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The cover image of Asin-badakide-ziibi, the Baptism River, is courtesy of M. Baxley, Bear Witness Media.

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INTRODUCTION

# INTRODUCTION TO ISSUE 26 | COMMITMENT

By Laurie Moberg, Editor

This spring, we've put this issue together while university campuses across the country and beyond have been in uproar. Setting up encampments on their own college campuses, students joined a movement demanding an end to the violence and deaths of civilians in Palestine. The students demonstrated the value and power of commitment even as the protests became contentious and complicated.

Commitment, especially in the face of adversity, can be a formidable task. Why should we make plans, emotionally attach, or invest in efforts that will be strenuous and possibly disappointing? The answer emerges in the articles in this issue: because commitment is how we effect change. From centering Indigenous knowledges to restor(y)ing ecological and social places to mobilizing hope, the articles here illustrate what



*Detail of image of tall rocks at the mouth of the Baptism River from which the river gets its Ojibwe name. Image courtesy of M. Baxley, Bear Witness Media.*

author Scott Russell Sanders (1998, 80) calls a “commitment...compounded of stubbornness, affection, and wonder.” Collectively, these authors show us the power of this kind of commitment—a determination rooted in emotional investment and conviction—to effect change and shape our shared futures.

Two of the articles in this issue demonstrate a commitment to Indigenous voices and stories. In his article tracing the Indigenous place-names for rivers along the North Shore of Lake Superior, Erik Martin Redix explains that his work counters the intentional erasure of Indigenous knowledge. The outcomes of this work, including signage across northern Minnesota, are also investments for the next generation of Ojibwe youth. Caroline Fidan Tyler Doenmez offers a review of *In Our Backyard: Keeyask and the Legacy of Hydroelectric Development* edited by Aimée Craft and Jill Blakely. Doenmez argues that the anthology is both a record of Indigenous dissent and a way of documenting responsibility to Indigenous knowledges and relationships with place.

Some articles share a commitment to reconfiguring our stories as a way of confronting challenges and injustices. Emily Levang entreats us to see the potential pitfalls of the dominant narratives for protecting the St. Louis River estuary; she proposes the rights of nature approach as an intervention that might reconfigure our relationships with the estuary and the more-than-human more broadly. In her article on Arctic archaeological sites, republished from 2019, Phyllis Mauch Messenger asks us to see the stories that might be lost due to climate change. She argues that as sites across the Arctic are threatened by thawing permafrost, so are the data and stories held in these places. She details the commitment of scholars to gather as much data as possible before climate change destroys the sites completely.

We preface Messenger’s article with a series of additional resources that explore both the threat to Arctic landscapes and ongoing recovery efforts. Based on his research on flooding in the Detroit area, Jacob Napieralski argues that historical practices of redlining and the erasure of streams and wetlands have colluded to put particular communities at greatest risk. Napieralski is committed to addressing these injustices and inequalities by telling stories of floods and flood mitigation that acknowledge ghost streams and discriminatory social practices.

Our final set of articles focuses on a commitment to hope examined through ongoing efforts to effect change. Joanne Richardson draws together several tools, initiatives, and people that work to improve our water futures at local, national, and global scales. In a rich and engaging StoryMap, a first of its kind for *Open Rivers*, Richardson demonstrates how these examples are motivated by hope and can spur us to action. In his reflections on a screening of *UPRIVER*, Chris O’Brien highlights the effects of the innovative conservation strategies that are transforming Oregon’s Willamette River system. O’Brien encourages us to consider how this commitment to reinvigorating a river system might be transferable to other places. In our Teaching & Practice column, several contributors offer hope by sharing ways they demonstrate a commitment to water, provoking readers to consider how we might make our own practice of commitment.

Sharing their stories and their dedication, the articles in this issue demonstrate commitments to people and places and the possibilities of a different, better future. More importantly, by sharing their commitments, the authors in this issue also invite readers to join them in creating this future together. This is not simple work. The articles here speak both to challenges and hope, to the labors of commitment and the inspiring power

of their outcomes, to confronting the formidable and to empowering others. Yet making commitments—to a cause, a place, people, or the future—is a way of demonstrating what matters to us, of living with integrity, and of effecting the changes

we want to see in the world. These articles compel us to consider: what future do you want to create and what commitments will you make in order to build that reality?

## References

Sanders, Scott Russell. 1998. *Hunting For Hope: A Father's Journey*. Boston: Beacon Press.

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## About the Author

Laurie Moberg is the editor for *Open Rivers: Rethinking Water, Place & Community*, a digital journal of public scholarship published at the University of Minnesota (UMN) by the Institute for Advanced Study and UMN Libraries Publishing. She earned her Ph.D. in anthropology from UMN in 2018. Her doctoral research investigates recurrent episodes of flooding on rivers in Thailand and queries how the ecological, social, and cosmological entanglements between people and the material world are reimagined and reconfigured in the aftermath of disasters. In her current work, she approaches public scholarship as a critical strategy for expanding whose stories are heard, for shaping our public conversations, and for forming solutions for our shared ecological challenges.

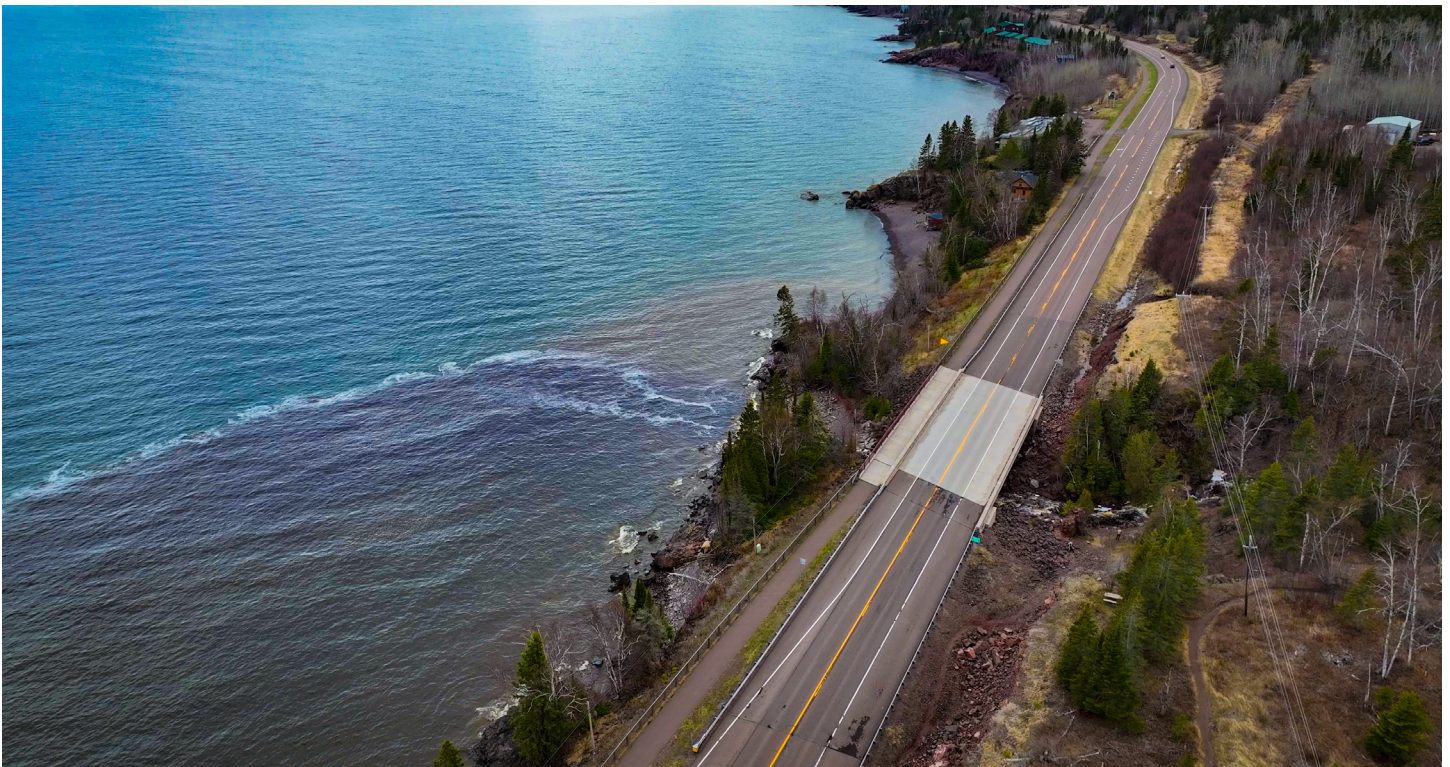
FEATURE

# RIVERS OF LAKE SUPERIOR'S NORTH SHORE: HISTORICAL METHODOLOGY AND OJIBWE DIALECTS

By Erik Martin Redix

The drive along the North Shore of Lake Superior between Duluth and the international border on Highway 61 is an iconic Minnesota experience. At just over three hours long, the trip offers unparalleled scenery in the upper Midwest. Visitors pass through a handful of small towns and over two dozen short scenic rivers along the shore of Lake Superior. These rivers are narrow and relatively short, descending anywhere from 20 to 40 miles down the rugged

