Biocultural Families and Leaders:
New Metaphors, Methods and Members for Environmental Connectivity in Unama'ki

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ABSTRACT

In this community inquiry into the importance of connectivity to the newly established Kluskap Indigenous Protected and Conserved Area (IPCA) in Unama'ki (Cape Breton), our team partnered with local knowledge-holders to develop locally appropriate definitions and metaphors for connectivity along with methodologies for understanding and visualizing its concrete manifestations, including by selecting species for geospatial modelling. The resulting process utilized salience, or consistent mention, of life forms in Mi'kmak placenames, oral teachings, workshop transcripts and Indigenous-led biological surveys to cumulatively nominate species for intensive discussion regarding connectivity with local knowledge-holders. These knowledge-holders came to define biocultural connectivity as that bundle of forces – known and revered by local community – which sustain mutually enriching relationships between a people and their place. Partners subsequently brought nominated species into conversation with the following identified major priorities for connectivity in their territory: connection between generations, connection to *Kepmej* – or taking action toward a Mi'kmaw Way of Life, and connection to healing. Our work generated several important outcomes: first, a set of species ready for leading the visualization of connectivity in and around Kluskap IPCA. This set of life forms is fully brought into a spatial visualization stage in our companion paper in this issue; second, a relational model of connectivity in which select species operate as leaders for family members, with leadership implying responsibility rather than hierarchy; and third, a work package for defining and visualizing connectivity locally and appropriately which is ready for dissemination to First Nations and Indigenous Peoples.

Keyword: *indigenous-led conservation, biocultural connectivity, Mi'kma'ki*

INTRODUCTION

This study documents efforts to support the Indigenous-Led call for research, titled “Connecting the Kluskap Indigenous Protected and Conserved Area (IPCA) to the Bras d’Or Lake Biosphere Reserve – A biocultural land, sea, and sky approach,” (Unama’ki Institute of Natural Resources, 2021) proposed and overseen by Unama’ki Institute of Natural Resources. IPCA’s are of a piece with other Indigenous-led environmental protection initiatives, such as those in Canada, U.S., Australia and New Zealand where communities have advanced cultural survival and territorial sovereignty outcomes using environmental conservation agendas. Similar programs to IPCA’s include Indigenous Guardians, Indigenous Protected Areas (IPA's), Indigenous Community and Conserved Areas (ICCA's) in Australia, and elsewhere, Tribal Parks. Of these, ICCA’s hold the most precedent, particularly through the deployment of indigenous rangers and watchmen as well as Caring for Country. This approach is broadly defined as "community-based environmental stewards who practice their cultural and traditional teachings on the land.” (Reed et al., 2020, p. 3)IPCA’s also known as Indigenous Protected Community and Conserved Areas (ICCA's) in Australia, and elsewhere, Tribal Parks. Perhaps uniquely, preservation of culture and language are the stated heart and soul of an IPCA (Indigenous Circle of Experts, 2018).

Meanwhile in applied ecology and environmental policy, it has unfortunately become normalized to enlist Indigenous Peoples' knowledge and priorities into an instrumental role in the service of technocratic applied ecology (Wall, 2024). This is exemplified in the CBD preamble, which states that such “knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles *relevant for the conservation and sustainable use of biological diversity*,”(United Nations, 1992) are to be respected, where relevance to aims defined by applied ecology would obviously be determined by applied ecologists. A disproportionate prioritization of the measurements of environmental well-being according to applied ecology, such as biological diversity subsumes robust and historic indigenous environmental values. Canada’s Indigenous Circle of Experts report succinctly rebuffs this orientation by stating,

> *ICE recommends that federal, provincial and territorial governments support IPCAs whether they count toward Target 1 or not. In many cases, IPCAs will be consistent with IUCN requirements for protected areas or “other effective area-based conservation measures” (OECMs); thus, IPCS’s may contribute to Canada’s targets under international agreements, such as the CBD (i.e., Aichi Target 11). However, not all IPCAs may contribute; and whether or not they contribute to Canada’s biodiversity targets, they should be supported by federal, provincial and territorial governments and other stakeholders. (Indigenous Circle of Experts, 2018, sec. 4.1)*

Therefore, in line with ICE’s rationale for warranting protection whether or not it contributed to pre-fabricated technocratic measurements, and in service to the mission and values of Unama'ki Institute of Natural Resources and the communities they support, our approach was at liberty to redefine connectivity, to dispel with the strictures that constrain its definition and usage, both conceptually and on the map. This required an advancement of current capabilities for identifying, understanding and visualizing connectivity that is mutually meaningful from a Mi'kmaw lens and from that of applied ecology.

Within applied ecology, connectivity is “the degree to which the landscape facilitates or impedes movement among resource patches” (Taylor et al., 1993, p. 571). It includes both structural connectivity, as it regards the shape, size and location of different features on the landscape as well as functional connectivity related to how individual organisms respond to the structure of the landscape (Brooks, 2003). Structural and functional connectivity are not mutually exclusive, as each works to inform the other. Anathema to ecological connectivity is landscape fragmentation, the splitting of contiguous habitat or land cover into smaller parcels that are functionally or structurally disconnected from one another (Turner et al., 2001). Fragmentation may occur naturally (e.g via

rivers) or through human influence on the landscape (e.g via roads). In our working conceptual frame, biocultural connectivity would necessarily include ecological connectivity insofar as it supports environmental well-being from the Mi'kmaq perspective. Yet, biocultural connectivity would necessarily extend beyond this to include the exquisite historical and on-going relationships between people and nature: between peoples like the Mi'kmaq and that land from which they sprouted (*weji-squalia'tiek*). To produce this new and needed perspective on biocultural connectivity, we endeavored to generate a broad platform for understanding and operationalizing the notion and its importance in great depth with knowledge-holders in the area of Unama'ki.

Finally, the abovementioned call for research required, "GIS Analysis - Using the information gathered, conduct a connectivity analysis to identify significant sites and habitat, priority properties for securement, restoration opportunities, and key players." This the identification of "biocultural indicators - a list of indicator species and habitat requirements for the design and long-term monitoring of" the connectivity we were to illustrate and define. Our approach to achieving these outcomes was to conduct two methodologically distinct companion studies in tandem with each other, one presented here tasked with qualitatively approaching and nominating a final set of species for modelling and another study tasked with entering these collaboratively nominated species into a geospatial model.

METHODS

Literature Review

The overall goal of our literature review exercise was to use the broad global literature documenting biocultural approaches to environmental conservation to envision and define the meaning of the term 'biocultural connectivity.' We conducted search focused on the existing scientific record dealing with 'biocultural connectivity' specifically.

We sought to learn about biocultural connectivity from this condensed library, selected for its advanced contribution to effective engagement with the concept of biocultural connectivity. For this we repeated the approach identified above in which we queried this library for mentions of connectivity-related terms such as family, relations, connectivity, connections, relationships, togetherness, kinship, corridor, migration, system, brothers, sisters, mother, father, uncle, aunt, care, reciprocity, gifts, holistic, and ties. We recorded and analyzed instances of these terms.

Work and Interviews with Local Knowledge-Keepers

UINR provided us with a list of local knowledge-holders, whom we invited to participate in a joined inquiry, interview and knowledge-sharing process. 10 individuals participated. Of these 8 have elected to be identified and serve as co-creators of resulting products such as this manuscript. A majority of these partners are Mi'kmak. The interview protocol was approved by the Dalhousie Research Ethics Board and the Mi'kmaq Research Approval as well as by Mi'kmaw Ethics Watch. Prior to interview activities, participants were asked to complete an informed consent exercise either verbally or in written form. In this process participants were informed in advance of the nature of the exercises which would take place. They were informed of their absolute right to cease participation for any reason and without explanation. Their preferences for attribution of their words and ideas were solicited and recorded, with the options ranging from full credit and attribution to no credit or attribution, with an open policy of negotiating case by case.

Interviews were conducted by phone or video conference according to the knowledge keeper's preference. Interviews followed a semi-structured approach. Participants were provided prompts, and were then encouraged to share their response with no time restrictions. In many cases, participants anticipated future prompts in which case these communications were organized during the transcription process. Interviews were conducted one-on-one with one exception of a married couple who preferred to speak with the interviewer together. Of 10 participants, 8 identified as Indigenous Mi'kmaq and 2 identified as white settler male.

The aim of our interview engagement was to elicit a community perspective on the priorities for connecting the emerging Kluskap IPCA. While our prompts were designed to keep a discussion focus on connectivity, participants defined the parameters of connection. In other words, our prompts were designed to bring up the 'big idea' of connection and to allow participants to fill in the idea with

their own thoughts, values and priorities, from the highly abstract to the highly concrete. Our questionnaire is provided in Appendix 1.

Saliency Analysis

In order to select a number of indicators to use in connectivity modelling, (i.e. species or species groups) we needed to investigate and quantity which might be 'salient' in Unama'ki. Salience basically means resonance or noticeability within a given material, such as texts or interview results. It has been discerned and measured in the ethnosciences based on frequency of mentions and order within listing exercises. In qualitative research, especially in ethnobiology (Nolan, 2014), saliency analysis involves analyzing comments, rhetoric, or other text to identify the most frequently used words, terms, or concepts. The recurrence of these elements throughout the surveyed texts is considered an indicator of significance (Buetow, 2010).

To determine salience of species or species groups, we consulted six key resources 1) A Combined list of UINR's 2012 study and a report generated by AMEC (AMEC, 2013; Unama'ki Institute of Natural Resources, 2012); 2) An oral tradition library compiled by the research team (See appendix 2); 3) a list of priority indicators identified by Kwilmu'kw Maw-klusuaqn (The Mikmaq Rights Initiative, personal correspondence); 4) A place names dataset derived for the target area from Ta'n Weji-squalia'tiek, the Mi'kmaq Placenames Project ("Ta'n Weji-squalia'tiek: Mi'kmaw Place Names," n.d.); and 5) species identified and discussed in the Bras d'Or Lakes Traditional Ecological Knowledge Workshop Proceedings (Doherty and Naug, 2006); and 6) the transcripts of interviews with knowledge-holders from this study.

From these resources, we assembled a list of species or species groups mentioned in each text. We observed a total of twenty mentioned species. The number of mentions was counted, and given an index score each species. Based on the knowledge holder's emphasis on language and local knowledge, we weighted species mentions in the Mi'kmaq place names and the Bras D'or Workshop report datasets more heavily (x1.5 vs. x1).

When comparing salience scores, we selected the highest-scoring species from each dataset. These included mammals, birds, trees, and plants. It also included species known for their harvest importance in spring, summer, fall and winter, as well as species understood to have strong association to coastal wetlands, inland riparian zones, forests, and clearing/edge space.

To determine biocultural leaders which could then be represented on the landscape of Unama'ki in geospatial connectivity modelling, we 1) worked with local participants to formulate an understanding of what it means for a species or species group to be culturally significant, 2) used pre-existing and records to determine which species or species groups may be of particular cultural significance to the Mi'kmaq, 3) developed and applied a 'salience scoring' protocol to identify 'leaders' so as to meet the limitations of the modelling requirements, and 4) applied locally important criteria to resulting information to nominate biocultural leaders.

When translating biocultural connectivity into discrete features for modelling, we wish to highlight a number of limitations. Firstly, scientific geospatial modelling techniques which are used to prioritize land areas have inherent limitations in the types of data they can accept and process. Secondly, we recognize the importance of recognizing the indivisible value of the land and the natural world, and as such make no effort to 'rank' aspects of the natural world as more important than others. This approach has proven consistently incompatible with the environmental value traditions of Indigenous Peoples and Local Communities (IPLCs) around the world, and was also expressly disfavored by the knowledge holders. We made an effort to identify and model environmental features which, as a set, represented salient attributes of the living world.

The environmental features considered included species or species groups from four salient families of life: mammals, birds, trees and lower plants. Features were to be modeled across a time dimension consisting of the four seasons from a western perspective, and representing the Mi'kmaw calendar. We also strove to include species or species groups that represented one or more landscape types common in Unama'ki including forest, coastal wetlands, inland riparian, and clearings/edge space. Finally, in congruence with participant guidance, we ensured that our final selection of features embodied elements of generational, *kepmej*, and healing connectivity.

Our final list of species and species groups (which we describe as 'biocultural leaders') in no way indicates a preference for these species or species groups by any individual or group, including

our interview participants. Our nomination of a species also indicates no particular value in relation to others, such as through a rank. Furthermore, no taxonomy – or system of compartmentalization or categorization – is implied. Each biocultural leader is inherently inalienable from all forms of life, whether species, families, kingdoms, landscapes, or habitats including any and all mentioned or cited in this report.

Validation
Explicit validation for the taxonomy (mammals, birds, trees and plants) and the salience of life form groups was sought from knowledge holders during subsequent interviews. No hierarchy or rank was implied in this process, but merely the notable nature and presence of the life forms was brought up and verified. We note that we gave knowledge holders opportunities to describe species they considered related to connectivity, and all mentioned were present in our existing dataset.

RESULTS

Literature Review
The main finding from our review of existing studies which directly cited 'biocultural connectivity' was that this concept was scarcely used or cited. Only 4 papers used the term (Table 1 and See Appendix 3). Furthermore, we found the conceptual bounds of the term's usage highly limited. To illustrate this observation, no use of the term was accompanied by a definition and, arguably, every case of usage we observed can be described as impromptu wordsmithing. There is one common employed meaning to two of the four citations: a general description of spatial dispersal of a distinct cultural pattern.

Table 1. Details from just 4 discovered papers which utilize the term 'biocultural connectivity'

Author-Year	Term Defined?	Employed Meaning
Hsiao-2020	No	Cross-border mobility and routine spatially dispersed engagement with lands.
Dunbar-2016	No	A hybridized nature/culture force which disperses across space in a pattern.
Pérez-Hämmerle-2022	No	Dubbed a "social attribute:" an example of the inherent complexity of wilderness alongside "ecosystem services, psychospirituality, and ecotourism." (p. 2)
Bautista and Smith-2019	No	Merely an unidentified important subject for future studies

Interviews
Three prominent areas of connectivity emerged. These were 1) connectivity through time, 2) *kepmej* ('to take action toward a Mi'kmaq way of life)'; and 3) healing. From here on out, these three important areas will structure the guidance from our knowledge keepers. We share their voices to give energy and clarity to the discussion. We note that these three principles are themselves connected and indivisible (Figure 3).

Figure 3 Biocultural connectivity bundle in Unama'ki. This includes three principles of connectivity as defined by interviewed knowledge holders: 1) Time – Language, Generations, Teachings; 2) *Kepmej* - Embodying the Mi'kmaw legacy of sustainability; sharing, regional influence, self-determination, values; and 3) Healing – personal, ecological, collective, and societal

From the sharing and teachings of the interviewed knowledge holders, we generated the methodology used and so report it here as a result. Furthermore, we put forward an operating defiition of biocultural connectivity as *the bundle of forces – known and revered by local community – which sustain mutually enriching relationships between a people and a place*. In the Unama'ki context, this bundle of forces includes Connectivity of Generations, *Kepmej*, and Healing.

Introducing Biocultural Families and Connectivity Leaders

We now strive to showcase an approach to representing and engaging culturally invaluable species that necessarily includes time, place and complexity of relations. First, in alignment with our broad literature review we sought to develop a relations-based approach rather than a systems approach. We took this to mean that we would steer clear from portraying the local value of nature as having any organizing principle rooted in linear causality, hierarchical taxonomy and/or pure function. Next, honoring insights offered by our partners, we held that any portrayal of environmental value must allow for obvious recognition and understanding of the connection between any single aspect with any other, including species, landscape types, people and more. At the same time, literature review and partner guidance converged on the importance of honoring and understanding groupings, dynamics and patterns. Finally, in the light of the foundations of significance outlined above, we argue that families offer an appropriate analogy to encompass and portray the longevity, place-specificity and relational complexity. However, in light of the spatial model requirements for a limited set of features, we find that the nomination of biocultural connectivity leaders drawn from each family appropriately honors local understandings of family and community. Consequently, the biocultural connectivity leaders put forward at the end of this section are leaders in the sense of accountability as emphasized by Elder Marshall in the previous section. They therefore should be seen as leaders in terms of responsibility rather than in any way to do with status or power.

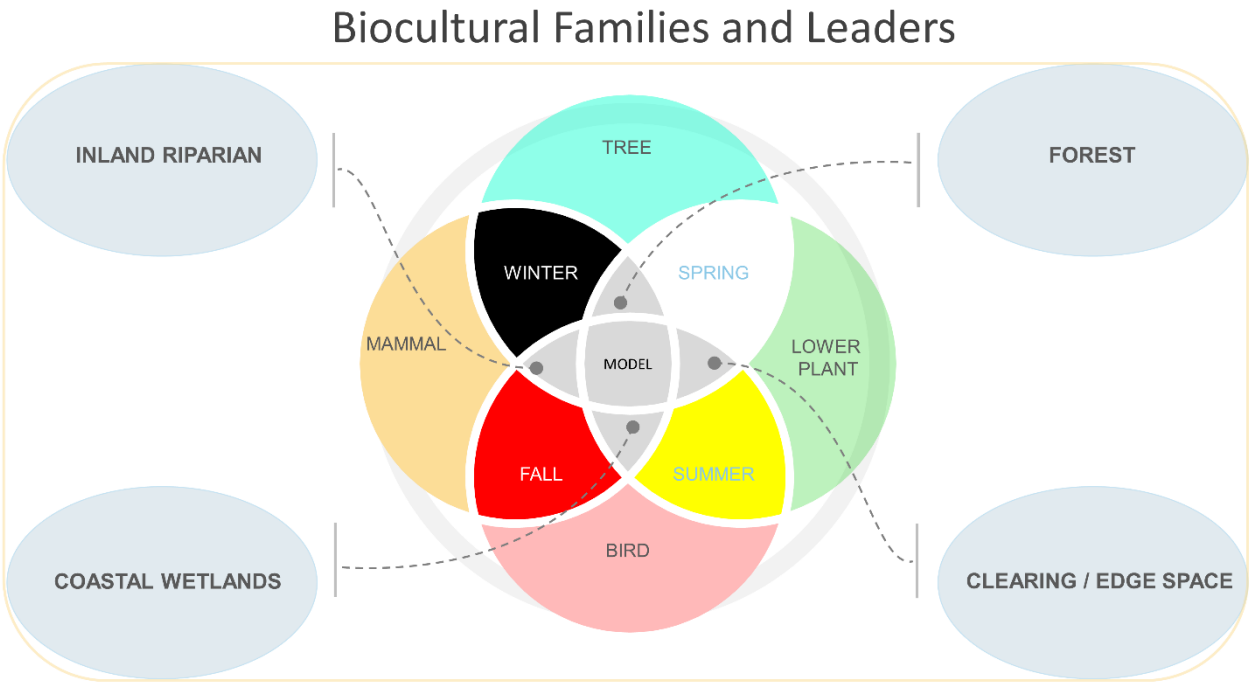

Figure 4 Biocultural families and leaders representation of traditional ecological value

Biocultural Collection and Salience Scoring Analysis

A breakdown of species mentions from our oral tradition library are shown in Figure 4.

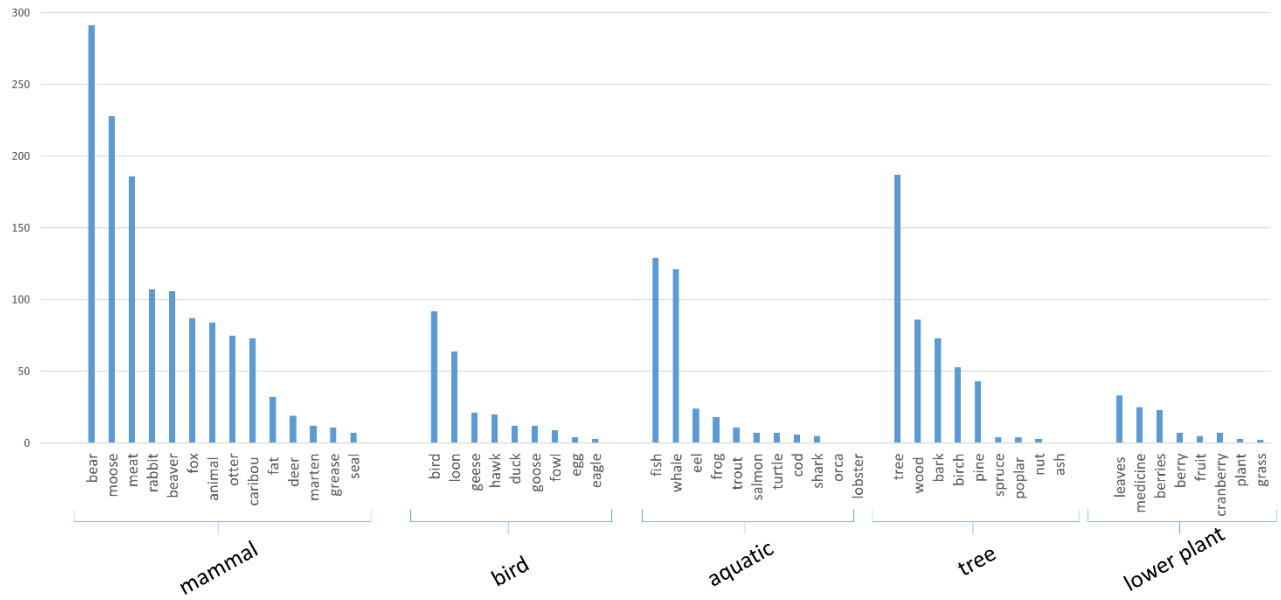

Figure 4 Citation counts of species terms in the oral tradition library, categorized by kingdom

The teachings and tradition library (Figure 4) reflects five lifeform categories which can be understood as inviolable members of Mi'kmaq environmental worldview (mammal, bird, aquatic, tree and lower plant).

Names of species recorded in the Mi'kmaq place names in the area of interest were compiled into a a *Mi'kmaw* language Names dataset. The following species were recorded in the place names in the area of interest: beaver, spruce, egg, seal, duck, lobster, cranberry, turtles, and duck (Figure 5). Because egg, cranberry, duck and goose may suggest multiple species, we grouped species from this data layer to 'berries' and 'waterfowl' more generally.

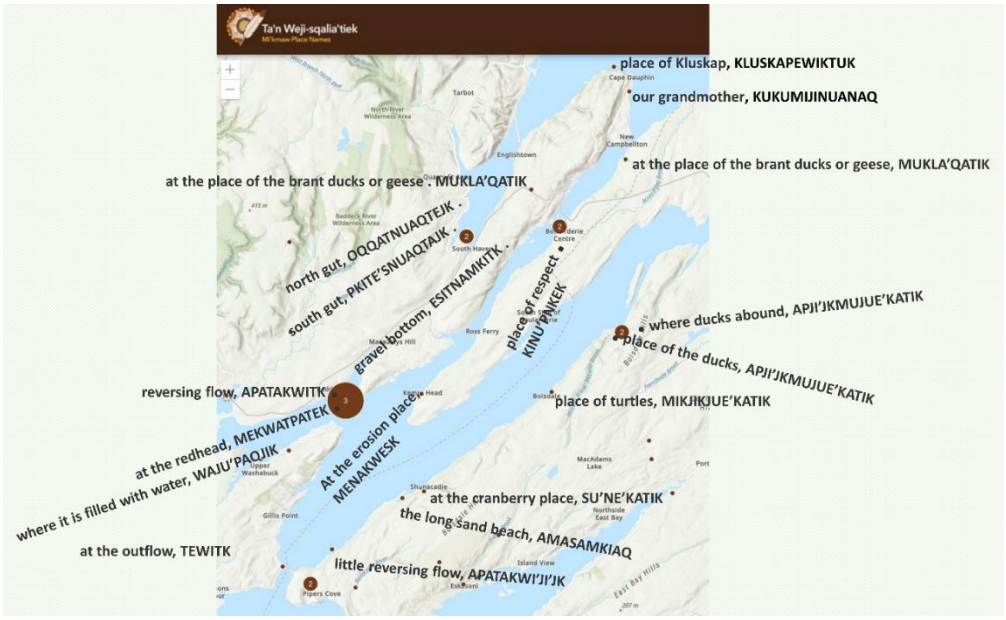

Figure 5 Mi'kmaq Place Names Project locations and names placed on the map

By scoring the salience of species in each dataset and combining those scores, we identified 20 species with the highest scores. These mammal, bird, tree, lower plants, and aquatic species (Table 2). A first observation is that numerous berry and water fowl species are present, as these were mentioned as groups in many of the datasets and not indicated by species as understood in the western scientific context. These crowd out mammals, and so since our criterion requires mammals, we needed to go deeper down the list, the first mammal of which was beaver. Eel had a high salience score, however, because of the limitations of the modeling approach, we were not able to directly include aquatic species.

Table 2. Top twenty species determined by salience score

Scientific Name	Mi'kmaw language Name	Common Name
Amelanchier canadensis	(Mi'kmaq word needed)	Indian Pear/ bilberry, serviceberry
Vaccinium oxycoccus	*su'naqsi*	Bog Cranberry
Anguilla rostrata	*katew*	American Eel
Amelanchier laevis	*kelmuetjimanaqsi*	Smooth Shadbush/Shadberry
Picea mariana	*kawatkuk*	Black Spruce
Prunus pensylvanica	*maskwenmaqsiey*	Pin Cherry
Ribes hirtellum	(Mi'kmaq word needed)	Swamp Gooseberry
Dendragapus canandensis	(Mi'kmaq word needed)	Partridge or Spruce Grouse
Aix sponsa	(Mi'kmaq word needed)	Wood duck
Anas acuta	(Mi'kmaq word needed)	Northern pintail
Anas crecca	(Mi'kmaq word needed)	Green-winged teal
Anas platyrhynchos	(Mi'kmaq word needed)	mallard duck
Anas rubripes	(Mi'kmaq word needed)	American black duck
Anser albifrons	(Mi'kmaq word needed)	Greater white-fronted goose
Anser caerulescens	(Mi'kmaq word needed)	Snow goose
Anser rossii	(Mi'kmaq word needed)	Ross's goose

We selected four species or species groups as 'biocultural leaders'. We chose beaver (*Kopit*, *Castor canadensis*), spruce (*kawatkw*, *Picea spp.*), berries (*Mi'kmaq word needed*), and waterfowl (*Mi'kmaq word needed*) (Figure 6). These leaders corresponded well to the seasons, to the landscape types identified as our criteria as well as to important dimensions of biocultural continuity for the target area as described in the previous report section. We describe these four leaders and their fit for a biocultural connectivity model in the area:

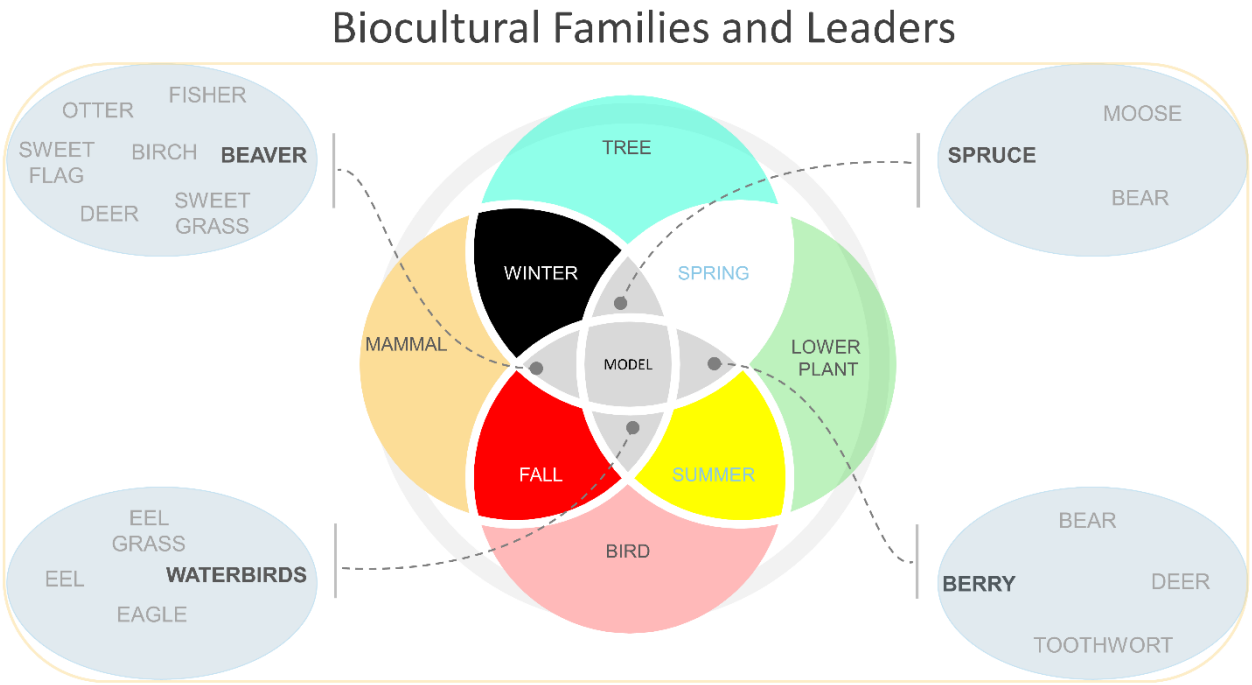

Figure 6 Biocultural families and connectivity leaders in and around Kluskap IPCA, and between the IPCA and the Bras D'or Lakes

Beaver is a known representative and pivotal member of inland riparian environments. Its vast effects materialize as iconic environments within Mi'kma'ki where a number of other species thrive. These include sweet grass, birch, sweet flag and numerous medicinal plants. Beaver traditionally hunted in the late fall and early winter after fattening time in summer and fall (W*ikiewiku's*) (MacLeod, 1995). They are a very salient member of traditional ecological teachings as embodied in the Kluskap tales. Interestingly, it is not just that beaver is revered on the land, beaver also represents a potent symbol of environmental accountability. Kluskap's actions routinely focus on ensuring beaver's right place on the land. Elder Marshall, in interview, also highlighted this meaning and importance of beaver as a landscape member that required maintenance as well as care. In terms of healing, beaver is an incomparably potent symbol, as it was once nearly extinct and is now thriving.

Spruce is one of many trees prized for its forest presence. Their utility is legendary. Its boughs were essential in the construction of *Wikuam* and its roots essential for canoe-making among other crafts. Mature spruce forests among others were vital areas for moose hunting in deep winter (*Kesikewiku's*), where moose foraged and could be caught in deep snow and dragged more easily than at other times.

Berries hardly need introduction. Their harvesting generally takes place in the spring and summer (*Kisikwekewiku's*), the time of berry-ripening, known as August in the Gregorian calendar. They are well documented to play a role in strong family tradition, intergenerational activities and in health (Parlee et al., 2005). They favor clearings, edge spaces and other areas where sunlight is abundant.

Waterbirds is a general term to describe any number of game birds and here reflects the prominence of coastal and brackish water wetlands in the area of interest. Their importance is especially notable in the target area where numerous place names bear the memory of their numbers and presence. While waterbirds can be hunted reasonably well throughout the year, they are fattened and prized in the fall. Egg harvesting, also enshrined in the place names, is of course a spring activity with its own time of the year named after it (*Pnatmuiku's*). The frequency of their mention in our oral tradition library and the ethnographic record is high.

Discussions

The words of knowledge holders are the best resource for situating the meaning and significance of the approach and resulting model generated in this collaboration. At the outset, it is important to mark the notable differences between the frames within which knowledge holders chose to discuss connectivity and the conventional framing of connectivity within the applied ecological sciences. Spatial connectivity, the primary mode for connectivity in applied ecological science (especially in terms of monitoring and evaluation) was not frequently emphasized by knowledge-holders. Likewise, the general applied ecological framing of connectivity was not discussed and in many cases was contradicted by participant views. For instance, spatial corridors – a very common applied ecological measure for improving connectivity – were critiqued by knowledge holders for being insufficient. They were cited as causes of other environmental problems such as concentrating and spreading Lyme disease-bearing ticks. Furthermore, the umbrella issue for which connectivity is seen as the antidote for applied ecology – fragmentation –was not emphasized, and was alluded to only via a few complaints of excessive vacation home construction. Rather, the changing conditions of existing significant natural areas, including pollution, temperature change, water level change, commercial planting regimes, the decline of favored species occurrence, and invasive species were very commonly cited. In fact, as will be delved into further later in this section, human influence and presence was not criticized but for a few instances. Furthermore, environmental management itself - both as a practice and a philosophy - received heavy critique and was cited as one major threat to the kinds of connectivity participants valued. Table 1 below offers a mnemonic for the holistic and appropriate domain of connectivity for knowledge holders.

Table 1 Essential Connections Bundle in Unama'ki

Connectivity through time
Language
Generations
Teachings
Kepmej: To Take Action Towards Mi'kmaw Way of Life
Embodying Mi'kmaq Legacy of Sustainability
Sharing, Regional Influence, and Self-Determination
Values and worldview
Healing

Connectivity Through Time

Language

Connections through time were described in a wide variety of ways. The Mi'kmaw language was one such evident priority. Whether seen as a vehicle for invaluable teachings, as a natural offering, a gift of the land, or as a necessary political achievement, nearly all participants said language was absolutely key to meaningful connection. Some hint of its centrality to First Nations Canadian's environmental priorities is well articulated in the ICE Report, We Rise Together when it states that "Culture and language are the heart and soul of an IPCA." (ICE, 2018: p 35) The knowledge holders' perspective has shown the report authors and hopefully its readers concrete illustrations of this argument and how it relates to the connectivity they promote.

As a starting point, Knowledge Holder 12 described one main conclusion of his extensive work with Mi'kmaq communities in the area in this way:

> *If you talk to anyone, elders, knowledge-holders: They would put language right on the top of importance.*

Our participants generally expressed an ethos common to many Indigenous peoples (Stoffle et al., 1990) by resisting ranking aspects of their way of life in terms of importance. This has important implications for identifying indicators for monitoring and evaluation. However, language continuation was a significant exception, as it was cited by many as a priority among priorities. While this could be due to the threat of language disappearance, this reason was not the rationale offered by knowledge holders. Instead, a top-cited explanation for the premier importance of the Mi'kmaw language was that it is an endogenous creation of the land of Mi'kma'ki and Unama'ki. As non-Mi'kmaq, Rodney Chiasson states,

> *So much of thought and language come from the environment.*

Though he observes a present-day "disconnect" between Mi'kmaq People and language, Albert Marshall pushes this principle along the path. What does it mean for environmental care that language comes from the land?

> *There is no disconnect from the language and the land. The language comes from the land. All these things will come from that. If you are not connected to the land *AND* the language…you are not accessing the teachings.*

One way of tying this guidance together is to state that the best practical wisdom available for environmental care in Mi'ma'ki is kept intact in Mi'kmaw language. Therefore, one connection which matters most is the one between Mi'kmaq people and Mi'kmaw language.

Senator Dan Christmas further lays out why this is an absolutely achievable and effective path to take. He described with great enthusiasm the outcomes of legislation he helped to pass in 1997, which took jurisdiction on education in Nova Scotia and required that Mi'kmaw language was taught along with English.

> *Within a decade, we had predominantly Mi'kmaq speakers in our schools….fast forward to 2010, we had a cohort who went all the way through. The graduates were visibly balanced. They knew who they were.*

He further commented on what this progress means for any and all work to better Mi'kmaw Peoples' future. First, there is a model for making positive change through legislation over time which engages Mi'kmaw peoplehood in powerful, impactful ways. Second, there is now a generation familiar with this process who is capable of imagining its scope going forward and therefor capable of taking it further. He ties this to IPCAs, saying

> *So when you think about IPCAs, once we fully develop them and kids understand them. The kids will take it from there.*

Knowledge holder 12 takes the implications for a language focus for IPCAs one step further by reemphasizing that unique, premier role for language.

> *Projecting our language onto IPCAs would be powerful, right on top of the list.*

<u>Generations</u>

> *To see the eagle, the whales. To see the elder climb.* –Clifford Paul

Kids and youth were the most cited subject by our participants in our discussions. These mentions were not tagged with strong declarations of primary importance as with language, but as we will discuss in the next section, recurring frequency of a subject in speech is very important to note and is a kind of announcement of its own. Recurrence understood this way is referred to as salience, which just means presence, and children were present in nearly every conversation. Elders were also mentioned with consistency, though not as much as children. Yet, as Clifford Paul's words above show, children, elders and all community members of every age must be seen as connected. In his quote it is children who are meant to see the eagles, the whales and the elder climb. They are meant to see this "so that they learn." So this particular connection of the generations is our next major theme to illustrate.

Albert Marshall Sr. puts this subject in a living context and sheds more light on the exact importance of this connection.

> *Each generation's responsibility was to prepare the oncoming generation to take on this responsibility.*

Marshall introduces us to a major challenge he perceives in that this virtuous cycle is one that is at major risk of disappearance. This generational sharing was once the veins through which the blood of accountability – including environmental accountability – flowed. Now though, "we just have to accept the information from the regulatory systems." The chief way he and others resist this extraction of their proper accountability is to teach and otherwise influence the youth.

Teachings

By way of tying together the main ideas presented through knowledge holders' words so far, we would like to discuss the idea of teachings. Elder Marshall emphasized accessing teachings in the above quote in which he assigns these a role as an ultimate value, or end value, which language and being on the land are meant to give rise to. Many other participants habitually described these as knowledge, but when asked whether knowledge and teachings were compatible, readily agreed. Yet, teachings as a concept is much more ready to incorporate the core biocultural products we used later in the research process. These included the oral histories, traditional place names, records of traditional plant and animal usage and value in the region and more. Furthermore, teachings as a concept holds within it validation and thanks for ancestors, and also expresses a direct importance of this heritage to present-day Mi'kmaq and the young. Often, whole bodies of teachings are carried into the present-day within single words, with one such word being *Kepmej*

Kepmej: To Take Action Towards Mi'kmaw Way of Life

As illustrated in *Tan Telolti'k*: How We are Doing Now (Unama'ki Institute of Natural Resources, 2020), a core principle of Mi'kmaq existence is *Kepmej*, meaning to take action towards a Mi'kmaw way of life. *Kepmej* holds within it a principle which might go unnoticed in translation, but which fundamentally should change the way non-Mi'kmaq understand its implications regarding the environment.

Embodying Mi'kmaq Legacy of Sustainability

Knowledge-holders' orientation to sustainability turns the formulation for environmental sustainability – as held by applied ecology – on its head. For example, numerous participants offered similar responses to the question: "What lets you know that the environment and Mi'kmaq culture is healthy?" Joe and Judy for instance, stated:

> *If you are in the woods and you come across goat beard, that is a healthy area…eagles too.*

Clifford Paul answered,

When you see the squirrel thriving. You see the ants build their nest. You see fish coming up the stream.

In this way, a number of participants let it be known that environmental health was definitively connected to Mi'kmaq health. To achieve one is to achieve the other. This understanding is furthered and deepened by Lisa Young who defined cultural continuity as when,

The land is healthy enough to sustain traditional practices... you can't have one without the other. A relationship to the land is necessary to exist as Mi'kmaq.

By saying this, Lisa adds what has already been outlined by Elder Marshall: a circular, cyclical and holistic definition of Mi'kmaq and environmental well-being in which each flow from the other like the health of one's brain and one's heart. With this Indigenous way of knowing identified and established, advocacy for Mi'kmaq rights, sovereignty and increased self-determination can be understood in its right context.

Sharing, Regional Influence, and Self-Determination

The fact is that Mi'kmaq pursue *kepmej* not in a vacuum, but in a position of a smaller culture embedded in a larger, more dominant one in the aftermath of centuries of oppression from European colonization. Clifford Paul situates Mi'kmaq environmental obligations in this history in the following way, and interestingly attributes the words to Elder Marshall:

Be the Mi'kmaq that you are. But I want you to know that what you are doing is damage control after 500 years.

Yet the default mode for Mi'kmaw expression of *kepmej* toward the larger society is one of communication and sharing. Lisa Young, for example, expresses ceaseless wonder at the generosity of Mi'kmaw orientation toward settlers.

Still, after all this time, they are willing to share.

Shaping and conditioning the larger culture can be readily understood as an important goal in the achievement of *Kepmej*.

Many knowledge holders offered concrete recommendations for how to bring about visionary designs like public identity resurgence for Mi'kmaq. Central among these recommendations is the expansion of the IPCA and other forms of Indigenous authority over traditional territory. As Senator Christmas promotes,

Kluskap IPCA should be a base but should point to a whole area. Connectivity would mean inherently including all of Kluskap's places.

Kepmej, in other words, can mean exerting available strength. Yet, as described already as a consistent environmental ethic of Indigenous Peoples around the world, this expansion is also motivated by a holistic understanding of place and territory.

Values and worldview

In our understanding, a chief dimension of ensuring cultural well-being of Mi'kmaq was the safeguarding of Mi'kmaw values and worldview. As previously mentioned, language was assigned very special status. One enthusiastic and recurring reason given for this was language's ability to retain and convey values and worldview.

Many participants offered further statements which clarified values and their importance. For example, many participants view IPCAs as an opportunity to showcase traditional wisdom. One way to do so is by the utilization of science for the achievement of essential, yet broad Mi'kmaw ends.

We desperately need western science, but steered to our needs.

Lisa Young reinforces this point,

Science is strong, and yet it does not suggest how it should be applied.

It is certainly a project to disentangle science, environmental science included, from the cultural value system which created, disseminated and governed it, yet this is the precise project Elder Marshall and Lisa identify as a priority. Subsequently, it will be an extensive project to adapt scientific practice and application to fit with local values.

Healing

By touching again and again on values, participants show the extensive depth and intent which fuel support of the IPCA. One value above all appears in a central role in participants' eyes: healing. Healing is not only central to Marshall, Marshall and Iwama's ideas of connectiveness outlined in 2010 (Marshall et al., 2010), it is highly resonant in just about every discussion we held with local participants. In the following section, we will walk through several important and concrete ways participants advocate for healing. Healing in the context of discussions about connectivity means connection to vital life forces necessary for the achievement of connection in time, and *kepmej*. Healing in the context of discussions about connectivity means connection to vital life forces necessary for the achievement of connection in time and *Kepmej*.

Elder Marshall, in a recorded dialogue ties together healing, nature, connectiveness, *Mi'kmaw language* and forgiveness all into a single objective,

> *We need nature to be soothed and to be healed. And to be brought back to our senses. As we have been swayed by other things like money. Individualism. So connectiveness and the healing tense have to become our one objective now*. (Albert Marshall in Marshall et al. 2010)

The parameters of connectivity in applied ecology are narrow relative to the understanding of local knowledge-keepers. They are bracketed around geographic surface continuity, a quality best visualized on two dimensional maps. Yet Marshall, Marshall and Iwama (2010) declared the need to broaden this definition to include healing, and even nominate a more appropriate and impactful English word to use: connectiveness.

The knowledge holders offered numerous pointed and grounded explanations and illustrations of the relationship between healing and connectivity. Participants situate and describe healing in diverse ways, from societal, to the personal, to the metabolic. Clifford Paul situates the need for healing with the idea that we must first acknowledge we are contending with five hundred years of damage. This includes damage to Mi'kmaq way of life, to Mi'kmaq persons, to their homeland and more. The healing Marshall prescribes, he calls 'indigenization.' This form of healing or repair will entail conditions,

> *In which we are given the legal and constitutional prerogative to include our knowledges into the system.*

Lest we think this is a project of merely causing existing power structures to act or transform in a certain way, he further states that,

> *Only we can do the indigenization…It took us 600 years to get to this place, indigenization will take baby steps. Haste is something we do not have the luxury to ponder, but instead to make sure things are done right.*

This healing or repair then must be matched from within the Mi'kmaw nations and from without. It calls for action and intent from Mi'kmaq sufficient to effect change in existing government

approaches, but also sufficient to regenerate connection between the people and the teachings, and to remain in effect for a great duration. Within this trend, Lisa Young sees sharp resonance with the emerging life of the Kluskap IPCA. The cave within the park is itself a gateway to other worlds, as many participants mentioned. Still the meaning of this place in the present context cannot be overstated.

> *It is the center of the universe, where he [Kluskap] left, but where, when the Mi'kmaq need him, he will come back.*

The cultural, historical, political and ecological healing possible in this understanding of events is momentous. It brings in ancestors, animal and plant relatives, settler neighbors and all living persons.

Conclusions

In conclusion, we argue that this study is best thought of as a facilitated encounter which has generated a number of teachings for applied ecology, conservation practice and sustainability studies. The productivity of these teachings might be best put in relief by taking a qualitative measure of the unlearning required to embrace them. What follows is a brief description of select teachings we determine to have the most of this unlearning potential. First of all, knowledge holders are co-creators of this study: from the nature of the questions asked, the way of approaching the assembled information to the interpretation of the gathered findings. Those who wished it are accordingly named as authors. Those who did not wish to be named collaborated no less. In essence, then, the dogmatic hold of objectivity is much muted in this study. The stakeholders and local knowledge holders who give voice to the teachings in this study make no claim at objectivity, but instead openly care about the subject matter. Therefor, the nature of this work is evidence of another, openly caring, way to knowledge.

Another critical area of unlearning envisioned by our findings relates to the profound entrenchment of the concept of connectivity and the corresponding profound lack of fit with local knowledge holders. This dissonance can be foraged for insight into other areas of scholarship and practice. The simplest narrative might be that the swell of literature, policy, practice, method, and technology flowing from the connectivity concept unfolded within a relatively isolated information and cultural space which enjoyed no natural communication with numerous other perspectives and traditions of thought and environmental care which held then and continue to hold great potential for advancing the concept. The result is that our modest check-in with the literature and with Indigenous environmental leaders in a certain location immediately put a spotlight on the glaring absence of a number of natural dimensions to the concept. In this case, a calcified focus on connecting pixels in two-dimensional space was found to be woefully inadequate in light of the importance of connectivity in time, connectivity between people across time and space, and connectivity of people and the earth with essential offerings like healing, ancestral memory and cultural survival. If community encounters like this one are made to happen elsewhere, in other cases, with applied ecological concepts other than connectivity, other profound blind spots are sure to arise. Like with the emerging field of connectivity studies, there may clearly be no good reason to exclude these from pertinent discussion, strategic and implementation phases.

Another key unlearning point to report has to do with the success of operationalizing salience to help determine a finite number of candidates from among the multitude of equally essential natural attributes in the study area. This plugs directly into the discreet methodological developments within conservation surrounding the appropriate determination of indicator species, targets, hotspots, priorities and more. It also presents an important case for the broader considerations around the suitability of reductionist approaches in scientific epistemologies and derived approaches. This study presents a case in which Indigenous leadership requires such a reduction for its own ends, yet insisted on a culturally appropriate avenue by which to achieve it. This fact in this case supports the holistic observation of Eugene Hargrove that "to provide a basis for discriminating between and ranking candidates for preservationist action, we need to go beyond mere existence to the values associated with it." (Hargrove, 1989, pp. 178–179) Yet, presented here is nothing short of the creation and application of a novel rationale for reduction which bypasses the conceptual juncture which invariably invokes the necessity of hierarchy. Hierarchy has nothing to do with the final list of

species whose existence we have called on to further the larger biotic family of Unama'ki. This is achieved, in part, by embedding the uniqueness of our indicator life forms in responsibility rather than power or prominence. We hope that this origin story of the Biocultural Leaders and Families Model can facilitate its dissemination to relevant initiatives.

Finally, as a practical matter for modulating reductionism, like that which we have necessarily performed, this study showcases the gains to be made by unlearning the habit of rigid categorization of our natural home. While numerous modeling practicalities disincentivized too much blurring of categories between taxa, a certain amount was absolutely achievable and paid dividends. For example, while not all bird species affiliated with coastal ecologies could fit in our workflow, the restrictions being what they were, yet similarly our qualitative assessment of the data consulted could not justify selecting a single one. So many were accommodated and to good effect. While, it is the aim of our partner paper in this series to showcase the added power of this in the mapping exercises, in the qualitative dimension, this relaxation of categories made headway toward aligning the methodology we undertook with the connectivity principles we uncovered in this very study.

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APPENDIX 1 Kluskap Connectivity Semi-Structured Interview Guide

Kluskap Connectivity Semi-Structured Interview Guide

Possible questions (to be adapted for fit with cultural context):

1. What is the importance of connecting lands within Unama'ki?

2. Have any changes in the land affected you, your family, and all your animal relations? How?

3. What do you think of when something on the land is well connected?

4. Why do you think the new IPCA for Kluskap's Cave is important?

5. What does cultural continuity mean to you?

6. Do you think animals can move freely from Kluskap's Cave area to Pitupaq and in Unama'ki in general? Why should they?

7. What lets you know the environment and Mi'kmaw culture is healthy?

8. From this list of species, which ones are important to each other, to you, to your family and community? Why?

9. How do we know that we are doing good for future generations?

APPENDIX 1 Kluskap Connectivity Semi-Structured Interview Guide

Kluskap Connectivity Semi-Structured Interview Guide

Topics for Discussion

Current state of connectivity
Is there evidence of connectivity in your area? (Tracks, photos, videos) If so, where?

Movements and Reproduction
Can you describe the seasonal movements of animals around Bras D'Or and the Kluskap IPCA?

What evidence do you look for?

What do you look forward to every year in the area?

Are there any specific locations that are important to you, family, community and any of the species we talked about? Why (feeding, reproduction)?

Management
How do you "manage" land around you? For example, what Mi'kmaq traditions or stewardship approaches do you follow? (Open dialogue is encouraged as there is no right or wrong answer).

What role should UINR play to ensure a sustainable Bras d'Or lakes watershed? (Open dialogue is encouraged).

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