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Living in an Eel's World

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> "As Anishinaabe, we are spirit first in this world. Anishinaabekwe responsibilities have come from our nurtured land relationships. These reciprocal relationships with land sustain and nourish our societies. It is our first relationship with water and land that feeds our spirit. It determines and informs our relationships with our self and with others in our families and community."
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> —Patricia D. McGuire, "Gii Aanikoobijigan Mindimooyehn: Decolonizing Views of Anishinaabekwe" in *Decolonizing and Indigenizing Education in Canada*

As material life has drastically changed for Indigenous societies of Kije-Mikinâk Minitig (the great Turtle Island, North America) with the introduction of settler colonialism, so has life for water-dependent migratory species, including *Anguilla rostrata*. *A. rostrata* is a curious aquatic animal that is widely imperiled, generally unappreciated, and often misunderstood. Known by other names such as the generic "eel" or "American eel," *A. rostrata* is the only catadromous eel that travels through watersheds of the Americas and beyond. Although this makes *A. rostrata* unique, since the majority of the nineteen anguillid eel species are distributed globally in other areas, there is another one close by, *A. anguilla*, also called the European eel. *A. rostrata* and *A. anguilla* share a common origin, outmigrating toward a common point in a section of the Atlantic Ocean called the Sargasso Sea, near Bermuda. These two comprise the only migratory anguillids in the Western hemisphere.

Anguillid eels are known for their fascinating, complex life cycles that involve catadromous migration—starting life in the ocean, migrating toward estuaries and freshwater bodies, spending potential decades inland, and travelling back to the open ocean toward the end of their lives. Populations around the world have experienced severe decline, with threats occurring at every life stage and while having "the broadest diversity of habitats of any fish species in the world."[1] Figure 1 demonstrates a rough estimate of continental migration patterns in North America.

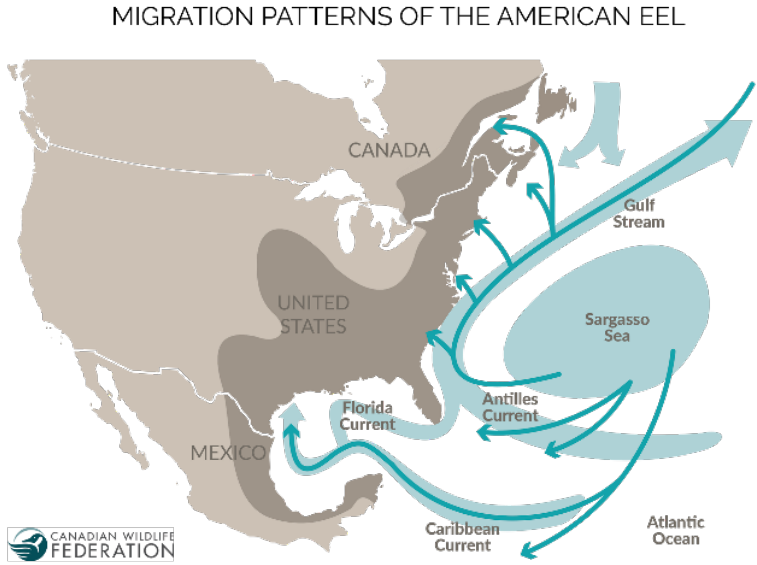

Figure 1. *Migration patterns of* A. rostrata*, the American eel. Image courtesy of Canadian Wildlife Federation.*

For centuries, families and communities of Anishinabeg and other Indigenous peoples have shared a chronotope of deep time-space continuity and a relationship with interspecies relatives such as plant life, trees, waters, countless species of birds, mammals, and fish, including American eels. (*Chronotope* is a term that refers to the relationship between time and space in a given setting, often in literary terms, coined by Mikhail Bakhtin.) Specifically, here I refer to Algonquin-Anishinabeg along the Ottawa River watershed and surrounding waters, as Anishinabeg is a term that refers to multiple nations, communities, and geographies. For many Anishinabeg, animals (and indeed, all forms of life) are thought to be ancient relatives and ancestors, many of whom hold a great deal of compassion and forbearance toward human beings. It is often said that human beings are limited in certain ways, needing support and guidance for the entirety of their lives; Anishinabe individuals and societies are gifted the intimate guidance of benevolent helpers who support personal learning, development, and locating a sense of belonging.

Animals form the foundation of legal orders that can determine one's kinship, life purpose, spiritual power, and other important ontological nuances inherent to being Anishinabe. These bonds come with multigenerational responsibilities to ecologies where animals and spirits carry out their lives. Ojibwe legal scholar Kekek Jason Stark explains the nature of human-animal relationships in the context of pursuing an appropriate framing for interspecies conduct based on Anishinabe *inaakonigewin*, sometimes translated as "law":

> When the Earth was created anew, the animals stood up for the Anishinaabe, they vouched for us and said they would teach us how to act, how to live, and how to relate to creation. The animals created a relationship with the Anishinaabe, the *doodem* (clan) system, and through this relationship they took responsibility for our actions and taught us lessons about the earth and all of creation. The animals taught us how to hunt, fish, and gather our natural resources. They also taught us which of these resources could be used for food, for utilitarian purposes, as well as for medicinal, spiritual and ceremonial purposes.[2]

Anishinabe worldviews and creation stories hold that animals and plants, rocks and birds, and, truly, all forms of life were a part of life on Earth well before the arrival of humans. Our relatives and teachers in the human and nonhuman worlds agree to, and persist in, giving of themselves in body and spirit to support the journey and unfolding of our purposeful lives. This is especially true of ancient species such as the American eel, or *pimisi,* a migratory, metamorphosing fish who in adult stages carries a high fat content and densely nutritious caloric profile.