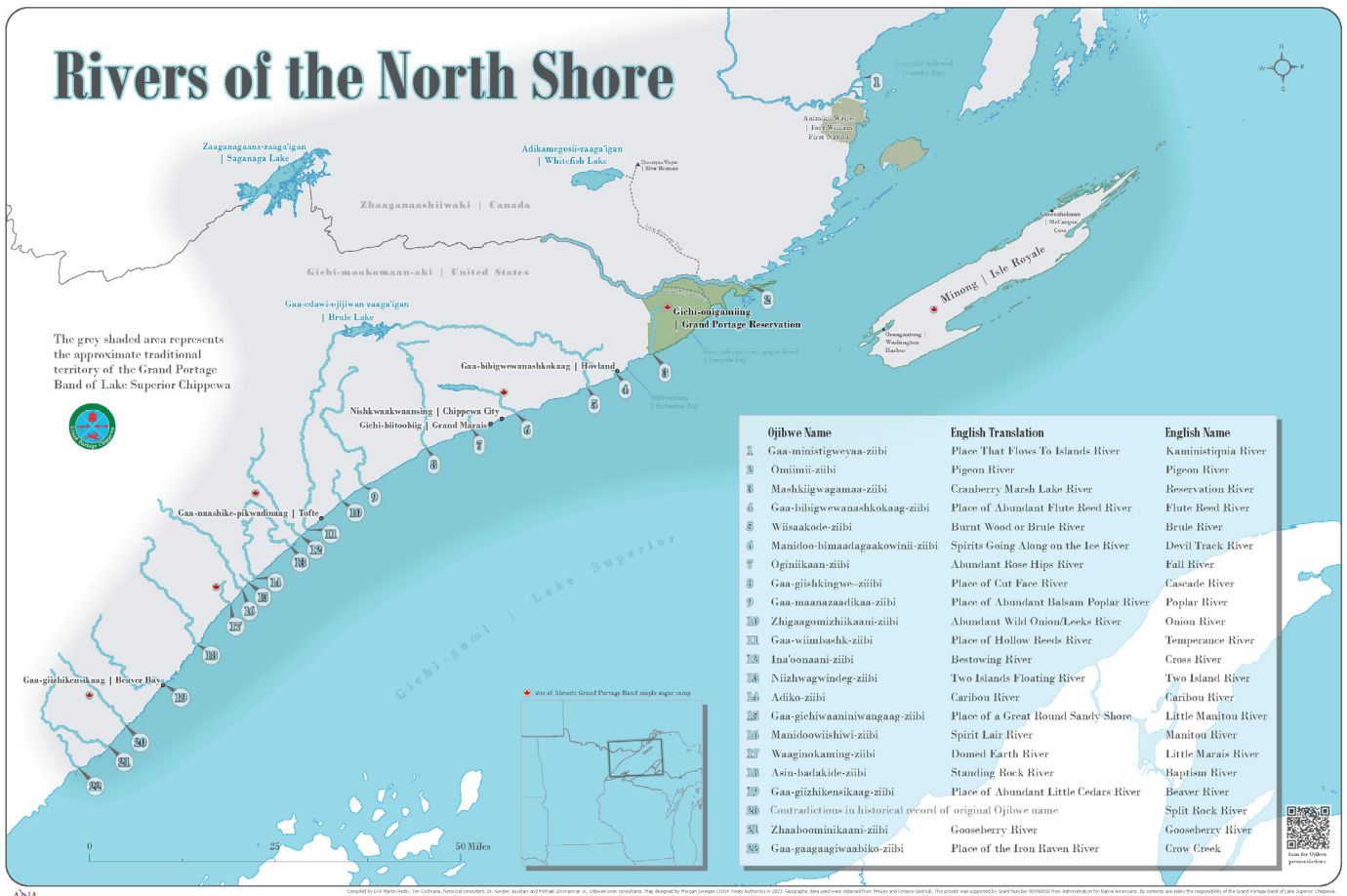
landscape of Minnesota's North Shore into Lake Superior. For example, Brule Lake, the source of the Temperance River (and the South Brule River as well) sits 1,851 feet above sea level and, over 39 miles of North Shore terrain, it descends to 697 feet above sea level at its mouth. These steep descents result in dozens of waterfalls that beckon visitors from across Minnesota and North America.



*Highway 61 at the mouth of the Onion River east of Tofte. Image courtesy of M. Baxley, Bear Witness Media.*

The North Shore lies within the traditional historical territory of two modern tribal nations: the Grand Portage Band of Lake Superior Chippewa and the Fort William First Nation. Historically, these two nations shared common geography, history, and kinship. For all intents and purposes, these two tribal nations functioned as one Band prior to being divided by the U.S.-Canadian border in the nineteenth century. In my work as the Ojibwe Language Coordinator for the Grand Portage Band, I served as editor for a map documenting the Ojibwe names for the rivers within the traditional territory of the Grand Portage Band.[1] This map is the first step

in promoting the use of these Ojibwe names. The Band worked with the Minnesota Department of Transportation to install bilingual signs along Highway 61 to Grand Marais. The first bilingual sign at Manidoo-bimaadagaakowinii-ziibi (Devil Track River) was installed May 16, 2024. Later phases may include signage down the shore all the way to Beaver Bay. The Band also started collaboration with the Superior National Forest and Cook County for bilingual signage on forest and county roads that cross these rivers further upstream. Six bilingual signs on Cook County roads were installed in May 2024.



*Rivers of the North Shore. Compiled by Erik Martin Redix, Tim Cochrane, historical consultant, Dr. Gordon Jourdain and Michael Zimmerman Jr., Ojibwemowin consultants. Map designed by Morgan Swingen (1854 Treaty Authority) in 2023. Geographic data used were obtained from MnGeo and Ontario GeoHub. This project was supported by Grant Number 90XN0058 from Administration for Native Americans. Its contents are solely the responsibility of the Grand Portage Band of Lake Superior Chippewa.*



[Download a higher-resolution copy of the map here.](#)

While creating the map, I found that there were many complicated issues and interesting stories surrounding the names of the rivers. The purpose of this article is to present these sometimes complex historical issues and the stories behind

## Format of the Ojibwe Names

Almost all of the names except one describe attributes of an area around the river, not attributes of the river itself. Accordingly, common to many Ojibwe river names is the prefix Gaa-, which refers to place. Another common word part is the final -kaa, which means “an abundance.” Interestingly, only one name here, Gaa-ministigweyaa (Kaministiquia River), includes the medial -tigwe- which indicates a river.[2] This is the only name that describes the river itself and not the area surrounding it. Ojibwe names

the names. Some of the names illustrate dialect differences that reflect the Ojibwe spoken at Grand Portage, while others show contrasts with other dialects in Minnesota. There are also contradictions and gaps in the historical record that warrant a longer discussion than was possible on the map.

recorded in the nineteenth century were captured phonetically, as Ojibwe speakers historically did not write using a standardized alphabet. Widespread standardization of Ojibwe writing did not occur until the mid-twentieth century with the Fiero or double vowel orthography, so named for Charles Fiero, the linguist who devised it. I am presenting the names using that orthography in this text, while the original phonetic renderings are provided in footnotes.



*The Onion River descending to Lake Superior.  
Image courtesy of M. Baxley, Bear Witness Media.*

## Border Lakes Ojibwe Dialect

Ojibwe speakers on the North Shore speak Border Lakes Ojibwe, a subdialect of what linguists call Southwestern Ojibwe, spoken in Minnesota, Wisconsin, and southwest Ontario. Border Lakes Ojibwe is a dialect spoken at Grand Portage, Fort William, Bois Forte, Lac La Croix, and other Ojibwe communities along the Minnesota and Ontario border.[3] Dialect difference is often overstated by beginning learners and others who do not fully understand Ojibwe. Despite dialects, Ojibwe spoken across Ojibwe country

from Quebec to the Great Plains is mutually intelligible. For example, one of the language consultants on this project is a fluent second speaker of eastern Ojibwe dialect of Lower Michigan and instantly recognized and interpreted all the word parts based on the renderings except for two rivers which featured a word part unique to Border Lakes Ojibwe. I have noted the few names that reflect the distinct Border Lakes Ojibwe dialect.

## Sources & Methodology

There are a handful of archival sources that provide documentation of Ojibwe names for the rivers of the North Shore. Not every source includes the Ojibwe names of every river, but used together, these sources provide fairly conclusive evidence of the Ojibwe names for most of the rivers on the North Shore. There was no standardized system of writing Ojibwe in the nineteenth century so in the archival sources, all the Ojibwe river names were written phonetically, according to how they sounded to the person recording them. As a result, the phonetic renderings vary in quality in archival sources depending on the transcriptionists' attention to detail with a language with which they may or may not have had strong abilities.

The more reliable sources come from people who worked directly with North Shore Ojibwe people. The earliest in-depth survey of Lake Superior was by British naval officer Henry Bayfield, for whom Bayfield, Wisconsin is named. Bayfield's survey in 1823–25 produced a map with some detail of the North Shore.[4] A much more detailed and thorough recording of Ojibwe names came two decades later when Congress authorized the first geological survey of Wisconsin, Iowa, and Minnesota. In the summer of 1847, a group of

scientists arrived at Minnesota's North Shore, a region that was, for all intents and purposes, Ojibwe territory at the time. While it was claimed as part of the United States, it had not legally become part of the U.S. until the Treaty of 1854. The region had practically no white settlers; the few non-Ojibwe people were fur traders. There was no other industry or corporate presence other than the American Fur Company. The results of the geological expedition were published in 1852 and became known as the David Owen Report, after its lead scientist.[5] The Owen Report produced remarkably accurate phonetic renderings of Ojibwe words, but some of the smaller bodies of water and rivers were not documented.

Another important set of sources for this study are the Trygg Historical Maps. In 1956, J. William Trygg began a project that created maps that included notes from the original surveys of Minnesota, Wisconsin, Michigan, and Iowa. The project was part of the litigation for the Indian Claims Commission, which attempted to determine the value of the timber harvested in these states compared to what tribes were paid at the time of treaties.[6] The original survey of most areas of the North Shore occurred from 1857 to 1859, with the Hovland Township survey

occurring twenty years later in 1879, and the Grand Portage Reservation survey not until 1893. [7] The Trygg Historical Maps also produced accurate phonetic renderings of North Shore river names. However, the original surveyors did not document every Ojibwe name of the geography they encountered. Despite that, having two independently produced historical sources that support each other was invaluable to this current project.

Less reliable are the works of missionaries Chrysostom Verwyst and Joseph Gilfillan. Both men were dedicated scholars of the Ojibwe language who published works on Ojibwe place names in Minnesota and Wisconsin. [8] However, both lived hundreds of miles from the North Shore and accordingly, their renderings were hampered by not working directly with speakers living in the region. Gilfillan was an Episcopal missionary working on the White Earth Reservation from 1873 to 1908. [9] The vast

majority of Gilfillan's names for North Shore Rivers and other landscapes were accurate, but a few occur nowhere else and directly contradict multiple other sources. Chrysostom Verwyst was a Franciscan missionary who came to the Chequamegon Bay region of Wisconsin in the 1870s and remained there until his death in 1925. [10] Verwyst sometimes provided interpretations that were based on Ojibwe spoken in Wisconsin and did not reflect the Border Lakes Ojibwe that is captured in the Owens and Trygg renderings.

Finally, Warren Upham's *Minnesota's Geographic Names: Their Origin and Historic Significance*, published in 1920, is a review of historical sources with no original research done regarding Ojibwe names. In his discussion of Ojibwe names of North Shore rivers, Upham relied almost solely on Gilfillan's work and did not critically discuss inconsistencies in the archival record. [11]

## Rivers of the North Shore: Thunder Bay to Duluth

Beginning in Thunder Bay and moving southwest to Duluth, I will present the Ojibwe name for each river written in modern orthography with the literal translation in parentheses, followed

by its official name today. I will then discuss the historical background of each Ojibwe name, as well as explain how it came to be known by its English name.

### Gaa-ministigweyaa-ziibi (Place That Flows to Islands River): Kaministiquia River

The Kaministiquia River is an Ojibwe word meaning "a place where a river flows to islands." Furthermore, there are two islands at the mouth of Gaa-ministigweyaa. However, there is historical evidence it was once known as Gaa-manitigweyaag, and that the name changed over time in a process of misunderstanding by non-Ojibwe speakers. In the archival record,

there are a variety of translations, most of which do not make sense in Ojibwe. The most grammatically viable of these translations is "place of a wide river." [12] This would be unique among geographic names with an Ojibwe origin in that the "corrupted" form makes sense in Ojibwe and also makes sense geographically.

## Omiimii-ziibi (Pigeon River): Pigeon River

The name Pigeon River is remarkably consistent across historical documentation. The name relates to the historical abundance of pigeons along the river. According to Grand Portage elder Billy Blackwell: “At one time, seasonally thousands of pigeons lived on the river.” Likewise, omiimii is “pigeon” across Ojibwe dialects. Dakota presence on the North Shore was much earlier than in central Minnesota and northwest Wisconsin. However, there is less documentation in archival records and oral tradition about Dakota names for places on the North Shore or records of interactions there between Ojibwe and Dakota peoples. One exception is a story told by Billy

Blackwell about a battle at Pigeon River prior to the nineteenth century, where an old man was awakened by a bird telling him the Dakota were near. He warned the warriors and they hid on the shore and ambushed the Dakota. Only two canoes escaped, and on their retreat they were spotted by Ojibwe women picking berries near what is today Paradise Beach, 15 miles east of Grand Marais. From where the women hid themselves, they watched as the Dakota stopped at an island to defecate before continuing to paddle west. Through the years, Grand Portage Ojibwe speakers continued to jokingly refer to that island as where the Dakota stopped to defecate.[13]

## Mashkiigwagamaa-ziibi (Cranberry Marsh Lake River): Reservation River

The Treaty of 1854 established the Grand Portage Reservation, identifying this river as the southern boundary, although that was modified in later acts of Congress. The English name, Reservation River, was applied after the establishment of the Reservation. In the Treaty of 1854, the river is identified as Mashkiigwagamaa, which describes the habitat where low-bush cranberries grow, even though the cranberry itself (mashkiigimin)

is not included in the word. Gilfillan mistranslated the river as Gaa-miskwaataawangag, or “place of abundant red sand.” Verwyst identified Red Rock beach, a few miles north (where George Morrison lived in his later years and painted his famous works inspired by the Lake Superior horizon) as Gaa-miskwaataawangag, which is more fitting to that area, with its stunning beach comprised of small red pebbles.[14]

## Gaa-bibigwewanashkokaag-ziibi (Place of Abundant Flute Reeds River): Flute Reed River

Bibigwewanashk is the Ojibwe word for elderberry. It is unknown exactly how or why elderberry was translated to flute reed, but Bibigwe means “she or he plays the flute,” and -ashk- is a medial

indicating grass. Elderberry wood has inner bark that can be easily hollowed out and can be used for as taps for maple sugaring. This trait may have lent itself to use in flute construction.[15]

## Wiisaakode-ziibi (Burnt Wood River): Brule River

The Brule River through Judge C.R. Magney State Park is one of a handful of rivers on the North Shore that is well documented in the historical record and directly translated (albeit into French) from its Ojibwe name (both meaning “burnt wood river”).<sup>[16]</sup> One of the sources of the Brule River is 40 miles upstream at Brule Lake, one of the largest lakes in northeastern Minnesota

at 4,272 acres and eight miles wide. However, Wiisakode-zaaga’igan is not the name of Brule Lake. Instead, in Ojibwe it is called Gaa-edawi-ojjiwan zaaga’igan, “place where the water flows on both sides,” due to its being the source of the Brule River on its east end, and the source of the Temperance River on its west end.<sup>[17]</sup>

## Manidoo-bimaadagaakowinii-ziibi (Spirits Going Along on the Ice River): Devil Track River

Northeast of Grand Marais, Devil Track River is an example of the effects of colonization on place names. In Ojibwe, the word “manidoo” means spirit, but Christian missionaries consistently translated words that meant “spirit” in Native languages as “devil” throughout Indian country, reflecting their views that traditional Native spirituality was devil worship. For example, the Spirit Lake Tribe in North Dakota was known as the Devil’s Lake Sioux Tribe prior to changing

its name in 1996.<sup>[18]</sup> Bimaadagaako means “she or he goes along on the ice,” with the final -aad-agaako referring specifically to action occurring on ice. The source of the river is just over eight miles upstream at Manidoo-bimaadagaakowinii-zaaga’igan (Spirits Going Along on the Ice Lake), today known as Devil Track Lake, a long, narrow lake (roughly five miles long by half a mile wide), a few miles north of Grand Marais.<sup>[19]</sup>

## Oginiikaan-ziibi (Abundant Rose Hips River): Fall River

Southwest of Grand Marais is the Fall River, which was consistently identified as Oginiikaan-ziibi in historical documents. It is unclear when it became known as Fall River, and when the creek a mile west became known as Rosebush Creek. The name Fall River likely refers to a waterfall

very close to the mouth of the river. In 2003, a petition with 80 signatures was presented to the Cook County Board of Commissioners asking the county to officially change the name of the Fall River back to Rosebush River. After hearing testimony, the County Board tabled the issue.<sup>[20]</sup>

## Gaa-giishkingwe–ziibi (Place of Cut Face River): Cascade River

The Cascade River has a story similar to that of the Fall River: it was known as something else in Ojibwe, and then the nearby creek took on that name in English. It is unclear when or why it

became known as the Cascade River and when or why the creek just to the east became known as Cutface Creek.<sup>[21]</sup>

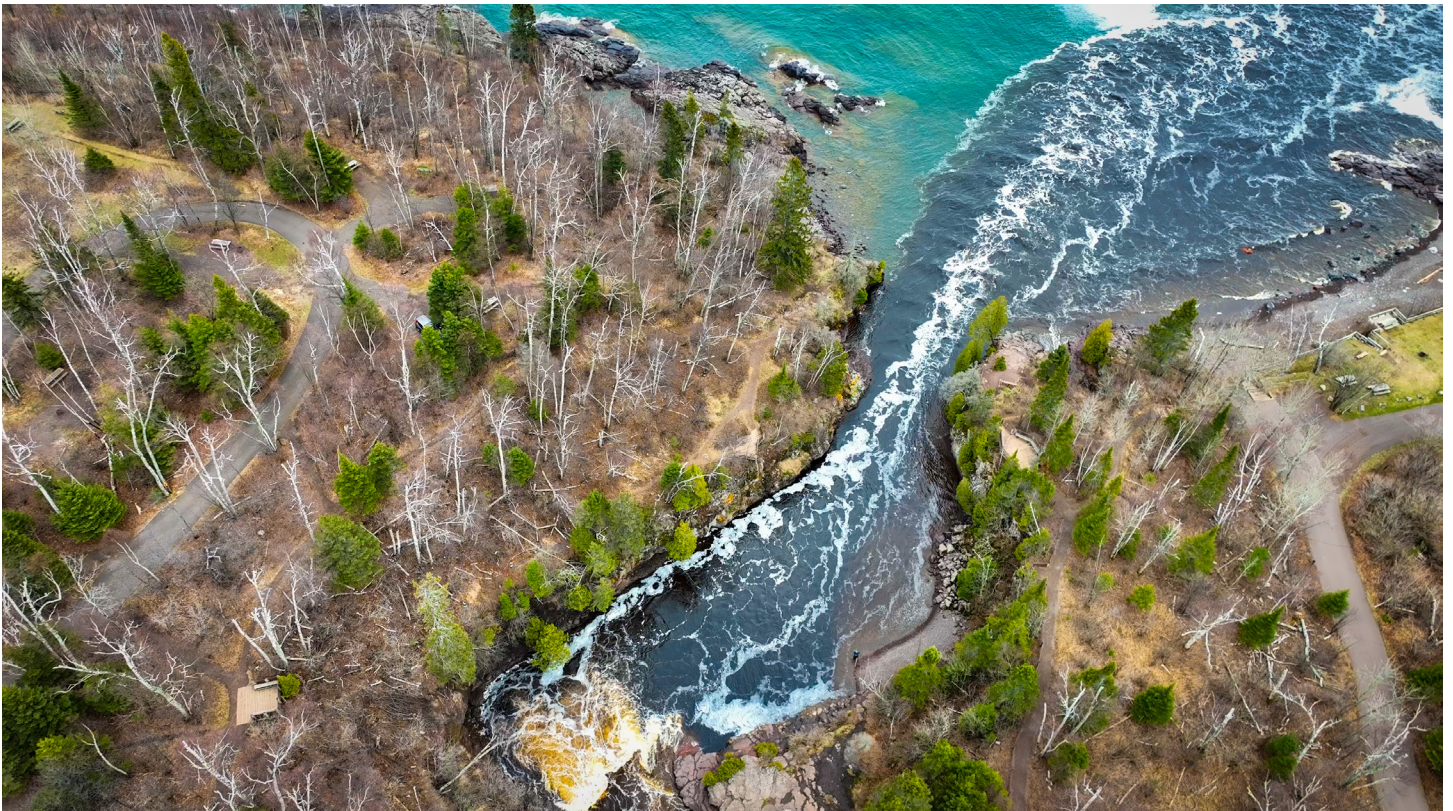
## Gaa-maanazaadikaa-ziibi (Place of Abundant Balsam Poplar River): Poplar River

The name for the Poplar River in Lutsen is well documented and consistent across historical sources.<sup>[22]</sup>

## Zhigaagomizhiikaani-ziibi (Abundant Wild Onions or Leeks River): Onion River

There are wild onions or leeks near the Onion River on the Superior Hiking Trail, which comprises the northern extent of the range of wild onions on the North Shore today. The zhigaag in zhigaagomizh shares its initial with zhigaag or “a skunk.” However, contrary to popular belief,

the commonality refers not to the pungent smell that onions and skunks share, but instead to the commonality of the point of a skunk’s tail and the leaf of the wild onion. The role of pointiness in defining zhigaag and zhigaagomizh is illustrated by the word for porcupine, “gaag.”<sup>[23]</sup>



*The mouth of the Temperance River. Image courtesy of M. Baxley, Bear Witness Media.*

## Gaa-wiimbashk-ziibi (Place of Hollow Reeds River): Temperance River

The name Gaa-wiimbashk-ziibi is well documented and consistent in historical sources. However, its meaning is a bit of a mystery. One source talks about how the Ojibwe name referred to a deep hollow—it could be that this refers to reeds being hollow and not a geographic term meaning “a valley.” The English name Temperance River is the result of a long-standing joke among early settlers: most of the rivers on the North Shore

have a gravel bar at the mouth of the river, which, except during spring runoff, nearly closes off the mouth. The Temperance River has no gravel bar, so early settlers called the river “no bar river” which humorously evolved into Temperance River after the Temperance Movement in the late nineteenth and early twentieth century to abolish alcohol sales in the United States.[24]

## Ina’oonaani-ziibi (Bestowing River): Cross River

The name Ina’oonaani-ziibi is very consistent and well documented across historical sources as well. The exact reason it has that name, however, is lost to time. According to Lac La Croix elder

Gordon Jourdain, the verb “ina’oozh” refers to one person bestowing or distributing something spiritual on another. The verb “maada’oozh” describes a similar action, but according to



*The mouth of the Beaver River. Note the presence of a large sand bar across the mouth typical of most of the rivers of the North Shore even in spring when this photo was taken. Image courtesy of M. Baxley, Bear Witness Media.*

Jourdain, ina'oozh communicates bestowing in a more spiritual context.[25] This may indicate that the area was a significant ceremonial place at one time. In 1843, Father Frederick Baraga ventured from his mission at La Pointe to travel to Grand Portage in his birch bark canoe. A dangerous storm came up and after more than 30 miles on open water, he landed at the mouth of the Cross River, 65 miles to the southwest. Grateful that

he survived, Baraga planted a cross there and the river became known as Jiibayaanigo-ziibi, the Ojibwe word for “a cross.” Jiibay is a ghost and the -aatiig final indicates it is made of wood.[26] It is significant that both of these names reflect spiritual traditions and, regardless of the exact origin of Ina'oonaaani-ziibi, may suggest that the area was consistently associated with spirituality.

## Niizhwagwindeg-ziibi (Two Islands Floating River): Two Island River

The historical record is mostly consistent for Niizhwagwindeg-ziibi. The Ojibwe word for island, “minis,” is not explicitly in the word, but the name instead describes two things floating near the mouth of the river in what today is called Taconite Harbor. There are two islands (Bear and Gull Island) directly across from its mouth. Agwinde is the Border Lakes dialect way of saying “it floats,” and illustrates how Ojibwe speakers

of the North Shore shared common dialect with speakers from Lac La Croix and Bois Forte. In contrast, Verwyst rendered it “nijogondeg,” but again, this reflects Verwyst’s understanding of the Ojibwe spoken on the south shore of Lake Superior. The way Ojibwe speakers in Wisconsin and central Minnesota say “it floats” is agonde. [27]

## Adiko-ziibi (Caribou River): Caribou River

The northernmost river in Lake County on the North Shore, Caribou River, like the Pigeon River, is a direct translation of its Ojibwe name. [28] According to Grand Portage Band member and local historian Alta Mcquatters, it was named in honor of Swamper Caribou, who lived in the

area in the late nineteenth century. Caribou was the grandson of Adikoons, who signed the Treaty of 1854 and was arguably the most influential Grand Portage chief of the mid-nineteenth century.[29]



## Gaa-gichiwaaniniwangaag-ziibi (Place of a Great Round Sandy Shore River): Little Manitou River

Today, the name of the Little Manitou River is derived from the Manitou River just west of it. Historically, it was known by the same name as

the bay it empties into, which today is known as Pork Bay, but was known historically as Gaa-gichiwaaniniwangaag for its round shoreline.[30]

## Manidoowiishiwi-ziibi (Spirit Lair River): Manitou River

Manidoowiishiwi-ziibi is another example of dialect difference in river names. Owen and the Trygg land maps identify it as Manidoowiishiwi-ziibi, “wiish” being a lodge in Border Lakes Ojibwe. Verwyst rendered it Manidoowaazhiwi-ziibi, reflecting the Ojibwe word for lodge, “waazh,” used in the community he was working

in. Gilfillan inaccurately identified it as Manidoo-bimaadagaakowinii-ziibi, erroneously stating “there being two rivers of that name on the north shore of Lake Superior.”[31] The mouth of the Manitou River is a dramatic waterfall into Lake Superior, the only river on the North Shore with that feature.



*Gaa-gichiwaaniniwangaag-ziibi (Pork Bay).  
Image courtesy of M. Baxley, Bear Witness Media.*

## Waaginokaming-ziibi (Domed Earth River): Little Marais River

Waaginokaming-ziibi is consistent in the historical record and may refer to the round, dome-like rock formations along Lake Superior near the mouth of the river. The Trygg Historical Maps document sugar camps a few miles upstream.[32]

## Asin-badakide-ziibi (Standing Rock River): Baptism River

Asin-badakide-ziibi describes the tall perpendicular rocks at the mouth of the river. The Trygg Historical Maps document the presence of an old Ojibwe village a few miles to the southwest of the mouth.[33]



*Tall rocks at the mouth of the Baptism River from which the river gets its Ojibwe name.  
Image courtesy of M. Baxley, Bear Witness Media.*

## Gaa-giizhikensikaag-ziibi (Place of Abundant Little Cedars River): Beaver River

The Beaver River is consistently identified as Gaa-giizhikensikaag-ziibi across sources, including Grand Portage elder Billy Blackwell. Historian John Fritzen points to the abundance

of beaver colonies on the Beaver River, but it is unclear when and why Beaver River (and Beaver Bay) became associated with beavers and not with cedars.[34]

## Gaa-nookikobag (Place of Soft Leaves): Unknown

This is an example of a documented Ojibwe name whose meaning is lost to time. Both the Bayfield Expedition and the Owen Report document a river between the Beaver and Split Rock Rivers known as Gaa-nookikobag. In the 1950's, historian John Fritzen wrote: "Early maps show a creek between Split Rock River and Beaver Bay

with the Indian name of Kanekikopeg or Low Bush River. This is probably the creek that flows into Little Two Harbors Bay." [35] The meaning of Nookikobag is also unclear. The initial nook- refers to being soft and the final -bag refers to a leaf.[36] No plants are known to have this name in modern Ojibwe.

## No Ojibwe name: Split Rock River

Gilfillan identifies the Split Rock River as Giniwaabik-ziibi: "the war eagle iron river." However, the Bayfield Expedition, Owens Report, and the Trygg Historical Maps all identify Giniwaabik-ziibi as what is today known as Silver Creek and identify the Split Rock River by its English name. Verwyst identifies Split Rock as

Gaa-nookikobag, but the Bayfield Expedition, Owens Report, and the Trygg Historical Maps identify the Split Rock River and Gaa-nookikobag-ziibi as two distinct rivers. Perhaps deep in an archive somewhere there is a map or letter or something that provides an Ojibwe name for Split Rock, but for now it is lost to time.[37]

## Zhaaboominikaani-ziibi (Abundant Gooseberries River): Gooseberry River

The Gooseberry River is consistently documented as a direct translation of the Ojibwe. Zhaaboominikaani-ziibi means Abundant Gooseberries River and is repeatedly identified as such in the historical record.[38]

## Gaa-gaagaagiwaabiko-ziibi (Place of the Iron Raven River): Crow Creek

Crow Creek is a watered-down translation of Gaa-gaagaagiwaabiko-ziibi. Gaagaagi is a raven, not a crow (aandeg is a crow), and the iron or metal part is completely missing from the English name.[39]

## Minising-ziibi (Island River): Encampment River

For Minising-ziibi, the Ojibwe is actually much simpler than the English. Minising is simply “on the island,” and historical sources imply that

the said island was used for camping. The Trygg Historical Map documents an early English translation as “Encampment Island River.”<sup>[40]</sup>

## Giniwaabiko-ziibi (Iron Golden Eagle River): Silver Creek

As mentioned before, Gilfillan erroneously identified the Split Rock River as Giniwaabik-ziibi: “the war eagle iron river.” He identified Silver Creek as Zhooniyaa-ziibiwesh. However, it is clear this is a direct translation of the English name (using the older diminutive ziibiwesh for creek, not the more modern term for creek, “ziibiins”). The Bayfield Expedition, Owen Report, and the Trygg Historical Maps identify Giniwaabik-ziibi as Silver Creek. Gilfillan’s English translation may very well be wrong also. Giniw is “a Golden Eagle,” but there is nothing in the historical record indicating an “Iron Golden Eagle” in the vicinity of Silver Creek. Neither the Bayfield

Expedition, Owen Report, nor Trygg Historical Maps provide a direct English translation of their phonetic Ojibwe renderings. Therefore, it is entirely possible (if not more likely) that the name “Kinewabik” as rendered in the Owen Report is actually Ginoowaabik, or “a long rock,” and was mistranslated by Gilfillan. While these two words look distinct in the modern Fiero orthography, ginoo-, “long” and ginew, “golden eagle,” sound almost identical. Many of the rivers are identified by rock formations, while very few are identified by animals, to say nothing of the rarity of Golden Eagles in northeast Minnesota.<sup>[41]</sup>

## Biitoobiigo-ziibi (Parallel River): Stewart River

Gilfillan translated this name as “Parallel river, or Double river, no doubt from its flowing parallel to Silver Creek.” Biitoobiigo-ziibi includes the initial biitoo- or “layer,” which refers to the land between, followed by -bii- indicating a liquid, meaning “the two rivers.”<sup>[42]</sup> This same concept

is behind the name for Grand Marais, Gichi-Biitoobiig, which refers to the two nearly identical bays intersected by a very narrow strip of land between them, a striking feature noticeable as one descends the Gunflint Trail into Grand Marais.<sup>[43]</sup>

## Mookomaani-ziibi (Knife River): Knife River

The Ojibwe people historically utilizing the area south of Two Harbors were likely affiliated with the Fond du Lac Band, thus the place-names reflect the Ojibwe spoken along the south shore of Lake Superior and central Minnesota. That being said, the remaining river names on the North Shore consist of words such as “sucker”

and “knife” that are the same across Ojibwe country. Knife River is a direct translation of Mookomaani-ziibi and is consistently referred to as such in the historical record. Historian John Fritzen claimed the name derived from sharp rocks on the riverbed.<sup>[44]</sup>

## Namebini-ziibi (Sucker River): Sucker River

Namebini-ziibi is a direct translation and consistent in the historical record. It was named for an abundance of namebinag, or suckers.[45]

## Manisisag-ziibi (Dry Wood River): French River

The Ojibwe name for French River refers to a piece of wood, with the final -sag indicating wood that has been dried and processed. Gilfillan

identified it as Aangwasago-ziibi, or Floodwood River, but that is the only such reference in the historical record.[46]

## Basaabikaa-ziibi (Low Rock River): Lester River

Gilfillan identified the Lester River as “Basaabikaa” and translated it as “the river that comes through a worn hollow place in the rock.” The initial Bas- refers to a lowering or depression, and the medial -aabik- indicates the mineral or rock. However, it is possible that the name is Baasaabikaa, from the initial baas-, which indicates something that is cracked or shattered. The transcriptions of both the Owen Report

and the Trygg Historical Maps do not explicitly indicate if it is the initial Bas-, or Baas-, as both are transcribed as phonetically with an “a,” which could mean either “a” or “aa” in the Fiero orthography. The translation given on the Trygg Historical Maps is Gap Rock River. Whether the name refers to a rock in a depression or a cracked rock is unclear. The English name derives from an early settler.[47]

## Connecting to Places and Place-Names

Recovering lost place-names can be challenging and even tedious at times. Historical sources sometimes contradict each other. The lack of a standardized orthography adds an additional challenge. However, the reward for this effort is that almost all of the Ojibwe names reflect a richer understanding of the land than the English names, even in instances where the English name derives in some form from the Ojibwe. This is a key aspect of cultural revitalization that benefits not just Indigenous communities but non-native folks as well who live on or visit these lands. In doing so, we are giving voice to centuries of Indigenous knowledge and history from whom

we lack firsthand accounts and whose voices were intentionally erased. Furthermore, recovery of these names and increasing their usage advance tribal sovereignty by connecting Native people to lands off the reservation that were historically Indigenous territory. In 2023, Governor Tim Walz signed a law making “Indigenous Education for All” the law in Minnesota schools.[48] While we can move toward a historically grounded curriculum in schools that better teaches treaty rights, it is important for a new generation of tribal youth to see Ojibwe language off the reservation, so that they can better understand Ojibwe lands as the entirety of the ceded territory.

## Acknowledgements

This project has its origins in 2017 when Rick Novitsky, retired park manager at Grand Portage State Park, introduced me to the Owen map. Miigwech niijii. Miigwech also to Kurt Mead, interpretive naturalist at Tettegouche State Park, who researched extensively and is a wealth of knowledge on the Owen map and North Shore rivers. Miigwech to Matthew Baxley of Bear Witness Media for your work getting the stunning images of the rivers.

## Footnotes

[1] Audio files of Ojibwe names on the map and in this article can be found at: <https://ojibwe.net/traditional-territory-of-the-grand-portage-band/>.

[2] Ojibwe People's Dictionary (OPD), s.v. "-tigwe-," <https://ojibwe.lib.umn.edu/word-part/tigwe-medial>, accessed October 24, 2023.

[3] Dialect difference is discussed at length in Michael D. Sullivan, Sr., *Relativization in Ojibwe* (Lincoln: University of Nebraska Press, 2020).

[4] Ruth McKenzie, "Henry Wolsey Bayfield," *Dictionary of Canadian Biography, Vol. 11* (Toronto: University of Toronto, 1982), [http://www.biographi.ca/en/bio.php?id\\_nbr=5362](http://www.biographi.ca/en/bio.php?id_nbr=5362); and Lieut. Henry Wy. Bayfield R.N.; assisted by Mr. Philip Ed. Collins, Mid., cartographers, *Survey of Lake Superior Sheet 1* (London: Hydrographical Office of the Admiralty, 1828), <https://recherche-collection-search.bac-lac.gc.ca/eng/home/record?app=fonandcol&IdNumber=3672171&q=Henry%20Bayfield,%20chart%20of%20Lake%20Superior,%20sheet%201st>.

[5] David Dale Owen, *Report of a Geological Survey of Wisconsin, Iowa, and Minnesota, and Incidentally of a Portion of Nebraska Territory* (Philadelphia: Lippincott, Grambo & Co., 1852). The Owen expedition is detailed in John C. Green, "The Owen-Norwood Survey of 1847-1850: The First Geological Survey of the Northeast Minnesota Region—and Its Context in the Evolution of Geological Science," *Minnesota Geological Survey Open File Report, OFR-22-9*, 2022.

[6] Trygg Historical Maps, "About J. William Trygg and the Historical Maps," <https://trygghistoricalmaps.com/about-j-william-trygg/>, accessed October 12, 2023.

[7] J. William Trygg, *Composite Map of United States Land Surveyors' Original Plats and Field Notes*, Sheet 14, 15, and 16, (Ely, MN: J. William Trygg, 1966).

[8] Joseph A. Gilfillan, "Minnesota Geographical Names Derived from the Chippewa Language," *Geological and Natural History Survey of Minnesota, Fifteenth Annual Report of Progress for the Year 1886*, N.H. Winchell, ed. (Minneapolis: Minnesota Geological Survey, 1887) 451–77; and Chrysostom Verwyst, "A Glossary of Chippewa Indian Names of Rivers, Lakes, and Villages," *Acta et Dicta* 4:2 (1916): 253–74.

[9] Elliot Darr Marston, "The Apostle to the Ojibway: Joseph Alexander Gilfillan, Archdeacon; a Study of the Life, Labors and Writings of the Great Frontier Missionary of Northern Minnesota" (Thesis (B.D.), Nashotah Theological Seminary, 1938).

[10] Wisconsin Historical Society, "Verwyst, Chrysostom Adrian 1841–1925," <https://www.wisconsinhistory.org/Records/Article/CS13966>, accessed October 12, 2023.

[11] Warren Upham, *Minnesota Place Names: A Geographical Encyclopedia*, 3<sup>rd</sup> Edition (St. Paul: Minnesota Historical Society Press, [1920] 2001). Upham corresponded directly with Gilfillan, although none of that correspondence dealt specifically with geographic names on the North Shore. Source: Joseph A Gilfillan and Family Papers, Ojibway Place Names, 1886–1901, Box 2, Minnesota Historical Society: 620.

[12] This is discussed at length with an excellent overview of the historical sources in Tania L. Saj and Elle Andra-Warner, eds., *Life in a Thundering Bay: Voices from Thunder Bay's Past* (Thunder Bay: River Rocks Publishing, 2007), 165. Gaa-manitigweyaag is also the name identified in Lawrence Leonard Moose, et al., *Ojibwe Vocabulary Project* (St. Paul: Minnesota Humanities Center, 2009), 106, <http://www.humanitieslearning.org/resource/uploads/Ojibwe%20Vocabulary%20Project.pdf>. OPD, s.v. “Mangitigweyaa,” <https://ojibwe.lib.umn.edu/main-entry/mangitigweyaa-vii>, accessed October 25, 2023. Lac La Croix elder Maajiigoneyaash (Dr. Gordon Jourdain) says that among his older family in Lac La Croix, it was known as Gaa-maanaatigweyaag, “an ugly or bad river” (Gordon Jourdain, personal interview, April 9, 2023). Another variation is Gaa-manetigweyaag. Verwyst identifies Fort William (on the Kaministiquia River) as “Ga-manetigweiaag...a scarcity of rivers” (Verwyst, “A Glossary of Chippewa Indian Names of Rivers, Lakes, and Villages,” 268). Grand Portage Band Member John Flatte recorded a diary in 1974 that includes two pages of “Names of Places around Gr Portage,” all written phonetically. Flatte included “Kah ma Net ki go yong” (John Flatte Diary, Grand Portage National Monument Archives, 1974–75).

[13] “Omimi,” Owen, *Report of a Geological Survey*, xviii; “Omimi-zibi,” Gilfillan, “Minnesota Geographical Names,” 453; and “Omimi sibi,” Verwyst, “A Glossary of Chippewa Indian Names,” 268. Blackwell writes Pigeon River phonetically as “Mi mi zibing” (Billy Blackwell, “The Battle of Pigeon River,” *Cook County News Herald*, April 2, 2021, and personal interview, November 3, 2023). The abundance of pigeons is discussed in John Fritzen, *Historic Sites and Place Names of Minnesota's North Shore* (Duluth: St. Louis County Historical Society, 1974), 29. Upham, *Minnesota Place Names*, 137.

[14] Gilfillan wrote: “the river marked on the map as Maw-ske-qua-caw-maw is called Mesqua-tawangawi-zibi or Red Sand river,” but this is clearly Red Rock not Reservation River (Gilfillan, “Minnesota Geographical Names,” 453). “Maw-ske-gwaw-caw-maw-se-be, or Cranberry Marsh river,” Treaty of La Pointe, September 30, 1854, 10 Stat. 1109; “Mau-ski-guaw-caw-naw,” Trygg, *Composite Map*, Sheet 16; and “Maskigwagama sibi, swamp lake river, a river coming out of a swamp lake,” Verwyst, “A Glossary of Chippewa Indian Names, 269. OPD, s.v. “Maskiigimin,” <https://ojibwe.lib.umn.edu/main-entry/mashkiigimin-ni>, accessed April 20, 2023. The role of Red Rock in George Morrison’s art can be found in George Morrison with Margot Fortunado Galt, *Turning the Feather Around: My Life in Art* (St. Paul: Minnesota Historical Society Press, 1998).

[15] James E. Meeker, Joan E. Elias, and John A. Heim, *Plants Used by the Great Lakes Ojibwa* (Odanah: Great Lakes Fish & Wildlife Commission, 1993), 258. Verwyst identified what is now Chicago Bay, where the mouth of the Flute Reed River is, as “Ga-pipigwewanashkokag, where there is much flute shaped grass, reeds or elder shrubs” (Verwyst, “A Glossary of Chippewa Indian Names,” 258). Additionally, John Flatte identified Hovland as “Ka pa Kivi Kway wa nish Kog” (Flatte Diary). OPD, s.vv. “Bibigwe,” <https://ojibwe.lib.umn.edu/main-entry/bibigwe-vai>, and “-ashk-,” <https://ojibwe.lib.umn.edu/word-part/ashk-medial>, accessed April 20, 2023.

[16] “Wisacode,” Owen, *Report of a Geological Survey*, 394; “Wisacode Sibi,” Trygg, *Composite Map*, Sheet 16; and “Wissakode-zibi or Half-burnt river,” Gilfillan, “Minnesota Geographical Names,” 453.

[17] “Ga-etawiodjidjiwan, where two rivers go out of a lake at opposite directions,” Verwyst, “A Glossary of Chippewa Indian Names,” 257.

[18] U.S. Department of the Interior, Indian Affairs, “American Indian Tribe Reverts to Ancestral Name Spirit Lake New Name for Devil’s Lake,” August 20, 1996, <https://www.bia.gov/as-ia/opa/online-press-release/american-indian-tribe-reverts-ancestral-name-spirit-lake-new-name>.

[19] OPD, s.vv. “Bimaadagaako,” <https://ojibwe.lib.umn.edu/main-entry/bimaadagaako-vai> and “-aadagaako,” <https://ojibwe.lib.umn.edu/word-part/aadagaako-final>, accessed April 20, 2023. “Manitoubintagico R.,” Bayfield, *Survey of Lake Superior*; “Manito-bimitagico,” Trygg, *Composite Map*, Sheet 16; “Manido-bimadagakowini-zibi meaning, the spirits or God walking-place on the ice river,” Gilfillan, “Minnesota Geographical Names,” 453; and “Manitobimadigakozibing,” Blackwell interview. A story circulated among settlers that the English name, Devil Track River, derived from early Cook County settler Sam Zimmerman. Zimmerman was born in Ohio and his family tried farming on the North Shore at Beaver Bay. Not surprisingly, they were unsuccessful, so they moved to New Ulm, where his father and two older brothers were killed in the Dakota War in 1862. The surviving family returned to the North Shore. Zimmerman grew up to be a trapper and lost his right leg to frostbite in 1882. Zimmerman kept trapping, fashioning skis and snowshoes that fit his peg leg and helped with his mobility. Supposedly, the name Devil Track is a tribute to the prints left by the odd shape of Zimmerman’s homemade snowshoes (Blackwell Interview and Willis H. Raff, *Pioneers in the Wilderness: Minnesota’s Cook County*,

*Grand Marais, and the Gunflint in the 19<sup>th</sup> Century* [Grand Marais: Cook County Historical Society, 1981], 31–32). Zimmerman’s son George married Grand Portage Band Member Josephine Drouillard, and some of their descendants live at Grand Portage today.

[20] Miigwech to Dennis Waldrop of the Cook County Historical Society for pointing me in this direction and providing documentation of this story (Rhonda Silence, “Fall River Forever,” *Cook County Star*, June 30, 2003). The change from Oginikaan-ziibi to Fall River is also referenced in Upham, *Minnesota Place Names*, 137. “Oginican R.,” Bayfield, *Survey of Lake Superior*; “Oginikan,” Owen, *Report of a Geological Survey*, 386; and “Oginikan Sibi, Rose colored earth,” Trygg, *Composite Map*, Sheet 16.

[21] “Kagishkingwa (Cut Face),” Owen, *Report of a Geological Survey*, xviii; and “Gaa-gishkingineshing, one who has a cut on the side of his head, perhaps so called from the shape of the waterfall,” Verwyst, “A Glossary of Chippewa Indian Names,” 257. The Trygg Historical Map identifies it both as the Cut Face River and Cascade River (Trygg, *Composite Map*, Sheet 16). Writing about the Cascade River, historian John Fritzen noted, “In the early days it was known as ‘Cut Face River’” (Fritzen, *Historic Sites and Place Names*, 20).

[22] “Kamanosisatikag,” Owen, *Report of a Geological Survey*, 382, and “Kamanoisatikag Sibi,” Trygg, *Composite Map*, Sheet 16; “Ga-manazadika-ziibi, i.e. place of poplars river,” Gilfillan, “Minnesota Geographical Names,” 454; and “Ga-manasadikag, poplar place, from manasad, a kind of poplar tree,” Verwyst, “A Glossary of Chippewa Indian Names,” 268.

[23] Miigwech to Michael Zimmerman, Jr. for pointing this out (no pun intended!): “Jigagawanjikani sibi, onion river, from Jigagawanjikan, onion place,” Verwyst, “A Glossary of Chippewa Indian Names,” 267. Verwyst identified the Onion River in Wisconsin and on the North Shore as Zhigaagawanzhiikaani-ziibi, but I have used the Border Lakes Ojibwe spelling of Zhigaagomizhiikaani-ziibi. Zhigaagawanzh is how Ojibwe speakers say onion in Wisconsin and central Minnesota, whereas speakers in Grand Portage and the North Shore say Zhigaagomizh. The final -mizh in zhigaagomizh indicates it is a plant (OPD, s.v. “\-mizhy\,” <https://ojibwe.lib.umn.edu/word-part/mizhy-final>, accessed October 16, 2023).

[24] Fritzen, *Historic Sites and Place Names*, 19. “Kawimbash,” Owen, *Report of a Geological Survey*, 377; and “Kawimbash Sibi,” Trygg, *Composite Map*, Sheet 16. Wiimbashk is not identified in any sources as a specific plant name; if that was the name to identify a specific plant locally on the North Shore, it has been lost.

[25] Gordon Jourdain, personal interview, November 9, 2023. OPD, s.vv. “Ina’oozh,” <https://ojibwe.lib.umn.edu/main-entry/ina-oozh-vta-569277ca-1bd0-4eb6-ae14-88afb669464f> and “Maada’oozh,” <https://ojibwe.lib.umn.edu/main-entry/maada-oozh-vta>, accessed November 9, 2023.

[26] Fritzen, *Historic Sites and Place Names*, 19. “Inondani R.,” Bayfield, *Survey of Lake Superior*; “Inaonani,” Owen, *Report of a Geological Survey*, 374; and “Inaonani Sibi,” Trygg, *Composite Map*, Sheet 16. Later sources identify the river as Jiibayaatigo-ziibi. “Tchibaiatigo-ziibi, i.e. wood-of-the-soul-or-spirit river; they calling the Cross, wood of the soul, or disembodied spirit,” Gilfillan, “Minnesota Geographical Names,” 454; and “Tchibaiatigo sibi,” Verwyst, “A Glossary of Chippewa Indian Names,” 259.

[27] Miigwech to Maajigoneyaash, Dr. Gordon Jourdain, for pointing out to me that agwinde is “it floats” in Border Lakes Ojibwe (Gordon Jourdain, personal interview, February 24, 2023). OPD, s.vv. “Agwinde,” <https://ojibwe.lib.umn.edu/main-entry/agwinde-vii>, and “Agonde,” <https://ojibwe.lib.umn.edu/main-entry/agonde-vii>, accessed October 16, 2023. “Nizhwakwindeg (Two Island),” Owen, *Report of a Geological Survey*, xviii; “Nishwakwindig Sibi,” Trygg, *Composite Map*, Sheet 16; and “Minissan-nijogondeg, two islands, floating, as it were, in the lake,” Verwyst, “A Glossary of Chippewa Indian Names,” 272.

[28] “Cariboo Sibi,” Trygg, *Composite Map*, Sheet 17, and “Atiko neiashing, caribou point,” Verwyst, “A Glossary of Chippewa Indian Names,” 257.

[29] Alta Mcquatters, personal interview, October 30, 2023. In the Treaty of 1854, Adikoons is rendered “Aw-de-konse or The Little Reindeer 2<sup>nd</sup> Chief: Grand Portage Band.” Adikoons’ influence is discussed in Richard E. Morse, “The Chippewas of Lake Superior,” in *Collections of the State Historical Society of Wisconsin*, vol. 3, ed. Lyman Copeland Draper (Madison: Wisconsin Historical Society, [1857] 1904).



[30] “Kagitshiwaniwak,” Owen, *Report of a Geological Survey*, 369; and “Kagitshiwaniwak Sibi,” Trygg, *Composite Map*, Sheet 17. Verwyst transcribes Pork Bay as “Ga-kitchi wanino-wangag, around the large sand point” (Verwyst, “A Glossary of Chippewa Indian Names,” 269). Historian John Fritzen wrote: “Kagitshiwaniwak, which meant round Sandy Shore or Beach” (Fritzen, *Historic Sites and Place Names*, 18).

[31] OPD, s.vv. “Wiish,” <https://ojibwe.lib.umn.edu/main-entry/wiish-ni>, and “Waazh,” <https://ojibwe.lib.umn.edu/main-entry/waazh-ni>, accessed October 16, 2023. “Manidowish R.,” Bayfield, *Survey of Lake Superior*; “Manitowish,” Owen, *Report of a Geological Survey*, 367; and “Manidowish Sibi,” Trygg, *Composite Map*, Sheet 17. Verwyst wrote: “Manitowajiwi-sibi, spirit-lair river, from manitowaj, spirit lair” (Verwyst, “A Glossary of Chippewa Indian Names,” 263). “Manido-bimadagakowini-zibi,” Gilfillan, “Minnesota Geographical Names,” 454. The two variations are present in local contemporary place-names: Manitouwadge is a township in the Thunder Bay District in Ontario just north of Lake Superior, and Manitowish Waters is a township in Vilas County in northern Wisconsin.

[32] “Waginokaning R.,” Bayfield, *Survey of Lake Superior*; “Waginokaning,” Owen, *Report of a Geological Survey*, 366; and “Waginokaning Sibi,” Trygg, *Composite Map*, Sheet 17.

[33] “Asinpatakitasibi,” Owen, *Report of a Geological Survey*, 364; and Trygg, *Composite Map*, Sheet 17.

[34] Fritzen, *Historic Sites and Place Names*, 16; “Kagishkensikag,” Owen, *Report of a Geological Survey*, xviii; “Beaver Bay is Ga-gijikensikag. The place of the little cedars,” Gilfillan, “Minnesota Geographical Names,” 454; and “Ga-gijikensikag, place where many small cedars grow,” Verwyst, “A Glossary of Chippewa Indian Names,” 256; “Gagizhigeyskag, Beaver Bay (Place of the Little Cedars),” Blackwell interview.

[35] Fritzen, *Historic Sites and Place Names*, 14; “Kanokikopag,” Bayfield, *Survey of Lake Superior*; and “Kanokikopag,” Owen, *Report of a Geological Survey*, 359. This river has been applied multiple places. Verwyst identifies it as the Split Rock River: “Nokikobag, where there are small trees” (Verwyst, “A Glossary of Chippewa Indian Names,” 256). The Trygg Historical Maps put it at Beaver Bay (“Kanokikopag Sibi,” Trygg, *Composite Map*, Sheet 15).

[36] OPD, s.vv. “Nook-,” <https://ojibwe.lib.umn.edu/word-part/nook-initial>, and “-bagw,” <https://ojibwe.lib.umn.edu/word-part/bagw-final>, accessed October 17, 2023. Gordon Jourdain suggested that the meaning could have to do with the flexibility of the tree (Gordon Jourdain, personal interview, February 24, 2023).

[37] “Giniuwabiko-zibi; the war eagle iron river,” Gilfillan, “Minnesota Geographical Names,” 454. Fritzen repeats this mistake: “Split Rock River was known to the Indians as Giniuwabiko-zibi or ‘War Eagle Iron River’” (Fritzen, *Historic Sites and Place Names*, 13). Verwyst identifies Split Rock as: “Nokikobag, where there are small trees” (Verwyst, “A Glossary of Chippewa Indian Names,” 256). Owen discusses rock formations on “Kanokikopag River and Split Rock River and it is clear that Split Rock is the next river southwest of ‘Kanokikopag’” (Owen, *Report of a Geological Survey*, 359). Again, the Trygg Historical Maps identify “Kanokikopag Sibi” as Beaver River (Trygg, *Composite Map*, Sheet 15). Bayfield, *Survey of Lake Superior*.

[38] “Shabonimikani-zibi; Gooseberry place river,” Gilfillan, “Minnesota Geographical Names,” 454; and “Jabomini sibi, gooseberry river,” Verwyst, “A Glossary of Chippewa Indian Names,” 260. Both the Owen Report and the Trygg Historical Maps identify it by its English name (Owen, *Report of a Geological Survey*, 358, and Trygg, *Composite Map*, Sheet 15).

[39] OPD, s.v. “-aabikw,” <https://ojibwe.lib.umn.edu/word-part/aabikw-final>, accessed October 17, 2023. “Ga-kagagiwabiko sibi, raven rock river, from kagagi a raven, wabiko, rock or metal, and sibi river,” Verwyst, “A Glossary of Chippewa Indian Names,” 259.

[40] “Menissingk (Encampment River),” Owen, *Report of a Geological Survey*, xviii; “Menissink Sibi, Encampment Island River,” Trygg, *Composite Map*, Sheet 15; “Encampment island is called ‘miniss’ or the island, that being the only one along the north shore nearly to Pigeon river,” Gilfillan, “Minnesota Geographical Names,” 454; and “Minissing, at the island, from Miniss, an island,” