova Scotia's Bay of Fundy coast?
2. What is the significance of dykes and dykelands to L'nu? How do L'nu use, relate to, and value dykes and the dykelands on Nova Scotia's Bay of Fundy coast?
3. How do L'nu approach coastal adaptation decisions in this context? What are factors to include in the decision process and how do L'nu balance between wetland restoration and dyke maintenance?

3.2 Background

Using an ES framework, Sherren et al. (2021) provide a wide-reaching baseline of the Bay of Fundy dykelands and tidal wetlands context (Figure 7). The synthesis emphasizes

the complexity of these adaptation decisions in terms of overlapping environmental, political, cultural, and stakeholder and rightsholder factors, and it identifies areas that require further research and collaboration.

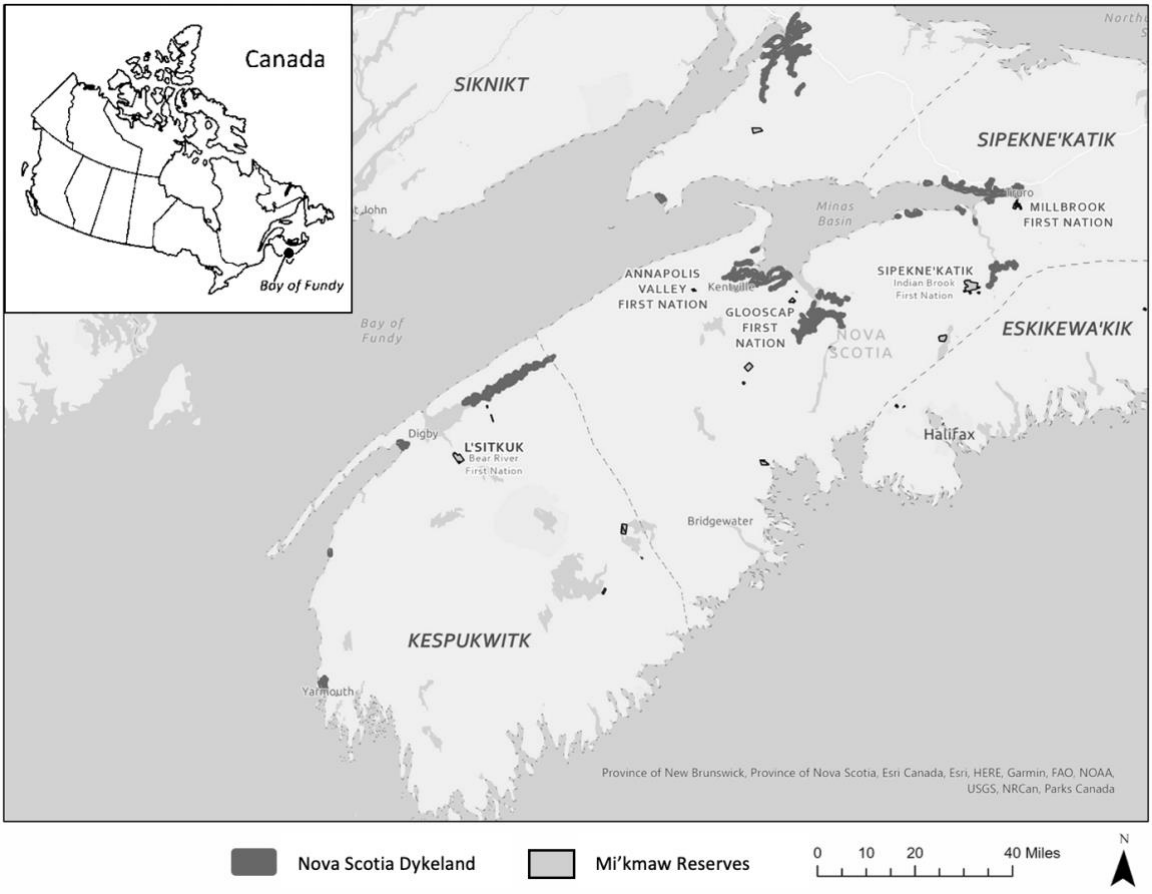


Figure 7. Dykeland locations on the Nova Scotia side of the Bay of Fundy, including the relevant districts of Mi'kma'ki, Mi'kmaw communities, key population centres, and geographic features. The distribution of districts was derived from Paul (2000).

The Bay of Fundy dykes have generated some of the most fertile agricultural lands in the Atlantic provinces of Canada (Butzer, 2002). The agriculture yields certain provisioning services, including food crop and turf/sod (Sherren et al., 2021). Approximately 70% of active dykelands are currently actively farmed (Nova Scotia Department of Agriculture,

2019). Dykes provide access to multiple forms of recreation, such as walking and birdwatching. The coastal region is recognized as an Important Bird Area and a Western Hemisphere Shorebird Reserve Network site. Though the dykes provide access for birdwatching, most birds inhabit tidal wetlands (Sherren et al., 2021). Tidal wetlands also provide natural and effective coastal buffering; however, citizens who are members of dykeland-associated cultural groups or who use dykes recreationally consider dykes the best form of storm protection (Sherren et al., 2016). Dykes are strongly associated with the Acadian identity and cultural legacy (Sherren et al., 2021). Private landowners have demonstrated a preference for dyke maintenance for this reason, despite recognizing the dykes' vulnerability to climate change and the tremendous cost of their maintenance (Champagne, 2021). Dismantling dykes, whether through active or passive restoration, may cause some asset loss (e.g., land for agriculture) because of salt water intrusion and flooding, especially in low-lying areas (Champagne, 2021; Sherren et al., 2021). The Chigneto Isthmus garners the most attention in discussions of dykes and flood risks as a low-lying, critical transportation route for fresh food and other goods between Nova Scotia and the rest of Canada (Sherren et al., 2021).

Tidal wetlands carry out a suite of ecological functions: they help regulate climate, sequester carbon, supply groundwater, mitigate erosion, and promote soil formation and nutrient cycling (Mitsch et al., 2013; Mitsch & Gosselink, 2000). They are considered among the most important ecosystems on the planet in terms of biodiversity and human benefit (Boyd & Wainger, 2002; de Groot et al., 2012). They provide habitat for bird and fish, including fish nurseries. They may play an additional role in generating fish stock for commercial fishing, though this service requires confirmation with further research

(Sherren et al., 2021). Restored tidal wetlands may provide more effective protection against climate change impacts than hard infrastructure (e.g., dykes), thereby fostering more resilient coastal communities (Narayan et al., 2017; Temmerman et al., 2013; Van Coppenolle & Temmerman, 2019). Some citizens have expressed support for wetland restoration, though in one survey-based study this seemed rooted in personal responsibility and government efficiency rather than attachment to wetlands (Sherren et al., 2016). The Bay of Fundy tidal wetlands are important for the Mi'kmaq for seasonal fishing and hunting; up to 90% of their dietary needs came from the ocean and other aquatic sources prior to European arrival (Hornborg, 2016; McMillan & Prosper, 2016). Tidal wetlands and adjacent brackish, marsh areas are also where Mi'kmaq harvest certain medicines, including sweetgrass, which is one of four sacred medicines (Reynolds, 2021; Sherren et al., 2021). The Bay is highly significant as the setting of many Mi'kmaw stories and legends (Gloade, n.d.).

Mi'kmaw approaches to resource stewardship and conservation provide insight on how Mi'kmaq conceptualize and relate to the land (Marshall et al., 2007; McMillan & Prosper, 2016; M'sɨt No'kmaq et al., 2021; Prosper et al., 2011). These works underscore the interconnectedness among human beings and other species, the land, and all of creation more generally. This is expressed through the concept M'sɨt No'kmaq, which represents a "kin-relationship with the land, waters and all living beings" (p. 840). McMillan & Prosper (2016) explain how this kin-relationship is all-encompassing and multifaceted, using water as an example: "Mi'kmaw relationships with aquatic resources were incorporated in every facet of their life, including cosmological belief systems, knowledge translation and education, political and family organization, and trade and

economies" (p. 630). Care for these kin-relationships is embodied in the concept Netukulimk, which parallels the concept of sustainability, and is generally conceived as "achieving adequate standards of community well-being without jeopardizing the integrity, diversity, or productivity of our environment" (M'sɨt No'kmaq et al., 2021, p. 846). Netukulimk is re-emerging in Mi'kma'ki alongside an increasing focus on reconciliation and re-indigenization across Turtle Island, including in approaches to conservation and resource stewardship (Barsh, 2002; McMillan & Prosper, 2016; M'sɨt No'kmaq et al., 2021; Prosper et al., 2011; United Nations, 2007).

The Bay of Fundy is also a setting of Mi'kmaw activism. In recent years, Mi'kmaw Water Protectors, Mi'kmaw Grassroot Grandmothers, and their allies have protested a tidal gate that disrupted water flow and fish passage at the Windsor Causeway along the Avon River (Baxter, 2020). Mi'kmaw activists have also protested a proposed natural gas project over concerns for water contamination and fish health impacts (M. Howe, 2016). These collectives have also carried out multiple Water Walks, which are multi-day or -week ceremonies to pray for healthy water and raise awareness of the sacredness of water (D. Howe, 2022). Collectively, this activism demonstrates the role of Mi'kmaq, as with other Indigenous peoples across Turtle Island (e.g., McGregor, 2008), in protecting water and water flow and becoming "the eye, the ear and the voice, for the ones that cannot defend themselves, in human form" (M'sɨt No'kmaq et al., 2021, p. 846).

3.3 Methods

We conducted community-based research that emphasized relationship building and reciprocity between research partners and between researchers and interview participants (Castleden et al., 2012; Israel et al., 1998); however, our project was proposed by

Dalhousie University through NSERC ResNet, a pan-Canadian research project (see 1.2 Research Approach), and did not emerge from community. We provide specific details about our community-based methods in the following paragraphs. The partnership for this research was between Dalhousie University and the Confederacy of Mainland Mi'kmaq, a partner of one of NSERC ResNet's six case study landscapes. They are a Tribal Council that supports eight Mi'kmaw communities throughout mainland Nova Scotia, including the Bay of Fundy region. Part of the mission for Confederacy of Mainland Mi'kmaq is to support the resilience and capacity among their constituent communities; they were inspired to partake in this coastal adaptation research because community leaders have expressed concerns about climate change.