Food, medicines, and cultural items are crafted from eels by Algonquin-Anishinabeg, Mi'kmaq, and others across eastern North America. Mi'kmaq knowledge about relationships with eels suggests a similar promise that was made to the people, shared in a 2012 publication from the Unama'ki Institute of Natural Resources. A narrating voice speaks from the perspective of an eel, translated from Mi'kmaq language: "Mother Earth told my family a special story. She said, 'You are put here to help Mi'kmaq people survive. . . . As long as you treat us and our home with respect, we will always be here for you.'"[3]

Pimisi has been likened to a majestic manna that once dominated the waterways of the Ottawa River, the St. Lawrence River, Lake Ontario, and all the tributaries that feed these major arterial water bodies.[4] The St. Lawrence was once the largest catchment area for female eels, who return to the ocean and spawn. Construction of major dams, canals, and other alterations have affected the flow of eels from the St. Lawrence into Lake Ontario and the Ottawa River, which each have their own dam systems and migration barriers.[5] The eel behaves as a hardy resident of lakes, streams, ponds, and rivers—not as an aggressive predator, but a constant staple of watershed wellness who connects distant ecological zones from estuary to freshwater. Along the way, eels contribute to both predator and prey cycles for larger and smaller animals, respectively. The Ottawa and St. Lawrence rivers are particularly known as historic habitats for the development of female eels. Females are crucial to the overall fecundity of the species, carrying millions of eggs to the Sargasso Sea.

Today, fecund adult female eels face numerous barriers while migrating these and other historical habitats: rerouted watercourses and altered landscapes formed by centuries of land alteration in the Northeast. In addition to physical barriers, female eels also face challenges from genetic changes: eels bioaccumulate toxic contaminants in their flesh, so waste deposited from human sewage systems (which can include pharmaceuticals, street drugs, and endocrine-disrupting household chemicals) can influence hormone balance and limit the viability of reproduction. In a study

conducted on *A. anguilla*, eels carrying a toxic burden in their fatty flesh were found to have a different genetic expression that makes it challenging for them to survive in a "toxic world," as their biophysical resources may be spent fighting contaminants. In North America, parasites are also a significant factor.[6]

Research speculates that all anguillid eels have lived on this planet for perhaps thirty million years or longer. A reason for geographic difference of the two "Atlantic" species is unclear but generally thought to be related to evolutionary biology, global tectonic shifts, and climactic changes.[7] *Pimisi*, like all anguillids, navigates elaborate environmental transformations through diverse aquatic zones and undergoes physical metamorphosis through several life stages, changing size, shape, color, and behavior. Consistent with pressing trends of biodiversity loss and ongoing, intergenerational impacts of anthropogenic and nonanthropogenic climate change, at least five specific pressures affect all migratory anguillid eels. These pressures compound at a rate that "can endanger even highly adaptive species."[8] The five factors most prominently affecting anguillid species are (1) global warming and ocean modification; (2) increased contamination load; (3) fragmentation and habitat loss; (4) alien parasites; and (5) exploitation of eels at all stages.[9]

Today, eels are reduced in population throughout the entirety of their range in North America and extirpated in several areas, yet continuity in eel migration is expressed through rhythms of seasonality persisting in the natural world. For example, every spring in North America, a series of saltwater currents swirl north from the Gulf Stream, with "several pulses of glass eels entering and dispersing" into estuaries, bays, and eventually rivers along the northeast coast.[10] Individuals will choose areas to travel for twenty years or more through a variety of freshwater and salinity zones. As summer arrives and morphs into autumn, long, mature silver eels disperse out of the rivers, lakes, and estuaries up and down the eastern coast, eventually back toward the ocean.

Migrating adult eels enrich the aquatic pathways they travel by distributing nutrients stored in their guts.[11] Their feeding slows and their bodies enter a state of fasting and autophagy, marking the time when summer turns to fall, and a new cycle of transformation befalls the biomes across coastal and inland habitats. This migration and these conditions were well known and widespread across the Atlantic coast and far inland for generations. Indigenous societies harvested and preserved eels, as evidenced in historical anecdotes, Indigenous legal traditions, traditional ecological knowledge, and physically visible in fish weirs that are still found in some rivers today. Deep time-space memory of dependence and connection with eels lives on through the people to whom they are related and in evidence left by *kete-Anishinabeg* (the old ones) in the waters, in the ancient soil and rock.

Culturally informed archaeology plays a significant role in uncovering and interpreting these histories, as so much modern development has focused on alteration of waterways and destruction of Indigenous infrastructures.[12] In the words of Bill Allen, researcher and friend of several Indigenous individuals in Ontario and beyond, "It is archaeology that holds promise about much of our new information about traditional use of eels through documenting weirs, fishing tools, eel faunal remains, and eel-related

language on the landscape."[13] The remains of ancient ancestors and animals interred in the earth constitute deep, place-based webs of spirit and relation that continue to nourish the generations of today.

According to the research of Ojibway scholar Darlene Johnston, creation stories of Anishinabe also teach about the relationship between humans and animals: "Remains of the First Animals contained a powerful spiritual essence that gave birth to the First Humans. Human remains return to the earth with their spiritual essence intact, continuing the spiritual cycle of birth and rebirth."[14] For those who seek to retain an Anishinabe sensibility through *doodem* and other responsibilities, effort is made to maintain what can be maintained in a reciprocity of care for one another.[15]

Despite centuries of erasure and denigration that have disrupted the cycles characteristic of Anishinabe relationality, these forms of knowledge and *mnido-inaakonigewin*, or spirit law, do persist. Anishinabe of today are blessed and obligated to recover and retain what is left for us by our ancestors and relatives, and to consider what we will pass on to future generations. Anishinabe scholar Sue Chiblow cites Sherry Copenance, an Anishinabe *kokum* (grandmother) who shares four different types of Anishinabe laws: "sacred, ancestor, natural, and human . . . founded on spiritual, sacred, and ethical principles."[16] Each of these types of laws applies to levels of relationship that support reconnection with eels and other species; it requires consideration of, in order, our Anishinabe peoples' sacred history, our collective connection to the lives and realities of our ancestors, respect for the forces of life that animate the natural world and constitute natural law, and the reciprocal interrelations that human beings have with eels and other fishes, birds, animals, and so forth.