The researchers based at Dalhousie University primarily collaborated with Kara Pictou, Community-Based Climate Monitoring Coordinator, Department of Environment and Natural Resources, the Confederacy of Mainland Mi'kmaq. At the time of this thesis research, Kara was conducting a climate change monitoring project with overlapping objectives; the Dalhousie University team was invited to join her interview process to reduce the burden on community members. The nature of our partnership was agreed upon through a collaboration agreement at the outset of the thesis research (Appendix C). In addition to her own project responsibilities, Kara supported Emily's research by leading interview recruitment, communicating with participants, co-designing data collection methods, providing additional interview accommodations (e.g., Mi'kmaq-English translation), and validating the research results. Emily, under the guidance of her supervisory committee, was responsible for research design, implementation (i.e., writing ethics proposals, data collection and analysis), and knowledge mobilization of research

outcomes. Emily provided additional support to Kara by handcrafting gifts for interview participants, pre-drafting emails for Kara to send to participants, connecting Kara with resources on qualitative data research and data governance, and presenting at a workshop organized by Kara. We describe how we co-conducted MTK interviews in Data Collection. Table 1 summarizes the processes that contributed to our goal of doing this partnership and research in a good way (Ball & Janyst, 2008).

This research was reviewed and approved by Dalhousie University's Research Ethics Board (REB # 2021-5705), as well as Mi'kmaw Ethics Watch (MEW), an independent ethics review board designed to protect Mi'kmaw integrity in research (*Mi'kmaw Ethics Watch*, n.d.). To each review board, we submitted thorough documentation of our methods for partnership, interview recruitment, participant consent (including optional anonymity), interview data collection, member checking, data security during and after the research, and Mi'kmaw cultural sensitivity. Most notably, all participants agreed and indeed preferred to have their names known in this research. The participants were informed at the outset of the research of their right to withdraw from the research, either Emily or Kara's projects independently or both altogether. Emily and the team at Dalhousie University protected the participants' data in a secure manner during the thesis research process. In alignment with Ownership, Control, Access, and Possession (OCAP®; Schnarch, 2004), Emily delivered the MTK interview data to the Confederacy of Mainland Mi'kmaq for long-term stewarding upon the completion of data analysis and deleted all copies in her possession. Settler interview data is being securely stored until thesis completion and publication at which time it will also be deleted.

3.3.1 Recruitment

Participants considered for inclusion in this research were required to be 18 years old or older and be knowledgeable of the Mi'kmaq and their traditions, history, culture, and/or livelihood in the context of dykes, dykelands, and tidal wetlands in Nova Scotia's Bay of Fundy. Kara led purposive sampling of recognized community MTK holders, particularly those that are water protectors, hunters, gatherers, community leaders, or a combination of these identities. Kara identified and contacted the MTK holders by phone and/or email. For participants from L'sitkuk (Bear River), Kara followed up with the community's Chief for approval of their participation, as per the Chief's request to be consulted. Independent of the Confederacy of Mainland Mi'kmaq, the researchers at Dalhousie University recruited settler subject matter key informants (i.e., settlers with recognized knowledge on archeology and fishing/fish passage). These were identified via snowball sampling from the MTK interviews (i.e., a person mentioned in several MTK interviews) and purposive sampling (i.e., a person identified by the researchers for specific content knowledge). Key informants were recruited specifically to fill gaps in content that were identified in Sherren et al. (2021) that were not resolved via MTK interviews.

3.3.2 Data Collection

To respect the COVID-19 public health guidelines, the interviews took place either remotely (Zoom or Microsoft Teams) or in-person, if permitted by public health measures, community leadership, and the participants themselves. Participants choose their preferred online format or in-person location, respectively.

Kara and Emily together conducted semi-structured, MTK interviews between Jan. 17, 2022, and April 20, 2022. We refer to these participants as MTK holders throughout the

text; however, they have more precise titles and roles, which most participants provided to us (six of seven participants; Table 5). MTK interviews are distinct from standard semi-structured approaches: they are not time restricted but rather respect the natural flow of dialogue, gifts are given before the occasion (e.g., tobacco, honoraria, handmade gifts), and Mi'kmaq-specific supports are available during and after the interview (e.g., Mi'kmaq-English translator; social support workers) (K. Pictou, personal communication, November 18, 2022). Participants were asked a series of low-risk questions, first by Kara and then Emily. Only the responses to Emily's questions were considered for this research project; we did not consider Kara's questions or any corresponding responses from participants because they pertained to all of Mi'kma'ki, which is a broader geographical scope than concerns this thesis research. Participants were given the option to schedule an additional interview if they felt they would become fatigued covering so much content at once; in this case, which occurred one time, Kara would ask her questions during the first interview, and Emily would ask hers during the second. Emily also conducted subject matter key informant interviews independent of Kara on May 20, 2022, and June 17, 2022. These aligned more with standard semi-structured interviewing practices (i.e., approximately one hour in length without honoraria; e.g., Bernard, 2006).

Table 5. Names and titles of all interview participants. All participants agreed to having their names disclosed during the consent process prior to interviewing. They were given the option to review the interview transcript, the study findings, and direct quotes so that they could understand and contribute to how their knowledge is being represented.

Name	Interview Type	Title
Dorene Bernard	MTK	Sipekne'katik Grassroots Grandmother, Water Walker, Water Protector, Survivor
Ducie Howe	MTK	Sipekne'katik Community Member, Water Walker/Protector, Mi'kmaq Grassroots Activist
Gail Tupper	MTK	Glooscap First Nation Band Member and Elected Councillor
Gerald Gloade Sr.	MTK	Millbrook First Nation, Artist, Educator
Rob McEwan	MTK	L'sitkuk (Bear River) First Nation, Council Member, Craftsman
Darren Porter	Key informant	Commercial Fisher, Activist, Consultant, Local Knowledge Holder
Dr. Heather McLeod-Leslie	Key informant	Senior Archeologist, Kwilmu'kw Maw-klusuaqn (KMKNO) Mi'kmaq Rights Initiative

All interviews were guided by prepared questions (summarized in Table 6; full question set in Appendix D). Emily would follow the questions and use probing techniques to match the narrative flow of interviews while still achieving the goals of the question set (Bernard, 2006). We continued with interviews until we reached a satisfactory level of data saturation (i.e., repetition of themes) that also aligned with our own time capacity.

Table 6. Summary of questions used in the semi-structured interviews, organized based on theme. The full question set is in Appendix D. The interview questions were modified for subject matter key informants to say "Mi'kmaq" rather than "you" and "your community". Questions in italics were specific to the key informants.

Thematic Section	**Question**
Starting the conversation, history	What is your history with the Bay of Fundy coast?
	Do you know how the Mi'kmaq were involved when the wetlands were drained for agriculture, if they were at all?
Ecosystem services	How do you use the dykes/dykelands/tidal wetlands, if at all?
	Do the dykes/dykelands/tidal wetlands hold any other significance for you?
Relational values	Do you do [the previously specified activities] with others, or do you see others in your community doing it together?
	Are there stories in your community about dyke/dykelands/tidal wetlands?
	Do you know of any words to describe dykes/dykelands/tidal wetlands in the Mi'kmaq language?
	Do the dykes/dykelands/tidal wetlands hold any other significance for you?
Adaptation decision-making	What would be the implications for you if the existing dykes were raised and reinforced?
	What would be the implications for you if the dykes were breached to restore wetlands?
	What about the implications your family or community?
	Are there particular dykelands you think should be maintained over others?
	What do you think are the major points to consider when deciding between dykes and wetlands on a given site?
Targeted thematic questions	We have heard is that the archaeological materials stored in modern dykelands may become damaged if salt marshes are restored. Do you think this is a good enough reason to maintain them as dykeland?
	What are the procedures and options if Mi'kmaw archeological resources were to be found in a dyke or dykeland considered for restoration?
	What are the points to consider specifically for fishing and fish passage when deciding between dykes and wetlands on a given site?
Concluding question	Is there anything else that we might have missed? Do you have any thoughts or stories that you didn't have the opportunity to share?

3.3.3 Data Analysis

With consent, all interviews were audio recorded and the recordings were transcribed. Participants were given the option to review their transcripts and comment on, revise, or omit any of its contents. Three of seven interviewees responded with minor revisions of specific content or clarifications of intent, but there were no substantial revisions. The transcripts were thematically coded with NVivo 12 using a blended deductive and inductive coding method (QSR International Pty Ltd., 2018). We deductively coded relational values based on the classifications outlined in Chapter 2 as well as landscape use (i.e., instrumental value) based on ES. We inductively coded any other relevant descriptions of Mi'kmaw experiences in dyke, dykelands, and tidal wetland systems and descriptions of how Mi'kmaq navigate coastal adaptation decision-making. The results of thematic coding were summarized in a 7-minute video, uploaded as an unlisted video on YouTube, and shared with the interview participants on November 10, 2022. They had the option to provide feedback; we specifically asked whether they agree with and feel represented by the themes we identified. Four of seven interviewees responded with feedback: three people expressed their support for the research findings, and one person asked for increased nuance in how dykes are discussed. The refined themes were subsequently shared with the Confederacy of Mainland Mi'kmaq, who expressed their support for the research findings. An additional opportunity arose to present the research findings at a small-scale event on November 29, 2022, with several Mi'kmaw Water Protectors, Grassroots Grandmothers, elders, and guests, including two interview participants who had not originally provided feedback on the research results. The attendees were supportive of the research findings: they did not express any disagreement, demonstrated supportive body language (e.g., head nodding, smiling), and

expressed their support for this work following the presentation. The member checking and community review processes validate the dependability and credibility of this qualitative research (Moon et al., 2016), while they also help mitigate community harm and support self-representation in research (Liboiron et al., 2018; Toombs et al., 2019).

3.3.4 Data Continuity

The findings from this research have been revised and prepared into this thesis; they will also be prepared into a plain language report for the Confederacy of Mainland Mi'kmaq, a publicly available video, and a peer-reviewed publication. All direct quotes were provided to the respective participants for verification. In alignment with the principles of OCAP®, the Confederacy of Mainland Mi'kmaq owns and possesses all data emerging from this research (i.e., interview recordings, transcripts, and a plain-language summary of outcomes). They are safely storing the data for their constituent communities to access. Any access and resulting use of the data will be controlled by the organization's board of directors. The academic team will not possess any copies.

3.4 Results

To describe the study results, we use the words "few", "some", "most", and "all" to indicate how many participants contributed to a theme, thereby demonstrating the support and strength of a theme (Sandelowski, 2001). "Few" represents one or two participants, "some" represents three or four participants, "most" represents five or six, and "all" represents all seven participants.

3.4.1 Data Description

We conducted seven interviews: five with MTK holders from Bear River, Millbrook, Sipekne'katik (2), and Glooscap, and two with subject matter key informants. Six interviews took place remotely and one took place in-person. They were between 50 minutes to two hours in length. Emily's portion of the interviews ranged from 35 to 60 minutes. Emily would ask a question and participants would typically answer it directly and then recount stories. Multiple questions from the interview guide were often answered within the stories that stemmed from a single question. For MTK holders, the stories often branched away from the focal landscapes of this study to in-land settings (e.g., woods or rivers near their home communities).

The participants had variable amounts of experience in the Bay of Fundy and along the coast. Among the MTK holders, a few said they "do not have much of a personal history" with the Bay of Fundy. We still consider these appropriate people to interview because they are recognized community knowledge holders with long-term, embodied knowledge of their community and Mi'kmaw values. Overall, most participants had a strong presence in the Bay of Fundy through their upbringing, livelihood, work, and/or activism.

When speaking of dykes, some participants occasionally seemed to be discussing those that act as tidal gates on rivers, rather than linear dykes (see 1.1 Introduction). This was evidenced when interchanging the words dyke and dam and when explaining how dykes interrupt fish passage – only tidal gate dykes inhibit fish passage, not linear dykes. No participants distinguished between different kinds of dykes.

3.4.2 Results of Synthesis

3.4.2(a) Relating to the Land

All participants described Mi'kmaq as inherently connected with other beings and the land. This was demonstrated through the participants' approach to answering interview questions and by directly calling other beings relatives. When MTK Holder Dorene Bernard was asked about the implications of dyke maintenance for herself and her community (question 6, Appendix D), she responded by considering the implications "on the water, on the groundwater, on the rivers, on the springs" as well as "the animals, the flyers, the swimmers" and "all the living beings that rely on that water". This implies a connectedness and kinship with other beings as well as the land. MTK Holder Ducie Howe similarly referred to "our relatives" throughout the interview when discussing the fish and birds that rely on tidal wetlands. She said, "We're made of the land. When we say we come from the land, partially that's what that means: we are the land." A few participants noted that interfering with other beings and the land inherently interferes with Mi'kmaq because they are all connected and relatives.

All participants described an ethic of relating to the land that embodied respect and allowed natural flow. They described "letting this land do what it's supposed to do", "what was meant for Mother Nature", and "living with that rhythm", which was described as "how we live in Mi'kma'ki" and "sustainability". A few participants explicitly called this approach Netukulimk.

3.4.2(b) Landscape Uses and Values

Most interview participants described the Bay of Fundy as an overall important and sacred place for the Mi'kmaq. It is the setting of many stories and legends, it was created

by Kluscap[6], and it is a unique and beautiful location. MTK Holder Gerald Gloade Sr. concisely summarized this significance by saying, “The history that we have from there, the connection, and plus it's just damn beautiful.” MTK Holder Ducie Howe highlighted the significance of the Bay for Kluscap, stating, “Most of Gluskabe's teachings come from the Bay of Fundy… there are a lot of sacred places and a lot of legends and lessons all tied to that area... The landscape was all created through Kluscap.”

When discussing tidal wetlands, most participants reported them as a source of medicines, primarily sweetgrass. Some participants also described them as a source of cat tails, natural grains, marsh reeds, and other plants. Most said the wetlands are important for fish habitat and health; sturgeon, tommy cod, and bass were specifically mentioned. Tidal wetlands were also significant for the habitat and health of birds, especially migratory birds. Some participants mentioned that tidal wetlands sequester carbon, which is important for mitigating climate change. Tidal wetlands were described as “important”, “resting and nourishing spots”, and “medicinal”. A few participants described the pre-dyked coast a “Mi’kmaw cultural landscape”. The species that inhabit wetlands were referred to as relatives and the well-being of these species was significant to the participants.

When discussing dykes, two participants associated them with recreation, specifically walking with friends and pets or playing in the vegetation as a child. A few participants

[6] Kluscap, also referred to in this text as Gluskabe, is a warrior and important figure in many Mi’kmaw legends and teachings (Gloade, n.d.).

mentioned that there is tidal wetland habitat adjacent to dykes where sweetgrass may grow. None of the participants said they use dykes to access sweetgrass for harvesting, though they mentioned that they are aware of other L'nu doing so further south along the Bay of Fundy coast, within Kespukwitk district (Figure 7). No one expressed concern that the loss of dyke would negatively affect their access to wetland or sweetgrass. Some participants stated that some areas would be flooded if dykes were removed; the Annapolis Royal and the Chignecto Isthmus were specifically cited by one participant as at risk of flooding, but the other participants spoke in general terms. No one described any personal value in the dykelands; MTK Holder Rob McEwan said, "To me, they're really of no use."

The dykes were described as "man-made", "obstructive", and structures associated with farmers, Acadians, and settlers. Some participants said that the Mi'kmaq helped build dykes. Their involvement was depicted variously as hired labor, helping a neighbor, or intentional involvement to avoid dyke construction near sacred areas. Local Knowledge Holder (LKH) Darren Porter questioned whether the Mi'kmaq truly helped build the dykes or whether this was being put forward by colonial governments as an argument for maintaining dykes. MTK Holder Gerald Gloade Sr. confirmed that there are historical records of Mi'kmaw collaboration on dyke construction in the Grand Pré and Annapolis Royal regions. Dr. McLeod-Leslie highlighted that assisting in dyke construction does not mean the Mi'kmaq were supportive of it: "Two people can work on one thing together and have a different vision of the future… Just because they helped a neighbor and helped a friend doesn't mean that they adopted that technology."

When prompt about archeological resources in dykelands, some participants emphasized that there are Mi'kmaw archeological resources all over Mi'kma'ki. Dr. McLeod-Leslie explained that these records are significant for the Mi'kmaq, as well as other Indigenous people, in the context of colonization, residential schooling, and racism. They provide evidence of occupation and may be a source of collective and individual identity; provide emotional, physical, and spiritual healing; and serve to recognize treaties and title to land. Archeological materials may be impacted by the physical disruption associated with dyke removal and wetland restoration earthworks. While Mi'kmaw materials would have been deposited when dykeland areas were tidal wetland, those materials are still susceptible to damage from rewetting associated with restored tidal access.

Most participants stated that dykes have been and continue to be a source of injustice for the Mi'kmaq. LKH Darren Porter explained that dykes in their current state violate federal laws and infringe on treaty rights. Specifically, the *Fisheries Act 1985* (C14) s. 34.3.F (Can.) states that water flow must be maintained to permit fish passage and, if an obstruction to flow occurs, it must "maintain at all times the characteristics of the water and the water flow downstream of the obstruction or thing that are sufficient for the conservation and protection of the fish and fish habitat" (s. 34.3.G). Many sluices within dykes do not meet these conditions. The *Fisheries Act 1985* (C14) (Can.) must also uphold the rights of Indigenous peoples (s 2.3) and must be informed by Indigenous peoples and their knowledges (s. 34.1G). Some participants emphasized that dykes do not abide by the original laws, dyke decisions were made without considering Mi'kmaw perspectives, and dykes – especially those that act as tidal gates – do not respect their relatives of other species. Likewise, the Peace and Friendship Treaties state that Mi'kmaq

have the right to continue fishing, hunting, and carry out other traditional practices (Government of Canada, 2010). Dykes, by harming fish habitat and obstructing their movement, violate this right.

3.4.2(c) Decision-making

Wetland restoration was described favorably among all participants because tidal wetlands are the naturally occurring habitat on the coast, restoration may help revitalize medicines that are currently in decline, and it would restore habitat for relatives of other species. A few participants considered restoration as a possible opportunity for reconciliation. MTK Holder Ducie Howe explains:

> Any kind of real reconciliation has to come through the land. I know that probably [settlers] are not going to give it back. But they can, as a way of reconciling, reconcile with the land. And do right by the land… that means our relatives that live on the land, that water and our relatives that live in that marsh, and our medicines that grow in that marsh, and our food, our relatives that need that land to be restored and viable for them to continue… That would be a form of reconciliation.

All participants generally did not support dyke maintenance because dykes interrupt natural flow and do not respect relatives of other species by obstructing habitat. MTK Holder Rob McEwan echoed the opinion of many participants when he said, "Any one [dyke] that can be removed, should be removed." Dykes are expensive to maintain, and they are going to be a recurring problem in the future because the coast, especially along the Bay of Fundy, is highly dynamic. Dr. McLeod-Leslie stated, "You're not building

massive walls to keep the ocean back. It's not going to work. The water table's going to rise…. It's all going to happen eventually."

Though there was a general favoring of wetland restoration and aversion towards dyke maintenance, most participants demonstrated balance in their approach. They appreciated that wetland restoration has challenging implications for some people; for instance, dyke breaching would cause flooding in some areas. They considered the impacts on landowners and farmers specifically. MTK Holder Gail Tupper said, "[Dykes] have protected the lowlands from flooding and over the years those land areas have built up with either homes or businesses, and you don't want to flood them out and ruin all that." If restoration were to occur, some participants emphasized that it should be done in a good way by avoiding contamination from pesticides embedded in soil and by re-introducing tidal wetland vegetation.

Certain dykes were regarded as significant and potentially worth maintaining for Acadian history (Grand Pré), for recreation (Blomidon, Port Williams and Wolfville area), and for flood protection (Annapolis, Chignecto Isthmus). Notably, no dykes were described as useful to keep for agriculture. When deliberating whether dykes should be kept for protecting archeological resources, most participants maintained their affinity for wetland restoration but recognized that archeology within dykeland should be approached on a case-by-case basis. There is a large variety of possible archeological resources as well as a variety of options for managing them. Archeological resources have varying significance in terms of the archeological record. MTK Holder Gerald Gloade Sr. explained how certain artifacts are extremely abundant: "You get a little arrowhead for $5, and you get a spearhead, probably five inches, $8. They were just so common. And

they're still common if you know where to look." Such highly abundant materials may be less of a priority to conserve, whereas novel materials may be higher priority because of their contributions to the archeological record and therefore the knowledge of Mi'kmaq and their territory.

Most participants underscored that decision-making in this context is complex and challenging. When approaching these decisions, some stated that all impacted communities should be involved in the decision process. Some stated the importance of considering a longer timeline, especially in the context of the intense dynamics of the Bay of Fundy. A few participants considered dyke adaptation decisions as "coming too late" because the dykes have been impacting the land, the waters, and the Mi'kmaq since their construction. Many asserted that the decisions should consider the impacts on future generations. Two participants underscored that the current-day approach may be an opportunity to enact reconciliation in the spirit of future generations and ancestors.

3.4.3 Limitations of Study

Gould et al. (2019) recommend using methods that are designed to capture embodied knowledge, rather than using methods that rely on verbal articulation of values, such as interviewing, because the values of Indigenous people are frequently embodied. As a master's student with a limited timeline, Emily had a limited ability to engage with such methods. We were likewise unable to interview a larger diversity of MTK holders. As a not-for-profit organization, the Confederacy of Mainland Mi'kmaq had capacity limits and high staff turnover. The Dalhousie University team was cautious to not overburden the Confederacy of Mainland Mi'kmaq with aspects of the work, but this also limited the extent of partnership.

3.5 Discussion

3.5.1 Foundations of Mi'kmaw Values and Approaches in the Bay of Fundy Tidal Wetlands and Dykelands

This study underscores two extant, overarching themes describing how Mi'kmaq relate to the landscapes and decision-making in the Bay of Fundy dykeland and tidal wetland scenario: kin-relationship with all beings (M'sɨt No'kmaq) and honoring the natural flow and integrity of the environment (Netukulimk). Though discussed in separate sections, these are highly overlapping and related; as McMillan & Prosper (2016) explain, "[Netukulimk's] practice and philosophy embrace coexistence, inter-dependence and community spirit" (p. 641).

3.5.1(a) M'sɨt No'kmaq

The participants' relationships with the dyke and tidal wetland systems as well as the adaptation decision-making are rooted in M'sɨt No'kmaq, a "kin-relationship with the land, waters and all living beings" (M'sɨt No'kmaq et al., 2021, p. 846). These kin-relationships serve as the source of a moral responsibility to non-human beings (Table 7), a relational value concept originally described by Chan et al. (2016). Participants considered the well-being of other species and the water when describing the value of each landscape and the impacts of adaptation. Tidal wetlands are "nourishing spots" for fish, birds, and plants, including medicines. Conversely, dykes are "obstructive" and impede the nourishment that would be provided by wetlands, thereby impeding the participant's obligation to care for M'sɨt No'kmaq. When acting as tidal gates, dykes interrupt fish passage. This contributed to an affinity for wetland restoration and an aversion towards dykes and dyke maintenance (Table 8).

Table 7. Relational values and disvalues that emerged from Mi'kmaw ways of thinking (L'nuwey) around dykes and tidal wetlands. Concepts that are new to relational values discourses are indicated in italics.

Relational Value	**Associated Landscape**	**Rationale**
Moral responsibility to non-human beings	Tidal wetlands	Mi'kmaq are morally responsible to protect M'sɨt No'kmaq, who rely on tidal wetlands
Cultural responsibility	Tidal wetlands	Netukulimk, a natural law, indicates that Mi'kmaq must protect the integrity, diversity, and productivity of the environment, which supports the persistence of tidal wetlands over dykes
Social cohesion	Tidal wetlands	Sweetgrass, which is a medicine and important part of traditional ceremony, is harvested from tidal wetlands
Cultural cohesion	Tidal wetlands	Sweetgrass, which is a medicine and important part of traditional ceremony, is harvested from tidal wetlands
Identity	Dykes and dykelands	Mi'kmaw archeological materials, stemming from ancestors passed, provide a sense of identity
Relational Disvalue	**Associated Landscape**	**Rationale**
Disruption of moral responsibility to non-human beings	Dykes and dykelands	Dykes disrupt the Mi'kmaq's moral responsibility to protect M'sɨt No'kmaq because they obstruct habitat and water flow
Disruption of *cultural responsibility*	Dykes and dykelands	Because they are human-made and obstruct habitat, dykes do not honor Netukulimk, a natural law, that indicates that Mi'kmaq must protect the integrity, diversity, and productivity of the environment
Disruption of social cohesion	Dykes and dykelands	Dykes obstruct the habitat of sweetgrass, which is a medicine and important part of traditional ceremony
Disruption of *cultural cohesion*	Dykes and dykelands	Dykes obstruct the habitat of sweetgrass, which is a medicine and important part of traditional ceremony

Table 8. Pros and cons of two general approaches to coastal adaptation, tidal wetland restoration and dyke maintenance, along Nova Scotia's Bay of Fundy coast according to MTK holders and key informants.

	TIDAL WETLAND RESTORATION	DYKE MAINTENANCE
PRO	• Provide habitat and support the well-being of M'sɨt No'kmaq, (birds, fish, water) • Source of medicine (sweetgrass) • Sequester carbon to mitigate climate change • The pre-dyke coast with tidal wetlands is a Mi'kmaw culturally significant landscape	• Provide storm surge and flood protection in low-lying areas • Some use for recreation
CON	• Archeological resources may be disturbed by restoration	• Detract from habitat and the well-being of M'sɨt No'kmaq, (birds, fish, water) • Do not align with Netukulimk as dykes impacts the integrity, diversity, and productivity of the land • Do not honor certain Canadian federal laws, Mi'kmaw treaty rights, and Mi'kmaw natural law

The participants' alignment with M'sɨt No'kmaq echoes literatures on resource stewardship in Mi'kma'ki, which emphasize re-centering M'sɨt No'kmaq (Barsh, 2002; Marshall et al., 2007; M'sɨt No'kmaq et al., 2021; Young, 2018). Indigenous peoples outside of Mi'kma'ki have comparable kin-centered approaches to nature (Chowdhooree, 2019; Howitt & Suchet-Pearson, 2006; Noble et al., 2016; Suchet-Pearson et al., 2013). In the southeastern United States, the Gullah/Geechee people, who hail from numerous African ethnic groups, express these kin relations in the context of tidal wetlands, saying, "The salt marsh is not something that we simply go through or to; it's part of our family, too" (Pew Charitable Trusts, 2021, para. 7). Understanding other beings as relatives

contrasts the separation and sense of human superiority over nature that is implicit in Western and Eurocentric ideas of natural resource management (Holling & Meffe, 1996; Howitt & Suchet-Pearson, 2006). The kinship embodies care and respect (Suchet-Pearson et al., 2013), leading to an obligation to care for nature and other beings (e.g., Beckford et al., 2010) and other relational values (2.4.2(a) Relational Value Concepts). Decisions rooted in M'sɨt No'kmaq would consider the impacts of all adaptation options on animals, plants, lands, waters, and all living beings, both in the current day and into the future.

3.5.1(b) Netukulimk

Netukulimk is not easily translated into English; Table 9 includes a list of descriptions of Netukulimk to demonstrate its nuances. It is generally considered a stewardship principle and natural law that embodies sustainability by honoring the wellbeing of Mother Nature while maintaining human well-being (McMillan & Prosper, 2016; M'sɨt No'kmaq et al., 2021).

Table 9. Descriptions of Netukulimk, a Mi'kmaw stewardship principle and natural law.

Description of Netukulimk	**Source**
Netukulimk is the Mi'kmaw way of harvesting resources without jeopardizing the integrity, diversity or productivity of our native environment.	Native Council of Nova Scotia (1993), through McMillan & Prosper (2016)
Netukulimk is the use of the natural bounty provided by the Creator for the self-support and well-being of the individual and the community. Netukulimk is achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity, or productivity of our environment.	UINR (2009)
Netukulimk is a complex cultural concept that encompasses Mi'kmaq sovereign law ways and guides individual and collective beliefs and behaviours in resource protection, procurement, and management to ensure and honour sustainability and prosperity for the ancestor, present and future generations.	Prosper et al. (2011)
Netukulimk denoted the proper customary practice of seeking bounty provided by Niskam [the Creator] for the self-support and well-being of the individual, and the nation, and thus was intimately tied to traditional rights.	McMillan & Prosper (2016)
Netukulimk is achieving adequate standards of community well-being without jeopardizing the integrity, diversity, or productivity of our environment.	M'sɨt No'kmaq et al. (2021)

Netukulimk was represented in the way participants described "what was meant for Mother Nature", "letting this land do what it's supposed to do", "living with that rhythm", and "working with the land", which was depicted as "how we live in Mi'kma'ki", "original law", "natural law", and "sustainability". The responsibility to care for the "integrity, diversity, and productivity of the environment" aligns with *cultural*

responsibility as defined in the scoping literature review (2.4.2(a) Relational Value Concepts). The participants honored Netukulimk in how they discussed dyke and tidal wetland systems. Tidal wetlands and wetland restoration are a natural response to the coastal dynamics in the Bay of Fundy and they provide habitat for relative species. In contrast, the participants were averse to dykes and dyke maintenance because they are "against natural law": they interrupt flow, are "man-made", and obstruct habitat of relative species (e.g., birds and fish). Dykes were generally considered to jeopardize the integrity, diversity, and productivity of the land, thereby disrupting the participant's responsibilities associated with Netukulimk.

There has been a re-centering on Netukulimk in environmental and resource stewardship in Mi'kma'ki (Barsh, 2002; McMillan & Prosper, 2016; M'sɨt No'kmaq et al., 2021; Prosper et al., 2011). The concept has been recently integrated as a core principle in Nova Scotia's provincial legislation for climate change reduction (*Environmental Goals and Climate Change Reduction Act 2021* (C12) (Can.)). The heart of Netukulimk is demonstrated in environmental and resource stewardship approaches beyond Mi'kma'ki (Chowdhooree, 2019; Howitt & Suchet-Pearson, 2006; Noble et al., 2016). Honoring Mother Nature's rhythm contrasts "command and control" paradigms that prevail in Western approaches to environmental relations, which emphasize management and superiority over nature (Holling & Meffe, 1996, p. 328; Howitt & Suchet-Pearson, 2006). Marshall et al. (2007), co-led by two Mi'kmaw elders, state, "We [humans] protect wildlife corridors, regulate the environment, manage land. Such metaphors represent a language of containment and separation, much of which originates in human abuse of nature" (p. 174). Decisions rooted in Netukulimk would consider the impacts of all

adaptation options on the integrity, diversity, and productivity of the environment, both in the current day and into the future. They would consider the wellbeing of the environment alongside that of human communities.

3.5.2 Tidal Wetlands and Wetland Restoration

Studies that describe tidal wetland values among Indigenous people often mention Indigenous "traditional use" but devote their focus to ecological factors and rarely describe Indigenous use in detail (Bhiry et al., 2011; Eliot et al., 1999; Jorgenson et al., 2018; Saintilan et al., 2019). Studies on tidal wetland restoration emphasize the significance of tidal wetlands for Indigenous people and their contributions to restoration, but again these studies do not elaborate on the nature of this significance (Gerwing et al., 2020; Harmon et al., 2021; Karim et al., 2021). The literature more extensively describes values of freshwater wetlands for Indigenous people (e.g., Bataille et al., 2021). This study presents a granular description of tidal wetland values and highlights the significance of tidal wetlands and tidal wetland restoration for Mi'kmaq. Tidal wetlands are a source of sweetgrass, a medicine used in ceremony, which is a central means of maintaining culture and gathering community (Kimmerer, 2013; Reynolds, 2021), respectively corresponding to the relational values *cultural cohesion* and social cohesion. Some participants told stories of how sweetgrass and other medicines are declining; they did not specifically cite dyking as a cause, but a few participants did consider wetland restoration as a solution.

The participants' affinity for wetland restoration was overall driven by care for relative species and honoring natural law and sustainability. This contrasts previous documentation of settler support for wetland restoration in the Bay of Fundy, which was

rooted in efficiency and pragmatism (Sherren et al., 2016). The participants' affinity for tidal wetland also contrasts the settler perspective of tidal wetlands as barren and void of use (Gasteyer & Flora, 2000; Rudin, 2022). Tidal wetlands were also valued for their role in sequestering carbon, and they were considered part of a Mi'kmaw cultural landscape.

3.5.3 Dykes, Dykelands, and Dyke Maintenance

This study contributes to a small body of literature that describes Indigenous values in drained agricultural lands. Similar to these works, the participants of this study described the drained landscape as something imposed by settlers (Dillon, 2022; Gasteyer & Flora, 2000). Specifically, dykes were associated with settlers, Acadians, private landowners, and farmers. A few participants associated dykes with recreation, which is a service identified by previous studies in the dykeland context (Sherren et al., 2016, 2021). The Mi'kmaw archeological materials stored in dykelands may also be a source of identity, a relational value described by Chan et al. (2016). The records may be an increasingly important source of emotional and spiritual healing as proof of land title and occupation. Overall, however, the participants described minimal personal use of the dykes or dykelands, and they did not demonstrate a rich vocabulary in their descriptions of dykes. Dykes were a source of injustice: they do not honor certain Canadian federal laws, Mi'kmaw treaty rights, and natural law. There was an overall aversion towards dykes and dyke maintenance, which notably contrasts previous studies in the Bay of Fundy context that describe cultural values associated with dykes and *status quo* biases as strong sources of affinity for dyke maintenance (Champagne, 2021; Sherren et al., 2016).

3.5.4 Decision-making

The participants balanced their affinity towards tidal wetland restoration and aversion towards dyke maintenance in discussions of decision-making. Their consideration of impacts on other communities aligns with distributive justice, an element of environmental justice, described as "the distribution of benefits and costs among stakeholders, or rights and responsibilities, from ES or in ES interventions" (Loos et al., 2023, p. 478, Table 1). Likewise, the participants emphasized that the decision processes are highly complex and must involve all impacted communities. This again aligns with an element of environmental justice: procedural justice is considered "Participation of all stakeholders and rights holders in ES interventions and roles in decision making" (Loos et al., 2023, p. 478, Table 1).

If restoration were to occur, the participants emphasized the importance of doing so in a good way to promote ecosystem health (e.g., by re-introducing tidal wetland plants) and to avoid leaching pesticides in the waters. Mi'kmaw communities have been significantly and disproportionately impacted by water contamination in the Bay of Fundy region, and it has demonstrated consequences for their cultural prosperity (Castleden et al., 2017). The participants also highlighted that Mi'kmaq conceptualize such decisions on a longer timescale, considering how current day decisions will impact seven generations into the future. Considering seven generations ahead is a well-established practice and lesson from Indigenous peoples across Turtle Island that has contributed to sustainability scholarship and practice (Clarkson et al., 1992).

The participants clarified that honouring Netukulimk was a greater priority than maintaining archeological records in the dykes, but this was not a blanket statement: it

was generally asserted that archeology must be approached on a case-by-case basis to honor Mi'kmaw sovereignty and rights. This clarifies that there is generally a prioritization of living over historical culture (Sherren et al., 2021). Some participants stated that our current-day decision-making may in fact be an opportunity to enact reconciliation in the spirit of future generations and ancestors. They highlighted that reconciliation must occur through the land, and that honoring natural laws in land-based decisions is one way to do so. This aligns with federal responsibilities towards recognizing Indigenous peoples' rights, outlined in the following section.

3.5.5 The Significance of Honoring Mi'kmaw Lessons

The Governments of Canada and Nova Scotia have commitments and legislated responsibilities to respect the rights of and engage with Indigenous people, which includes the Mi'kmaq. The Government of Canada has expressed commitment to UNDRIP and is working to implement the TRC's "Calls to Action" (TRC, 2015b; United Nations, 2007). UNDRIP recognizes that "respect for Indigenous knowledge, cultures, and traditional practice contribute to the sustainable and equitable development and proper management of the environment" (United Nations, 2007, p. 2). It reaffirms Indigenous peoples' right to determine what takes place on their territories. The TRC's Calls to Action serve to guide all Canadians with "constructive action on addressing the ongoing legacy of colonialism" (TRC, 2015c, p. 3). They state that "virtually all aspects of Canadian society may need to be reconsidered" to enact reconciliation over past and ongoing colonial harms (TRC, 2015a, p. vi). These commitments highlight the responsibility of decision-makers in the Bay of Fundy context to honor Mi'kmaw

knowledge, culture, and traditions in order to honor Mi'kmaw rights, which, based on this findings of this study, appear embedded in wetland restoration.

The provincial acts most relevant to the Bay of Fundy dykeland context include the *Agricultural Marshland Conservation Act 2000* (C22) (Can.) and the *Fisheries and Coastal Resources Act 1996* (C25) (Can.). Neither specify any commitment to engage with the Mi'kmaq or Mi'kmaw knowledge, culture, or traditional practices. However, the Government of Nova Scotia recently instated the *Environmental Goals and Climate Change Reduction Act 2021* (C12) (Can.). Section 4a states that "The achievement of sustainable prosperity in the Province must include (i) Netukulimk". As a form of climate change adaptation, dyke decision-making in the Bay of Fundy is privy to the principles outlined in this act.

Beyond commitments to Indigenous engagement, it is beneficial to engage with and listen to Mi'kmaw lessons for realigning land relations in the Bay of Fundy. As Dr. McLeod-Leslie stated, "Mi'kmaq have been adapting to climate change in Mi'kma'ki since time immemorial." M'sit No'kmaq, Netukulimk, and other Mi'kmaw principles emerge from this longstanding, intergenerational relationships with the land (M'sit No'kmaq et al., 2021). Mi'kmaw knowledge, culture, and traditional practices bring valuable insights to climate change adaptation, conservation, and human-nature relationships in general because they have been co-developed with the land over a tremendously long time (M'sit No'kmaq et al., 2021; Young, 2018). Mi'kmaq and other Indigenous peoples have an intimate and extensive knowledge of the land that is globally recognized as an integral part of sustainability (Berkes et al., 2000; Brondizio et al., 2021; Huntington, 2000).

Mi'kmaw lessons for coastal adaptation are also significant for addressing colonial power relations embedded in Eurocentric approaches to conservation and resource management (Howitt & Suchet-Pearson, 2006; M'sit No'kmaq et al., 2021). Howitt & Suchet-Pearson (2006) explain, "Development and conservation reflect highly problematic assumptions about relationships between people, and between people and their surroundings, which are rooted in Eurocentric ontologies, and that failure to challenge these assumptions risks reimposing colonial power relations" (p. 323). The participants of this research communicated clear lessons on how Mi'kmaq relate to the land, which are supported by substantial literature on how Mi'kmaq and other Indigenous peoples approach resource stewardship. Dykes have been a source of injustice to the Mi'kmaq as they do not align with natural law or how Mi'kmaq relate to the land. To avoid "reimposing" such "colonial power relations" (Howitt & Suchet-Pearson, 2006, p. 323), the L'nuwey in the Bay of Fundy must be central to adaptation decision-making in the Bay of Fundy context.

3.5.6 Future Directions

This research would benefit from engagement with more MTK holders and subject matter key informants. As MTK Holder Ducie Howe said, "We don't all think the same." It would be enriching to engage with people from communities not represented in this study, especially Annapolis Valley First Nation considering the community's proximity to the target landscapes (Figure 7), as well as Mi'kmaq who have more extensive personal experiences with the dykes and dykelands, such as Mi'kmaw farmers of such land, if any exist. For more detailed histories of the Mi'kmaq in the context of dykes, participants also suggested consulting subject matter key informants at Fundy Geological

Museum and Parks Canada (Fort Ann and Port Royal, both early European settlements). We were not able to do so given our time limitations.

It would also be beneficial to engage more with language through Mi'kmaw language specialists. Though they were asked, none of the participants shared Mi'kmaw words associated with the target landscapes. Marshall et al. (2007) say, "Anything you need to know is in the language. The voice of the language is in the land" (p. 177). Language has embodied meanings and lessons that enlighten how the Mi'kmaq value the coastal landscapes and approach adaptation (M'sɨt No'kmaq et al., 2021; Young, 2018). As suggested by many participants, this research would also be enriched by incorporating Mi'kmaw legends and stories (Gloade, n.d.). M'sɨt Nokmaq et al. (2021) emphasize "Indigenous stories are the platform for teaching Indigenous worldviews, values, culture, and how to live with and uphold responsibilities to the land" (p. 847).

3.6 Conclusion

The results of this study contribute to understanding how L'nu use, relate to, and value the dyke and tidal wetland systems, as well as how they approach coastal adaptation decision-making in this context. Overall, Mi'kmaq align with the land by considering other beings (M'sɨt No'kmaq) and respecting the integrity, diversity, or productivity of the coast (Netukulimk). Their approaches are informed by long considerations of time and by the sacredness of the Bay of Fundy. As a result, the participants demonstrated an affinity towards wetland restoration over dyke maintenance. Tidal wetlands embody Netukulimk: they are home to many relative species, they are naturally occurring, and they are a milieu for harvesting sacred medicines. Wetland restoration is described as an opportunity to enact reconciliation with Mi'kmaq by realigning land relations to honor

Netukulimk and M'sit No'kmaq. Correspondingly, the participants held an aversion towards dyke maintenance as they are human constructed, interrupt water flow, and obstruct habitat. Dykes generally do not respect Netukulimk or the wellbeing of M'sit No'kmaq, they violate laws and infringe on treaty rights, and they are inevitably going to be overtopped by continuous coastal dynamics.

The participants demonstrated balance in their approach to these alternatives by considering landowners and farmers for whom wetland restoration will be difficult and disruptive. Some dykes may be worth maintaining due to flood protection, recreation, and Acadian history. Dykes that store archeological records must be approached on a case-by-case basis to honor Mi'kmaw sovereignty and rights. If restoration were to occur, the participants emphasized doing so in a good, sustainable way.

Overall, the decision process is highly complex and must involve all impacted communities. It will be important to think on a longer timeline by considering the impacts on future generations. The current-day approach may be an opportunity to enact reconciliation in the spirit of future generations and ancestors. Mi'kmaw lessons for re-aligning land relations are fundamental to doing resource management in a way that honors Mi'kmaw rights in Mi'kma'ki.

CHAPTER 4 DISCUSSION & CONCLUSION

To continue aligning with multi-scale movements that foreground Indigenous rights, resilience, and resurgence, it is essential to interrogate conservation and the dominantly Eurocentric frameworks that underpin it (Howitt & Suchet-Pearson, 2006; Muller et al., 2019). ES is among the most recognized frameworks within conservation that is used to discern nature's value according to its use for people (instrumental values) and, more debatably, its value independent of people (intrinsic values) (Batavia & Nelson, 2017; Millennium Ecosystem Assessment, 2005). Implicit within such conceptualizations is a dichotomy between people and nature that is not salient in many Indigenous peoples' ways of relating to the land (Cajete, 2000; Howitt & Suchet-Pearson, 2006; Normyle et al., 2022; Pascua et al., 2017; Stoeckl et al., 2021; Wilson, 2008).

An additional class of values, relational values, has emerged within environmental valuation discourses to better capture how individuals and collectives truly value, think of, and make choices around nature, which includes "preferences, principles, and virtues" (Chan et al., 2016). Relational values derive from the interrelations and mutuality between people and place (Chan et al., 2016, 2018; Díaz et al., 2015; Pascual et al., 2017). For many Indigenous people, such values have been integral and co-developing from relationships with the land since time immemorial (Cajete, 2000; Gould et al., 2019; Sheremata, 2018). Relational conceptualizations of values therefore appear better aligned with Indigenous ways of knowing and being than intrinsic and instrumental framings (Cajete, 2000; Gould et al., 2019; Sheremata, 2018). Relational values is too within environmental valuation literatures to fuel synthesis of its own use in Indigenous contexts. This study aimed to enrich descriptions and classifications of Indigenous

relational values using a scoping literature review methodology with the term's antecedent concepts and subsequently engage with these findings in a case study on Mi'kmaw approaches to adaptation decision-making along Nova Scotia's Bay of Fundy coast.

4.1 Summary of Findings

4.1.1 Enriching Descriptions and Classifications of Indigenous Relational Values

Using Scopus, we conducted a scoping review of peer-reviewed studies published between 2002-2021. We used key terms corresponding to relational values, nature, and Indigeneity to locate studies that describe relational values of nature among Indigenous people, whether directly (i.e., through an intentional value or service assessment) or indirectly (i.e., values emerged through studies with other intentions). We limited the search results by subject area, location, type of publication, and year of publication to achieve a feasible breadth for a scoping review and automatically filtered the initial query results using a bigram methodology in R (Gerl, 2021; R Core Team, 2022). Two-word bigrams from the original query's titles, abstracts, and keywords were filtered and used to increase the specificity of the original relational value key terms in a subsequent search. This narrowed the query results to scale manageable for manual filtering, which produced 27 articles for full-text analysis. These articles were thematically coded in NVivo 12 using a blended inductive and deductive approach (QSR International Pty Ltd., 2018): we deductively coded occurrences of previously defined relational values and inductively coded any other occurrence of emergent relational values or relevant themes. To assess the co-emergence of relational values, we generated co-emergence matrices.

The review demonstrated the prevalence of relational values previously established in environmental valuation discourses while it also enriched our understandings of Indigenous relational values with emergent concepts and themes that meaningfully align with principles that are central to many Indigenous peoples. Overall, many values previously outlined by Chan et al. (2016) were described in the review (social responsibility, moral responsibility, eudaimonic stewardship, social cohesion, individual and cultural identity, and belonging). Virtuous stewardship was the only established relational value that was not present in the corpus. We identified four relational value concepts that were not among the original concepts. *Cultural responsibility*, describing a culturally originating obligation to care for nature, and *reciprocal stewardship*, describing a care for nature as a response to nature's care for humans, embody the significance of relationships between humans and non-human beings. These arise on a newly proposed universal scale, which encompasses non-human beings (e.g., wildlife, plants, spiritual forms). The two other emergent values emphasize the unique and irreplaceable nature of relationships with place: *cultural cohesion,* which describes place as a mediator and connection between people and culture, and s*ocial structuring*, which describes how elements of place moderate social structures within human societies. Among all the values described herein, individual identity, social responsibility, and virtuous stewardship were the least commonly discussed, while *cultural cohesion* was, by an extensive margin, the most described value, followed by social cohesion. This suggests an overall prioritization of collective-scale values in indigenous contexts.

Beyond value concepts, the literature also demonstrated various facets depicting how relational values arise and are experienced. The relationships from which relational

values emerge may be based on kinship, whereby humans and non-human beings are kin, and their relations are maintained through reciprocal care and responsibilities. Certain values, including *cultural cohesion*, social cohesion, cultural identity, and *cultural responsibility*, appear closely associated or bundled. The values may also arise on expansive timescales, encompassing ancestors from the distant past and generations into the future, and emerge in desirable or undesirable ways, in the case of disvalues. Overall, relational values are frequently embodied. Language is specifically recognized as an essential means through which values are mediated and reinforced. This underscores the importance of preserving and protecting such embodiments and approaching values assessments with suitable methods and literacy. Though not claiming to be comprehensive, the classifications and descriptions emerging from this review contribute to a more situated and robust understanding of Indigenous relational values.

4.1.2 Mi'kmaw Lessons for Bay of Fundy Adaptation Decision-making

Guided by a community-based approach, researchers from Dalhousie University and the Confederacy of Mainland Mi'kmaq collaborated to understand how Mi'kmaq navigate adaptation decision-making along Nova Scotia's Bay of Fundy coast. Kara Pictou, the primary collaborator from the Confederacy of Mainland Mi'kmaq, purposively recruited recognized MTK holders from the constituent communities of Confederacy of Mainland Mi'kmaq. Kara and Emily together conducted MTK semi-structured interviews, which were guided by pre-drafted questions and adopted culturally relevant practices (e.g., gifting tobacco) and additional supports (e.g., translation services). Only Emily's portions of the interviews were analyzed in this research. After five MTK interviews, the Dalhousie University team independently recruited two settler informants who were

asked a similar range of questions as the MTK holders with additional questions that targeted their area of expertise with the goal of addressing content gaps that were not resolved in the initial MTK interviews.

With consent, all interviews were recorded, transcribed, and then sent back to the participants for optional revisions of the transcript (i.e., member checking). We then used a blended deductive and inductive coding method to analyze the transcripts. We deductively coded for themes of relational values, as identified in Chapter 2, and for instrumental services described by ES. We inductively coded any other relevant descriptions of Mi'kmaw experiences in dyke, dykelands, and tidal wetland systems and descriptions of how Mi'kmaq approach coastal adaptation decision-making. The initial findings were summarized in a short video and participants were given the option to provide feedback. After their feedback was received, the findings were revised, validated by the Confederacy of Mainland Mi'kmaq, and then presented at a gathering with recognized Mi'kmaw Water Protectors, Grassroots Grandmothers, and Elders. The group demonstrated their support for the research findings. The validated results were prepared into this thesis; they will also be prepared into a plain language summary for the Confederacy of Mainland Mi'kmaq, a peer-reviewed manuscript, and a publicly available summary video.

The participants demonstrated two overlapping principles that mediated how Mi'kmaq use, relate to, and value the dyke and tidal wetland systems, as well as how they approach adaptation decision-making in this context. First, Mi'kmaq understand other beings as kin, as expressed through M'sɨt No'kmaq. Second, they are guided by Netukulimk, a natural law that embodies sustainability by honoring the wellbeing of Mother Nature

while maintaining human well-being (McMillan & Prosper, 2016; M'sɨt No'kmaq et al., 2021). Considered together, M'sɨt No'kmaq and Netukulimk informed a general preference towards restoring wetlands. Tidal wetlands provide habitat to relative species and are a naturally occurring system. They are also a milieu for harvesting sacred medicines, an important social and cultural practice, and they sequester carbon, which mitigates climate change. The pre-dyked, wetland-abundant Bay of Fundy coast was considered a Mi'kmaw cultural landscape. Correspondingly, the participants held an aversion towards maintaining dykes that reflects M'sɨt No'kmaq and Netukulimk: dykes are human constructed, interrupt water flow, and obstruct the habitat of other beings. The participants did not describe much personal use for dykes; rather, they emphasized how dykes violate laws and infringe on treaty rights, and they are inevitably going to be overtopped by continuous coastal dynamics.

Though participants were generally favourable towards wetland restoration and averse to dyke maintenance, they were balanced in these approaches. They considered how wetland restoration will be difficult and disruptive for landowners and farmers and that some dykes may be worth maintaining due to flood protection, recreation, and Acadian history. Archeological records may be present in dykelands and could be impacted by the rewetting process and dismantling dykes. There is a large variety of possible archeological resources as well as a variety of options for managing them; the participants therefore suggested approaching archeological management on a case-by-case basis. When discussing the overall decision processes, the participants said they are going to be complex and that all impacted communities should be involved. They underscored the importance of thinking on a long timescale by considering the impacts on

future generations, with wetland restoration being described as a possible opportunity for reconciliation on behalf of future generations as well as ancestors. Listening to Mi'kmaw lessons for re-aligning land relations is fundamental to doing resource management in a way that honors Mi'kmaw rights in Mi'kma'ki and is especially significant given federal and provincial government commitments to Indigenous rights and reconciliation.

4.2 Insights for Environmental Valuation from Mi'kmaw Relational Values in the Dykes and Tidal Wetlands

Relational values were significant and meaningful for articulating how the participants navigate adaption decision-making in the Bay of Fundy. If we were to review this case study exclusively in terms of instrumental and intrinsic value, we would see that the participants described minimally using dykes for recreation and flood protection, while wetlands provide sweetgrass and sequester carbon. Relational thinking revealed the underlying principles that guided the participants' more nuanced perspectives of how Mi'kmaq relate to the landscapes and adaptation. Because relational values better represent non-human beings, we were able to understand that the kin-relationship Mi'kmaq have with other beings, embodied in M'sɨt No'kmaq, nurtured a responsibility for their care and protection, thereby framing a strong preference for tidal wetlands over dykes. Likewise, we captured the value of sweetgrass as far more than instrumental: as a medicine used in ceremony, it is a mediator of social and cultural life (social cohesion and *cultural cohesion*; Kimmerer, 2013). These contributions support the growing literature that argue for expanding beyond ES when articulating Indigenous values and demonstrate relational conceptualizations of value as a significant and meaningful way of doing so (Bataille et al., 2021; Gould et al., 2019; Klain et al., 2017; Pascua et al., 2017; S. Russell & Ens, 2020; Sheremata, 2018; Stoeckl et al., 2021).

Our understanding of relational values was expanded and enriched by considering them in the Bay of Fundy case study (Box 2). Certain themes from the scoping literature review (Chapter 2) were clearly demonstrated in the Bay of Fundy case study (Chapter 3), while others were not (Table 10). Kin-relationships were highly significant in both studies and gave rise to various relational values. Relational values were likewise bundled and experienced as both desirable (values) and undesirable (disvalues), generally corresponding respectively to the wetland and dykeland systems in Chapter 3. Relational values were also embodied in Mi'kmaw language and natural law. However, among the Bay of Fundy interview participants, there was no clear indication that relational values may be place-based or span deep time. These may have been implicit aspects of the values. For example, the *cultural cohesion* and social cohesion derived from sweetgrass may inherently contribute to cohesion across generations, considering a deep time span; however, the participants did not explicitly say this.

Box 2. Summary of insights on the originally proposed classifications and descriptions of relational values from Mi'kmaw relational values in the Bay of Fundy tidal wetlands

- Relational values revealed the underlying principles, including M'sɨt No'kmaq and Netukulimk, that guided the interview participants' nuanced perspectives of how Mi'kmaq relate to the landscapes and adaptation
- Relational values may be better understood through embodied forms of sharing knowledge, rather than through verbal articulation (e.g., interviewing) as suggested by the implicit nature of relational values and their presence in stories of the participants
- Relational values do not only span large expanses of time – they also emerge from principles that have evolved over and embody such expanses of time
- "Cultural" may not be the best suited term described responsibilities that stem from the Creator and natural laws, as we had originally posited in *cultural responsibility*, because these are more sacred and/or are from the land, not culture.

Table 10. Connecting findings on the source relationships, characteristics, and embodiments of relational values from the scoping literature review with the Bay of Fundy case study.

	Scoping review finding	**Bay of Fundy case study finding**
Source relationships	Relational values may arise from kin-relationships with non-human beings	M'sɨt No'kmaq, a Mi'kmaw word describing kinship with other beings, embodies the value "moral responsibility to non-human beings"
Characteristics	Relational values are bundled	Both social and *cultural* cohesion co-emerge from sweetgrass
	Relational values tend to be specific to place	*No explicit evidence*
	Relational values may be experienced desirably or undesirably (relational disvalues)	Relational disvalues emerged from dykes and dykelands

	Relational values span deep time and may involve ancestors from the distant past or seven generations into the future	*No explicit evidence*
Embodiments	Relational values are embodied in language, stewardship approaches, and other manifestations of peoples' worldviews and culture	The Mi'kmaw word M'sɨt No'kmaq and the natural law Netukulimk embodied relational values

The implicit and embodied nature of relational values in this context indicates the importance of familiarity with the context and using methods that elucidate embodied knowledge. Were the authors of this research unfamiliar with sweetgrass, we may not have deduced the associated implicit relational values. Moreover, certain research methods better capture implicit meanings that are carried in embodied knowledge, such as those that emphasize storytelling more directly than semi-structured interviewing and those that do not depend on verbal articulation of values (e.g., going out on the land together). Such methods have critically been shown as important when conducting research with Indigenous people (Drawson et al., 2017; Poff, 2006).

Though no values explicitly arose across time scales as they had in the scoping review, certain values embodied and stemmed from such expanses of time. M'sɨt No'kmaq and Netukulimk, for example, embody deep time perspectives and emerge from longstanding relationships with the land. This suggests that relational values may not only be experienced across generations but also stem from values, principles, and preferences that are rooted in deep time. This is supported by literature on Indigenous relational values, where many relational values likewise stemmed from longstanding principles among the

respective Indigenous communities (Bataille et al., 2021; Gould et al., 2019; S. Russell & Ens, 2020; Sheremata, 2018)

Through this case study, we also recognized that "cultural" is likely not the best suited term to capture natural laws or obligations that stem from the Creator; rather, deducing these to "culture" may be inappropriate, inaccurate, or both as "they were not created by humans" but instead emerge from the land (M'sit No'kmaq et al., 2021, p. 846). This could be reconsidered in future iterations of the relational value classifications, such as by adding an additional value classification (e.g., *sacred responsibility* or *inherited responsibility*).

There is also evidence that suggests additional values beyond those we proposed in the scoping review. MTK Holder Ducie explained that restoring dykes to tidal wetlands would be a form of reconciliation in the spirit of future generations. She emphasized, "Any kind of real reconciliation has to come through the land." Her explanation may enlighten reconciliation as a relational value. Consider the TRC's definition of reconciliation: "[Reconciliation] is about coming to terms with events of the past in a manner that overcomes conflict and establishes a respectful and healthy relationship among people, going forward" (TRC, 2015a, p. 6). This definition's emphasis on relationships among people hints towards social cohesion and healing – not healing within an individual but healing relationally among people who harmed and people who have been harmed. As such, reconciliation may be considered relational among people and, as emphasized by MTK Holder Ducie, through the land. In these ways, reconciliation aligns with definitions of relational values. Similar to other relational values emerging in this research, it may also span multiple generations, considering

ancestors and seven generations into the future. In addition, the idea of healing as relational is reflected in Dr. McLeod Leslie's descriptions of archeology: connecting with ancestors and the past through archeological materials provides a relational form of healing. To continue enriching and refining relational values, it will be critical to apply them in further case studies.

4.3 Reflection on Positionality

As in 0, this section on positionality is written in the first person by Emily. As I had anticipated, my settler identity presented most prominently throughout this research process. I expected it may be challenging to build trust with Mi'kmaw research partners and participants given the well-founded skepticism that Indigenous people may hold towards academia (Guillemin et al., 2016). I was also concerned about my ability as a settler to meaningfully and accurately curate, synthesize, and write about the knowledge of MTK holders (e.g., Toombs et al., 2019). I ultimately did not find it overly challenging to build trust with the Mi'kmaw partners and interview participants. Because of my initial concern, I was very attentive to learning about the Mi'kmaq, Mi'kma'ki, and respectful partnerships. My research partner, Kara Pictou, graciously informed me of community protocols that allowed me to demonstrate respect to the MTK holders, such as offering gifts before interviewing. I largely found that the people I worked with welcomed anyone who is supportive of their causes: protecting the water, other living beings (especially fish), the land, and their people. I would carefully demonstrate my respect and intentions at the beginning of and throughout our relationships, and people were overwhelmingly receptive.