Such concepts of reciprocity and multigenerational connection to the totality of life are sometimes understood as *mino-bimaadiziwin*—the pursuit of a balanced life—or, in the spelling and dialectical variation used by Deborah McGregor, *mino-mnaamodzawin*, which she defines as "living well, the overriding goal of the Anishinabek, both individually and collectively."[17] This article develops a related concept: *kagige pimadiziwin*, which I translate as "forever life," to discuss the cycles that all of us, human and nonhuman, are implicated in, with a specific focus on the life of American eels. Earth's forever life is characterized by processes of birth, growth, death, and regeneration, which are evident through close study of *pimisi* in their migratory life cycle.

Nonhuman animals have been staples of food, medicine, and meaning-making for Anishinabeg (and relatives) across a wide diaspora of diverse waters and lands since the time of the First Humans. The American eel is perhaps one of the finest teachers of the aquatic realm, symbolizing the nature of travel and mobility along with transformation and metamorphosis, while also holding fast to persistence and life purpose despite tremendous odds and barriers. This migration requires a strength and determination that is almost supernatural in its scope, demonstrating what it means to be of strong heart and character despite a barrage of obstacles. Honoring their journey and strength is still an important part of trying to maintain a balance in today's world.[18] This insight and contribution comes from a specifically Anishinabe sensibility. Anishinabeg live in a world of relations and *mnidoog* to whom each of us

has unique interactions. Anishinaabe historian Alan Corbiere notes the importance of both *mnidoog* and ancestors for Anishinabe scholars:

> "Professing to adopt an Anishinaabe perspective should incorporate and address the significance, influence, and intercession of the *manidoog* (spirits) and *mishoomisag* (grandfathers) into Anishinaabe decision-making." [19]

Voices of Indigenous people in fisheries and about watersheds have not been considered or implemented in ways that lead to the meaningful changes needed to benefit eels and other migratory fish on a broader scale, although much knowledge has been shared and published by knowledge-keepers such as Kerry Prosper.[20] The inclusion and application of Indigenous knowledges is needed, since Indigenous chronotopes and practices are key to understanding the holistic story of eel abundance, decline, and meaning in North America. Such knowledge can bolster more effective strategies to understand holism in environmental planning and relations, doing away with the past practice and status quo where "Indigenous ways of knowing and being are regularly belittled, overlooked, or purposefully suppressed in the interest of economic gain and industrial development opportunities."[21] It must also be noted that economic interests are also a dominant factor in current-day interactions with eel populations in North America, as they are valuable to overseas markets, which drive overfishing and poorly informed harvesting methods.

The unique axiology of *pimisi* and related species has made them difficult to categorize, though anguillid eels have found a place in standard classification schemes: "biologically, they are fish, but they appear to be more than that; their unique morphology draws a clear line between them and other fish. . . . Their bodies are not streamlined, as are those of ordinary fish, but elongate, closely resembling snakes, which are reptiles."[22] Another word to describe but not classify an eel is the Anishinabe word *mshkiki,* or medicine, which is the framing I propose when thinking through what recovery might look like if successfully implemented in waters frequented by *pimisi* and all the relatives she tries to support in her migration journey. *Pimisi* carries a medicine that both physically nourishes people, ecosystems, and animals and is likewise a *spiritual* medicine that reminds often-forgetful humans of our obligations to conduct ourselves with respect and understanding for the interconnected gifts of life on which we depend.

Spirit First: Relationality and Method

Nitam manidów-i. Anicinabe ikwe indow. I am a spirit first, a woman, Anishinabe-kwe. I seek meaning in life through being Anishinabe. My mother and maternal grandmothers are Algonquin-Anishinabe *kwewug* (women), and my maternal grandfather was enrolled as a Six Nations Mohawk and Pine Ridge Oglala Lakota. It is normative Anishinabe behavior to state one's lineage and clarify the fullness of where one comes from. *Miskwadsi ijinikȧz-o.* I am called Painted Turtle, and *Thačhinčala Nunpa Wiya emaciyapi* (Lakota), Two Fawns Woman, born to an Anishinabe mother and Onondaga father who is from the eel clan, as was *his* mother, grandmother, and generations of his

matrilineal, matriarchal ancestors. Each community to which I am related has its own distinctive governance practices. In general, my effort is to respect the dignity of each of those systems on their own terms. For example, I recognize and honor my patrilineal ancestors, but I do not speak for or through Ongwehonwe/ Haudenosaunee sensibilities. Clan systems are nation-specific and carry specific meaning based on the laws and customs of each. Haudenosaunee laws indicate the passage of clan identity and nationhood most often occurs exclusively through a mother's lineage.

Through my mother, I am a citizen of an Anishinabeg First Nation, Omamiwinini, a self-referential term used by ancestral communities of the Algonquin-Anishinabeg along the Kichi Sibi–Ottawa River watershed. My ancestors were among the first families that compose today's citizenry of Kitigan Zibi Anishinabeg First Nation, with ancestral connection to Pikwaknagan First Nation as well. Our historic homelands spanned areas along confluences of the Ottawa and St. Lawrence Rivers. In the late 1700 and early 1800s, some ancestors began to flee to a winter hunting area, leaving their villages at present-day Lake of Two Mountains, Quebec, during times of intense Christian proselytization and other encroachments. Originally called the River Desert Band, the Kitigan Zibi reserve of today is within the site of that winter hunting ground. Kitigan Zibi Anishinabeg is a resilient First Nation deeply impacted by the Indian act and reserve system, pass system, day schools, residential schools, and other racist and dehumanizing oppressions of the Canadian state. These ongoing, structural factors continue to adversely affect land relations, collective knowledge, connectivity, and historical understanding of *pimisi* throughout Algonquin communities today.

However, documented events show that within Kitigan Zibi, some retain a strong sense of cultural authority, persistence in mobility, and Anishinabe connection to their precolonial world. For example, amid challenging eras living in the early reserve system, my maternal ancestors initiated intertribal organizing efforts that sought to retain Indigenous autonomy, including practices of seasonal travel and diplomacy across territories. They "asserted their treaty rights under the Royal Proclamation of 1763 and other treaties as early as the mid- 1920s."[23] My great grandmother and grandfather (referenced in the below quote as "the Algonquin") were part of a political organizing movement that formed councils and hosted meetings alongside neighbors and collaborators from other communities, including Clinton Rickard of the Tuscarora Nation and other Haudenosaunee people:

> Chief Rickard and the Algonquin continued to collaborate into the early 1930s, most notably during the Grand Algonquin Councils of 1930 and 1931. These meetings were significant. They drew participants from all over Quebec, Ontario, and New York State to Kitigan Zibi. Their collaboration focused on onerous provincial game laws. In addition, they undergird their arguments on treaty rights and sovereignty by invoking the Royal Proclamation of 1763. They also hoped to publicize their cause by inviting government representatives to their meetings. . . . These encounters shed additional light on the Department's repressive actions—most notably by severing the connections between the Algonquin and their political partners across the border.[24]

Today, I endeavor to honor the memory of *mishomisag* and *nokomisag*—my grandfathers and grandmothers—and my intertribal and Anishinabe inheritance. I do so by maintaining ancestral practices retained in family lines, regularly participating in Anishinabe life and governance privately and collectively. Through these practices, I have come to learn more about the dynamic relationship and connection with migratory animals, including *pimisi*, held by those who came before me on both sides of my family. Ancestral villages of Anishinabeg had sophisticated sustenance and trade practices with seasonal, rotational "mobility traditions" to preserve *mino-bimaadiziwin* by keeping connection to other families and nations across territories—and eels were one of their most common foods.[25]

Omamiwininiwug traveled "lean and mean" (per Verna McGregor by personal communication, May 2023) across a rugged and vibrant watershed, relying on deep knowledge of territory, including the development of seasonal food stores and sources. In birch canoes and on foot, they had a close relationship with water and with *pimisi* in seasonal fishing camps and elsewhere. They saw eels as sacred beings who carried deep medicine, applied in a variety of remedies and as material for clothing and tools. Ceremonies honoring the life of foods, plants and animals, through offerings, songs, dances, and other forms of reciprocity were and are traditional, key aspects of harvest for many Anishinabe communities. These practices were often labeled "sorcery" by early Jesuits and other colonizers.[26]

Eels were a source of trade food that was prized for long-distance travel. Lightweight, satiating, and calorie-dense, especially smoked, eels would keep for a long time and were abundant throughout multiple watersheds. One study found that Morrison Island, near Pembroke, Ontario, is, according to one researcher, the "largest-known eel harvesting site in North America" based on analysis of faunal remains and other archaeological data.[27] Today, Ontario is a place where migrating eels have "no habitat deemed to be safe" as they migrate through heavily developed areas.[28] Countless free-flowing waterways have been altered and reformed, and these geographies are dotted with private property, dams, installed canals and culverts, and other restrictions of access for people and migrating fish.

Eels are also historically prevalent in other geographies where I lived and grew up. On my father's side, early Jesuit records and other historical data show evidence of abundant eels in present-day New York State. Migratory fish were perceived to represent the fertility and health of waters and lands:

> "One must not be astonished at the fertility of the country, for it is everywhere watered by lakes, rivers, and springs, which are found even on the highest mountains. But, if these waters make the earth fertile, they themselves are nonetheless fruitful in what pertains to them. The fish most commonly found in them are eels and salmon, which are caught there from the spring to the end of autumn."[29]

Contemporary Indigenous societies and communities, including Haudenosaunee and others who survived the taking of these lands, endure a legacy of violation that disables the actualization of the truly "free" ontological expression described in such narratives. The epistemic tragedy of eel decline is also concurrent with the dispossession

and contamination of Indigenous governance in many of these areas. Indigenous environmental justice frameworks encourage a holistic understanding of traumatic factors including the imposition of colonial rule over water. "Water colonialism" is proposed by Robison et al. as the result of "aggressive colonial processes through which the continents' landscapes changed from exclusive indigenous territory."[30] It is important to bear in mind all that has been destroyed, disrupted, and deleted as the transformation of the continent continues to unfold in the imprint of settler colonial practices that are antithetical to living in deference to the natural processes and relationships that inform Anishinabe *inaakonigewin* and *mino bimaadiziwin*.

Analysis of an eel's journey and life path is a matter of interpreting the sacred patterns of nature, seasonality, and the evident truths of spiritual determination that exist as models from which Anishinabeg may learn. *Pimisi* and people once had the ability to express their kinship and life path in concert with the elements that direct all life: the moon, the waters, the seasonal expressions of stars, and the right to pursue a purposeful and meaning-driven life connected to the tides of the earth. While free will certainly continues to exist, the physical barriers and alterations imposed on Indigenous mobilities, territories, and generations specifically affect Anishinabe nations who live in "relational geographies" where mobility is central to expressions of "physical philosophy."[31,32] The very same is true for the hundreds of thousands of eels that die in watersheds through violent means such as turbine mortality, wildlife trafficking, and barriers that prevent their full migration.

Eel reproduction is thought to be panmictic, which means that their migration is individually chosen. Panmixia refers to random breeding: parents of individual eels may have spent their lives in different areas. Parents' choices may have very little bearing on the migration path of offspring. Some eels choose to go to specific areas even if their parents were never there. No explanation is known for why and how they choose the routes of their travel, although some research suggests choice of migratory path may be related to salinity, water quality, and other factors. An eel continues to express the effort of free, unfettered mobility every time an individual tries to migrate through river systems that were once the home of seemingly limitless populations. Each female carries millions of eggs toward the Sargasso Sea, and today many cannot complete that cyclical journey—a running problem for decades.

Similarly, colonial impositions have affected the retention and expression of Anishinabe's ability to relate to and with *pimisi* as they travel a "gauntlet of threats," including disappearing habitat, drained wetlands and saltmarshes, dams, and the countless changes that have been made that convert lands from one purpose to another.[33] While I have heard stories from elderly people and reviewed literature about abundant and ubiquitous eels in prior generations, today their presence might be described as ghostly and inconsistent.

In this sense, the return of eels to historic watersheds is urgently needed; eels are unique and irreplaceable as an indicator species. Their lives can teach Indigenous children and families how to interpret the past and envision the future. To unfurl "deep histories" with connection to eels enables insight to humanity's global story and its intertwined nature: *pimisi* and Anishinabe have an intimately related place in

that story.[34] Lakota scholar Vine Deloria Jr. called for a "unified body of knowledge" to think through multiple dimensions of understanding in terms of interpreting sacred histories.

> In most tribal traditions, no data are discarded as unimportant or irrelevant. . . . Individual experiences, the accumulated wisdom of the community that has been gathered by previous generations . . . dreams, visions, and prophecies, and any information received from birds, animals, and plants [are] data that must be arranged, evaluated, and understood as a unified body of knowledge.[35]

My work employs such methods to call for broad and deep consideration of *pimisi*, privileging the realities of an Anishinabe-informed perspective. For more than thirteen years, I have devoted time, energy, and ceremonial petitions directed to the spirit of eels and the waters where they reside, meeting them at oceans, rivers, creeks, lakes, and in dreams. I have also participated in structured research and fieldwork studies alongside those who utilize scientific practices of other disciplines, often very intimately linked missives. From this integrated learning, I conclude that the story of eels represents opportunities for renewed relations and immense human learning, particularly about our relationship with and responsibility to care for water—and for one another. The lineages I come from have been subjected to multiple forms of assault and attempted assimilation, and yet a pathway connected to the ancestors and future generations is forged by healing relationships with water and eels.

In the next two sections, I explain how drawing from knowledge systems and practices of Anishinabe and other Indigenous intellectual and governance traditions might contribute to an expanded understanding of eels—which may be seen as out of sight, out of mind, and out of time in current realities. Countless eels tragically perish annually; many are disdained. Memories of them have also been eroded, yet migrating individuals continue to try and enter areas along the Ottawa and Saint Lawrence Rivers in addition to their historic habitats along tributaries to Lake Ontario and throughout the range of multiple Indigenous homelands.[36] They are still fulfilling their promise to the earth, to be there for people and for others, physically and symbolically meeting a variety of diverse purposes.

Current Plight and Recovery: Some Concepts

As juveniles navigate from the depths of the Sargasso Sea, *pimisi* travel ancient aquatic paths, weaving a vibrant fabric of time and space showing the constant cyclical nature of change and metamorphosis. Their migration is a pattern that repeats annually across the North American seaboard as young eels depart the Sargasso in spring (*ziigwan*) and adults return to the open ocean during late summer (*niibin*) and autumn (*dagwagin*). These are nonextractable forms of Earth knowledge that live with the elements and spirits, in wild oceans and rivers increasingly affected by human infrastructures and technologies. Human lives and structures are only one aspect of an eel's world and ecology, yet those structures influence eel lives in irrefutable ways.

Anishinabe scholar Lawrence Gross has referred to the alteration of the Anishinabe world as an apocalypse, clarifying as such:

> [The term *apocalypse* means that the] cultural and social factors that comprised the way of life for a given people have come to an end. Further, no matter how much the people in the culture may want the previous lifeway to return, it cannot. The situation with the culture has changed so much that the previous way of life can never be reconstituted as it once existed. This is what happened to all Native American nations. No matter how much Native Americans may wish to return to life the way it was before permanent contact was established between the Americas and the rest of the world, that is not going to happen.[37]

This means that Anishinabeg and other Indigenous nations are in a constant reckoning with transformed, potentially desecrated and colonized spaces, with concurrent need to mourn all that has been lost in a relatively short span of time. Eels are also specifically affected by these changes, including the construction of hydroelectric facilities that kill eels through turbine mortality, and many such creations may never be undone or removed. The Ottawa and St. Lawrence Rivers, Niagara River, and other connections to Lake Ontario have endured a long legacy of deep contamination and privatization. Fish mortality and inedibility is a grotesque and long-running tragedy known for decades among diadromous fishes in Atlantic-adjacent regions.[38]

In some regions, eel mortality has become commonplace and accepted: the violent shredding of eels in the turbine blades of hydroelectric dams is tied to a long-standing stalemate resulting from the political indifference to ameliorate the rate of those deaths on a broad scale. Similarly, the imposition of hydroelectricity has not always been designed with the input and consent of Indigenous communities, who depend on free-flowing rivers and ecosystems across Anishinabe-aki (lands). These are just a few symptoms of unacknowledged effects that come with massive watercourse alteration and infrastructural changes linked to industrialization and colonialism: "hydropower dams hum quietly in the surroundings, little noticed, but wreaking unseen biological havoc on an ongoing basis."[39]

Profitability, convenience, and so-called progress have been dominant narratives to excuse and justify the poor side effects of development and water colonialism. Anishinabe teachings suggest that animals and the ecologies they compose are voluntary contributors to human and nonhuman wellness. Each has their own sense of *mnidoo*—mystery, potential, spirit—that animates their lives, each carries unique purposes and medicine.[40] Said another way, "every sentient creature is a world-maker."[41] An eel's world shows the ability to take direction from both the earth and the celestial realm. Here's how:

Aspects of eel migration, resulting from studies on *A. anguilla*, are thought to be related to geomagnetic cues and the eel's sensory connection to Earth's magnetic fields.[42] Migraters also move in alignment with moon cycles and the seasonal expression of constellatory star patterns. Like so many other *geghoon* (fish), eels migrate by the stars. These organic processes are cosmological connections and must be respected since diadromous fishes and migratory animals do not live by or acknowledge the boundaries of

nation states, *i.e.*, the demarcations of USA and Canada and its policies, zones, boundaries. The seasons of fall, winter, spring, and summer are enduring forms of chronological orientation essential to understanding migration and how to learn from the animal.

Pimisi has migrated into fresh waters up and down the eastern shores of *Kije-Mikinâk Minitig* for epochs and centuries. The significance of losing connectivity for and connection to the eel is meaningfully linked to other phenomena in the human world: "the story of the colonization of North America is full of myths and legends, but the story of the eel isn't one of them."[43] Extirpated and reduced eel populations in North America represent changes and threats to a range of waters and to the webs of biodiversity that eels contribute to. In river systems, eels are important contributors to food webs, water filtration, and general watershed wellness.[44]

To better explain intricacies of eel science, Tsukamoto and Kuroki created a framework through which all planetary eel study might be proposed as an interdisciplinary effort.[45] They suggest drawing from three areas—social sciences, cultural sciences, and natural sciences—to demonstrate the connective and overlapping aspects of eel study. This model highlights the suitability of eels to reveal, simultaneously, multiple insights into dimensions of human and nonhuman worlds (see fig. 2).

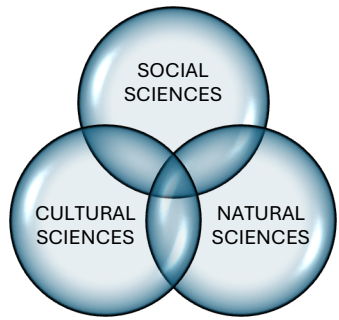

Figure 2. *Adaptation of Tsukamoto-Kuroki eel science diagram, by the author.*

Each of these categories has subdisciplines that help audiences understand the need for collaboration across differences. For example, social sciences can include economics, cultural sciences include mythology, and so on. Similarly, legal scholars have examined the need for transboundary, transdisciplinary collaboration and the immense challenge of doing so. In 2013, Cecilia Engler-Palma et al. wrote about the difficulty of building momentum for change: "envisioning future directions for American eel management remains difficult in light of the many current governance uncertainties and realities."[46] A review of existing literature with recommendations about improving life for eels shows a range of actors advocating for understanding from the perspective of Indigenous peoples, policymakers, legal experts, biologists, naturalists, and authors of children's literature.[47]

Indigenous interventions to existing fisheries through scholarship and research emphasize a relational approach to fishing. Yet in specific Mi'kmaq territories, the information carefully gathered and generously shared does not gain application in decision-making of colonially managed fisheries practices. In one study, fishers and

government employees did not see Mi'kmaq knowledge as useful or important: "the phrase 'there is no place for it' in reference to the cultural and spiritual components of a Mi'kmaq knowledge system . . . was used repeatedly during interviews.'"[48]

However, members of the scientific community are continuing to refine practices that are mindful of this tendency, highlighting the missed opportunity that comes with such dismissals. Kim Birnie-Gauvin et al. suggest that freshwater biodiversity can draw from an 'appreciation' of Indigenous knowledges, which serves to "recognize and celebrate the inherent connections between human life and freshwater life."[49] In freshwater environments that have been degraded, the message about dams is clear: "cleanup actions have been helpful for some species in some places . . . (but) the single broadest and most useful recovery action has been to remove dams wherever possible."[50] This is specific to eels but to other diadromous fishes as well, along with aquatic plants, mammals, and others who depend on connected freshwater ecologies.

Dam removal shows a successful prognosis for eel migration.[51] Successful dam removal creates astounding results, touching several dimensions of human interaction: the process can facilitate environmental restoration, opportunities for cross-cultural relationship-building, and cultivate improved watershed resilience.[52] The process of dam removal represents an opportunity to "awaken dormant life" in rivers where habitat alteration and barriers have dominated for decades. One example is the famous case of the Elwha River, which now runs free, as was the dream of so many elders of the tribe with cultural and spiritual connections to that river, the Nəxʷsƛ̓áy̓əm people.[53]

Dam removal projects also build human relationships and collaborations that support an enhanced understanding of ecosystems, in addition to improving the migrations of fish, the health of water, and the general wellness of waterways. Decisions made today affect future generations of eels, mussels, plants, animals, birds, and fish, to say nothing of human spaces and places. Participation and leadership of tribal nations helps "investigate the emergence of new political, cultural, and ecological spaces in river restoration efforts."[54] Increasing water connectivity is one of the most ideal and immediate ways to improve eel migration habitats.

Building a world that is less reliant on the abuse and degradation of water and migratory fish serves a relational and restorative different future. To rethink and redo infrastructure is a long and involved process; "infrastructure is, by definition, future-oriented; it is assembled in the service of worlds to come."[55] By contrast, entire worlds of infrastructure built over tribal and First Nation lands promote interspecies injustices that prioritize settler teleology. The loss of lifeways that honor deep interspecies, intergenerational connections and mobility traditions is not complete—the people are still here. Yet a response to such injustice involves undoing the prominence of colonially imposed interpretations of power, time, and control, including the occupation and management of water.

The practice of draining wetlands, filling in salt marshes, and altering lands for the purposes of commercialization and agriculture have a firm grip on legacy systems that impact waters for all people and nonhuman relatives. To undo and heal from this will take several lifetimes, but steps toward restoring river connectivity is one way to rethink and reframe who can share their stories and speak about the future they desire and dream of.

Storytellers of Change: *Kagige Pimadiziwin*

Pimisi is an important storyteller of many things, both literal and symbolic. Indigenous communities and peoples are often absent from literatures that advocate urgent change due to anthropocentric-induced changes. Indigenous histories paint a wider lens toward Earth changes: "looking at Indigenous mobility in the Anthropocene [epoch] involves unraveling layers of colonial injustice, instead of simply focusing on grappling with 'unprecedented' phenomena."[56] We must understand that eels have already navigated massive climactic changes as part of their multimillennial Earth tenure. Current forms of anthropogenic climate changes are part of relational imbalance and human failures to engage with *mino-bimaadiziwin*, the pursuit of a balanced way of living. This is not specific to Anishinabeg but refers to the general state of relationships between humans and water across eastern waterways in which eels are brutalized, disregarded, and disrespected.

As a countervision to the dystopian reality of fish die-offs, permanently jarring infrastructure, and suppressed decision-making for Anishinabe communities, I have created the schematic (fig. 3, Forever Life) which reflects my understanding of what it means to inherit being Anishinabe *in relation with living in an eel's world, through water as a sacred conductor of life and wellness*. A brief explanation follows. My adaptation includes an alteration of Tsukamoto and Kuroki's triple Venn diagram (i.e. social, cultural, natural sciences). As knowledge has been siloed through disciplines of scientific inquiry, I propose what Deloria called a "science of wholeness"[57] to expand beyond disciplinary boundaries and foreground Anishinabe knowledge and reality.

Figure 3. *Forever life, a proposed schema of eel relations.*

A "golden spiral," the spiral-arc, holds the three circles together. Golden spirals are building blocks of patterns found throughout nature, and are, in my view, a connector

for the ongoing expression of *pimadiziwin*: life that endures through all time (*kagige* means forever and *pimadiziwin* means life). The words in boldface font (engagement with spirit, gifting, interdependence, mutuality) reflect the foundations of my own land-based research practice: the gifts, interdependence, and mutuality of giving and receiving life from lands and waters. This includes memories and relationships I have built in places, such as ancient rock formations and burial sites that hold physical and other types of memory about *kete-Anicinabe* (old ancestors) and the sacred characteristics of certain areas, especially rock, trees, rivers, oceans, and all aspects of Anishinaabe *aki* (lands).

The four hearts at the bottom of the spiral-arc represent literal hearts that connect ancestors and descendants, recognizing their vastly different circumstances with different choices, possibilities, and relationships to water, to eels, and to all of life. The four hearts are related to the word *anikobijigan*.[58] In ascending the golden spiral, we move along the birth-death-rebirth cycle. One way to interpret this is that in doing so, we must touch the center, which is *engagement with spirit*. Connected hearts are the connected generations ascending the journey of life. These are timeless connections that bind individuals of all species to others in ethical relationships across time, space, and difference, with ethical dimensions and considerations.

Anishinabe environmental knowledge includes the legal tradition of *doodemag*.[59] *Doodem* connections between both ancestral lines (matrilineal and patrilineal) create "family in four directions."[60] *Doodemag* (clans or families) is a kinship and knowledge system that honors the unique relationship of animals to the Anishinabeg. *Doodemag* stories, connections, and legal traditions are nation- and region-specific, forming lineal bonds to specific animals that are part of one's family, whether inherited or adopted. While specific to geography and cultural history, the meaning is similar in multiple communities: "*doodem* relations, specific animals and life forms, are inherited through descent, commonly paternal but also maternal, through ceremony, through adoption, fasting, and through other Anishinabe methods of *gikendasowin* (seeking knowledge) and relationality."[61] In this schema, I draw from my ancestral connection to *pimisi* as inherited through my father's *doodem*, eel, which animates much of my spiritual identity and scholarly activity.

Doodemag serve Anishinabeg seeking meaning in their lives; *doodemag* are "the Creator's gift . . . [and] that creation gave each of us certain responsibilities. . . . Clans remain [the] center of and [the] brilliant spark to our world."[62] Like my ancestors, who lived highly mobile and physically demanding lives, eels do not recognize or abide by the boundaries of colonial invention that constitute today's nation-state occupations. Anishinabeg do well to remember how our *doodemag* have a great deal to teach us. Our ancestral teachings remind families that another principle law of Anishinabe conduct is *zoongide'ewin*, which means "to engage life from the heart in a strong manner, to live life from the heart with a firm character and exhibit a strong nature of being from the heart."[63]

Living well for Anishinabeg is based on cultivating heart-based knowledge and action, and obtaining reciprocal knowledge of how to endure seasonal, atmospheric, and other changes of the nonhuman elements. *Mino-bimaadiziwin* is life in motion.

Maintaining deep connections to the nonhuman world is part of seeking a balanced way of life. Animals and people must be free to move, to carry out their migration and life paths in a way that reflects freedom and dynamism, a natural attribute of life. The people are always in motion, like the rivers, and must be free to move and express their responsibilities by living according to a series of laws and behaviors that honor and respect the powers of the natural world. Those who are engaged in defense and restoration of the Earth based on Anishinabe legal principles frequently reference the many disruptions imposed by generations of colonialism and the constant influx of nonconsensual, disempowering decisions that have been made in the homelands of Anishinabeg and other native peoples.

Nonhuman life forms for Anishnabeg include places, elements, and stories, and they have agency and "aliveness" that continually offer guidance and impart clear instructions. This sacred knowledge is kept and transmitted in oral and other forms. As humans and other species face the ongoing pressures of atmospheric and planetary changes, deep, embedded memories exist in the people of Turtle Island—and these memories include the potentiality of activating clan-based knowledge to reinvigorate native ecologies. Principally, this knowledge is held amongst First Nation communities and their historic families (human and otherwise). Yet a related opportunity calls on all people to leverage scientific knowledge and wisdom to reform paradigms of land conservation and care: "conservation support has been linked to societal attention and species charisma."[64] Eels have not always been considered "charismatic," treated as valuable for their ecological contributions or for their inherent right to be, to exist as both a spirit and a body, and to continue as a spiritual guide for the children of today and future generations of tomorrow. This should and will change.

Conclusion: Witnessing and Collective Responsibility

In recent years, a continually pressing message from a chorus of diverse perspectives is that eels are worthy of deep meditation and respect, as they are historically, spiritually, and ecologically necessary contributors to life on *Kije-Mikinâk Minitig* (and in global waters).

Several authors have pleaded for new ways to rethink, reimagine, and assess the impact of humans having lost their connection to eels, underscored by a need to mobilize the knowledge that already exists. Policy briefs and management plans have been created to emphasize the important insights and recommendations from scientific bodies of knowledge. Decades of research have accumulated, the observations of naturalists and others. Indigenous elders and knowledge-keepers have shared their perspectives, uses of eel medicine, and interpretations concerning the sacred nature of the species—how their lives enable rich connections between earth, sky, and waters. Advocates and community-based researchers have accentuated the importance of specific disciplines such as archeology, which holds a range of tools and approaches that can shed light on the ancient past and Indigenous connections to eels.

The especially important role of archaeology is emphasized for its ability to combine with Indigenous knowledge to create new understandings of previously

misunderstood aspects of history. For example, consider the role of eels in sustaining large populations of Indigenous people: "records indicate that centuries before agriculture supported aggregations of population on the land, the eels supported larger populations of Indigenous people."[65] The twin myths of devoid lands and the introduction of industrial agriculture as the greatest improvement to befall Indigenous people is seriously challenged by Anishinabe environmental knowledge, which submits that fisheries sustained life for large populations long before sedentary crops and capitalism were forcibly introduced in so many areas.

Connection with eels may be found in historic habitats including rivers, creeks, streams, and lakes. Studying and understanding the personalities and attributes of specific waters is an Anishinabe life-giving and life-affirming practice; these are among some of the sustained actions that enable personal "reconciliation with the Earth."[66] Honoring the spirit of water and all who live in the water can reframe entrenched epochs of dystopian reality induced by settler colonial occupation and land-controlling, water-polluting practices. There is a need to tell new stories about eels; to renew relationships in human communities as well.

Most discussions over the last twenty years have focused on fisheries and the intense debates that rage on about international eel trade and fishing. Around the world, eels are still a popular menu item. In the US and Canada, however, changing cultural habits and palates have repositioned the eel from a delicacy to a disregarded, nuisance fish, a "trash fish"—an animal not worth saving. But more pressing is how the eel is living—and dying— in the habitats where she migrates. Indifference to and acceptance of eel suffering has dominated for a long time. To study the ancient cycles of death, birth, and rebirth found in eel migration is to become aware of violence often unseen and undetected, since so many people have been removed from the physical sites of rivers. Yet the truth persists for Anishinabeg: today's migratory eels are descended from the first animals who maintained a place in the consciousness and lifeways of Anishinabe and other Indigenous peoples around the world.[67]

There indeed are bright possibilities in the story of *pimisi*, which is not yet complete or even partially understood. The continued presence of eel migration, even if drastically reduced, represents a memory of ancient global tenure, a glint of hope and spiritual nourishment that can sustain the sometimes-overwhelming adversity of studying their disappearance, decline, and abuse—the stifling roadblocks encountered when trying to make improvements for all the waters and lives eels are connected to. So far, colonizer governments and conservation groups have not made a great deal of progress in ameliorating this centuries-long issue. Including and foregrounding the ancestral knowledge and practices of culturally grounded Indigenous people is the most reasonable step forward.

Eels are residents and travelers of *Kije-Mikinâk Minitig* and the global waters that they have known for millions of years. If information delivered to the masses about Indigenous peoples (and likewise about eels) has been, at best, misinformed or, at worst, a massive conspiracy to commit genocide and erase history, the work of recovering relationships with eels is part of an intergenerational, interspecies act of environmental justice. Recovering the sacred, bearing witness to what has been

desecrated, and ameliorating damage are foundational guideposts for a legacy of relatives who can act as leaders and change-makers in control of their own destiny, a way to "create knowledge and energy that have the power to transform social, political, and public consciousness."[68]

What is known: for some reason, eels continue to migrate into polluted, obstructed, and contaminated waters. Whether consciously or not, humans are involved in the complex and delicate worlds that eels belong to. Whereas the discipline of archaeology is often concerned with material excavation, perhaps what needs to be unearthed is the submerged consciousness of what it means to live in a way that is attuned to the realities of the aquatic world around us, and do so with an effort to create balance in challenging conditions.

My concurrent and future research will continue to build on the voices of Indigenous-led efforts alongside others who are aware of the complexities associated with eel recovery. There is space for those who are new to this situation alongside those who are well informed about the history of *pimisi*, which has, for generations, brought people together: for fishing and for celebrations, giving themselves as sacred offerings to the spirit, animals, and people of the land. Coordinated, transboundary education of students and residents of watersheds (of all ages and stripes of life) will benefit a wider awareness that normalizes and recasts eels as sacred and special watershed travelers. This must include anticolonial relation-building and an end to the erasure of culturally grounded Indigenous peoples who have survived our apocalyptic genocide and want to build a thriving future for those Anishinabeg who are coming to this earth. We are reviving and reclaiming our lives, destiny, and dignity along with land, water, and kinship traditions. Eel migrations mark the annual changes of season with a deep connection to the cosmos, supporting all life across the continent. They are a gift to all ecologies, stemming from and returning to the depths of an ocean beyond human reach. More must be done to elevate the stories and survival of *pimisi*. *Nmégwecwendám kagige pimisi*. Forever thankful to eels.

Notes

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55. Anne Spice, "Fighting Invasive Infrastructures," *Environment and Society* 9, no. 1 (2018), 47.

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57. Deloria, *Spirit and Reason*, 40.

58. Translation note: My late grandmother translated the word *anikobijigan* to me with her hands: she used her hands to show me what it would look like to hold a long string with several knots on it. These relationships are part of what it means to exist and persist today in the spiritual and physical footprints of ancestors. Stark writes, "As we recount and share our traditional stories, our way of life is passed down through the generations along an interconnected string entitled *nindaanikoobijiganag*. The concept *aanikoobijigan* is defined as an ancestor, a great-grandparent, and a great-grandchild."

59. Deborah McGregor makes a clear distinction between *traditional ecological knowledge* and *Anishinabe environmental knowledge*, to be specific with Anishinabe epistemologies in her chapter "Anishinaabe Environmental Knowledge" in *Contemporary Studies in Environmental and Indigenous Pedagogies: A Curricula of Stories and Place* (Rotterdam: Brill, 2013).

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66. John Borrows discusses the practice of connecting with and learning from waters in his chapter "Earthbound: Indigenous Resurgence and Environmental Reconciliation," in *Resurgence and Reconciliation,* (Toronto: University of Toronto Press, 2019), 49–82.

67. Darlene Johnston, *Respecting and Protecting the Sacred*. Ojibway scholar Darlene Johnston documents versions of Anishinabe creation stories, discussion of which are beyond the scope of this paper, but worth mentioning for context and connection. In one version, she explains that some Anishinaabeg "understood themselves as descended from the first animals who participated with the Great Hare in the act of creating the land above the waters. Each of the animal progenitors helped to shape the landscape of their countries for the sustenance of their animal and human descendants."

68. Paulette Steeves, *The Indigenous Paleolithic of the Western Hemisphere* (Lincoln: University of Nebraska Press, 2021), 182.