I sought on multiple occasions to validate the results of this research with MTK holders, including people who were not interview participants, which eased my concerned about meaningfully and accurately conducting this research. The participants provided clarifications and supportive feedback on my video summary of initial results, and several Mi'kmaw Water Protectors, Grassroots Grandmothers, and elders demonstrated their support for the work at a serendipitous workshop where I presented the refined results. Overall, six of the seven interview participants validated the findings. I had trouble connecting with the seventh for this task, though we have been in contact about other topics since this research was conducted. The participants' support provided me greater confidence in this work. Nonetheless, I am aware that this work would have benefited from greater collaboration or if it was led completely by someone who is Mi'kmaq. It is gratifying to have the support and validation of the MTK holders, but it would be even more instructive to have a Mi'kmaw researcher conduct the data curation, analysis, and writing. This applies to the literature review chapter as well – the research process and outcomes would differ if the work was conducted more collaboratively or carried out by Indigenous people/researchers, who may have a more extensive contextual knowledge than outsider researchers as well as a greater embodied knowledge of Indigenous ways of knowing, being, and relating to the land.

4.4 Study Limitations

The classifications and descriptions of relational values used in this research are based on a scoping review, which is limited in breadth. There may have been studies that were erroneously excluded through automated or manual screening, and there may be ranges of literature, peer-reviewed and otherwise, that would be informative for this work that were

not considered in this instance. We chose an approach that aimed to balance the depth of thematic findings with the immense breadth of potentially applicable studies. Likewise, we relied on a single database, Scopus, which is moderated by the decisions of the Scopus Content Selection and Advisory Board and may be prone to biases as a subsidiary of a major journal publisher (Elsevier). Our review also relies on the corpus articles and their methods of data curation, synthesis, and writing, upon which the written work provides a limited lens. Notably, common Western approaches to data curation rely on verbal articulation of values, while Indigenous people may more often demonstrate or embody values (Gould et al., 2019).

Our case study in the Bay of Fundy dykes and tidal wetlands was primarily limited by researcher capacity. As a master's student, Emily had a limited timeframe and learning capacity to engage with a greater diversity of research methods and participants. The Confederacy of Mainland Mi'kmaq, as a not-for-profit organization, experiences high staff turnover and had a limited logistic capacity to facilitate this research. Consequently, we interviewed a limited number and diversity of people. We developed questions specifically about the richness and significance of language in the focal landscapes that the research participants were unable to answer (though they also expressed curiosity about these questions when they were asked; e.g., questions six and ten, Appendix D). We intentionally tried to frame the questions in ways that encouraged storytelling and elucidating embodied knowledge (e.g., question two, Appendix D, reads "Are there stories in your community about when the wetlands were drained for agriculture?"). Nonetheless, semi-structured interviewing relies heavily of verbal articulation of values,

and this work was particularly limited in Mi'kmaq who have extensive personal experience with dykes and who are fluent in the Mi'kmaq language.

4.5 Opportunities for Future Knowledge Connection

We have intentionally framed this section as "opportunities for future knowledge connection" rather than the more common "knowledge gaps" because the term "gap" implies a void in knowledge. There is existing and likely rich knowledge on the topics we discuss in this section, it is simply not known to us, the authors, or described within the scientific literature, based on our situated knowledge at the time of writing this. We acknowledge that describing knowledge in the literature is a tradition of Western science. It is not requisite, possible, or ethical for all forms of knowledge to be described in the literature, especially knowledge embedded within Indigenous communities. Essentially, after conducting the research described herein, we suggest the following as next steps to deepen the scholarship on topics relevant to relational values and Bay of Fundy adaptation decision-making, if appropriate.

As we described in 2.2.3 Characterizing Indigenous Relational Values, classification systems are never complete and are instead intended to be contextually useful (Bowker & Star, 2000). The completeness and applicability of the classifications and descriptions emerging from this scoping review are uncertain. Importantly, we did not engage with Indigenous approaches to classification, though publications on this topic exist (e.g., Agrawal, 2002; Cherry & Mukunda, 2015). To refine and validate our research, it will be important to apply and expand the relational value classifications in additional settings, ideally led by Indigenous people. We also recommend engaging with topics that we have

specifically identified as necessary to enrich the classifications (e.g., spirit; Gould et al., 2019).

This research underlined a clear need for methods that target embodied knowledge when evaluating relational values. We could not be certain if the articles within the scoping review engaged meaningfully with such methods, and we did not deeply engage with such methods in the Bay of Fundy case study. We suggest conducting future research with methods that focus on embodied knowledge, rather than relying on verbal articulation, to validate their role in discerning relational values (e.g., going out on the land to demonstrate stewardship practices and learn the language of the place). Publications like Drawson et al. (2017) and Wilson (2008) specifically detail Indigenous research methods.

On this point, we are uncertain whether there may be other values associated with dykes or tidal wetlands than we heard through this work because we used methods that heavily relied on verbally articulation of values. We recommend using methods that elucidate embodied knowledge, as described above. We also recommend engaging with a greater diversity of MTK holders, language specialists, and Mi'kmaq who have more extensive personal experiences with dykes. We echo many of the interview participants in saying that there is also an abundance of lessons on these topics and many others in Mi'kmaw legends and stories.

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APPENDIX B LIST OF STUDIES THAT INTEGRATE RELATIONAL VALUES IN CRITIQUES AND SCHEMES OF INDIGENOUS RESOURCE MANAGEMENT

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APPENDIX C COLLABORATION AGREEMENT BETWEEN DALHOUSIE UNIVERSITY AND THE CONFEDERACY OF MAINLAND MI'KMAQ

DALHOUSIE UNIVERSITY

Collaboration Agreement

June 2, 2021

Re: *Agreement of tasks for the Bay of Fundy Dykelands Adaptation project between researchers based at Dalhousie University and the Confederacy of Mainland Mi'kmaq (CMM)*

The Board of Directors for the Confederacy of Mainland Mi'kmaq (CMM) have passed a motion that indicates their approval for Emily Wells' research project about coastal adaptation in Nova Scotia's Bay of Fundy. This "Collaboration Agreement" serves to outline the tasks involved in this collaboration between Emily, a Master of Environmental Studies student at Dalhousie University, and Kara Pictou, Community-Based Monitoring Coordinator with CMM.

i. **Kara's tasks**
   a. *Participant recruitment and communication*: Kara will recruit participants for the interviews. She will contact participants about the studies via telephone and/or email and then arrange a time place that suits the participants and their communities. She may facilitate communication between Emily and the participants (e.g., providing contact details to deliver transcripts).
   b. *Interview accommodations*: Through CMM, Kara is able to offer additional supports to participants. She may offer the support of a Mi'kmaq-English translator and a Resolution Health Support Advisor to participants as needed.
   c. *Project design*: Kara may offer Emily support with project design as necessary (e.g., providing insight on ethics applications or final reports).

ii. **Emily's tasks**
   a. *Project design and implementation*: As the lead researcher, Emily will prepare project proposals and final documents. She will lead the data analysis with the help of her supervisory committee.
   b. *Interviewing*: Emily will lead a portion of the interview to address questions that are pertinent to her research objectives.

iii. **Managerial tasks**
   a. *Honoraria*: The participants will be provided honoraria of $100-250. Dalhousie University will provide the funding and CMM will help deliver it to interview participants.
   b. *Long-term storage*: CMM will store any interview data that participants have consented to provide. They will protect the data while ensuring community access.

By signing below, you indicate your approval of the tasks expected for this collaboration. The tasks may be modified, added, or removed throughout the study period through a discussion between researchers.

Emily Wells	Dalhousie University	June 2, 2021
[redacted]	Affiliation	Date
Signature		

Kara Pictou	The Confederacy of Mainland Mi'kmaq	June 7, 2021
[redacted]	Affiliation	Date
Signature		

APPENDIX D INTERVIEW QUESTION SET

I'm interested in talking about the Bay of Fundy and climate change adaptation in this region.

1. What is your history with the Bay of Fundy coast?

As you may know, Acadian settlers built a series of dykes in the Bay, starting in the 1600s.

2. Are there stories in your community about when the wetlands were drained for agriculture?

3. How do you use the dykes, the protective structures, if at all?
   Follow up: Do you do this activity on the dykes with others, or do you see others in your community doing it?

4. How do you use the dykelands -- that is, the lands that the dykes protect?
   Follow up: Do you do this activity on the dykelands with others, or do you see others in your community doing it?

5. (only ask if there ARE uses reported in 3 or 4) Are there any ways that you or other community members contribute to the persistence of dykes and dykelands while you're there? (e.g., if asked, avoiding eroding the vegetation)

6. Do you know of any words to describe dykes and dykelands in the Mi'kmaq language?

7. Do the dykes and dykelands hold any (other) significance for you?

The dykes were, of course, constructed to drain tidal wetlands. There are still wetland habitats in the Bay of Fundy. I'm curious about your relationship with these habitats.

8. How do you use the tidal wetlands, if at all?
   Follow up: Do you do this activity in the wetlands with others, or see others in your community doing it?
   Follow up: Is there anything you feel you contribute to the tidal wetland ecosystem while you're there? Do you take anything away from the wetlands?

9. Are there stories in your community about tidal wetlands?

10. Do you know of any words to describe tidal wetlands in the Mi'kmaq language?

11. Do the wetlands hold any other significance for you?

Climate change is often talked about these days, especially around coasts.

12. Have you observed any impacts of climate change in the Bay of Fundy?

It seems that the options for adaptation around the dykelands are to raise and reinforce some dykes, or to restore some dykelands to tidal wetlands.

13. What would be the implications for you if the existing dykes were raised and reinforced?

14. What about the implications your family or community?

15. Are there particular dykelands you think should be maintained over others?

16. What would be the implications for you if the dykes were breached to restore wetlands? Often this involves building new dykes further back from the coast to protect any homes, for instance.

17. What about the implications for your family or community?

18. Are there particular dykelands you think should be converted back to salt marsh above others?

19. What do you think are the major points to consider when deciding between dykes and wetlands on a given site?

20. One thing that we have heard is that the archaeological materials stored in modern dykelands may become damaged if salt marshes are restored. Do you think this is a good enough reason to maintain them as dykeland?

21. Is there anything else that we might have missed? Do you have any thoughts or stories that you didn't have the opportunity to share?

Additional questions for subject matter key informants:

22. What are the procedures and options if Mi'kmaw archeological resources were to be found in a dyke or dykeland considered for restoration?

23. What are the points to consider specifically for fishing and fish passage when deciding between dykes and wetlands on a given site?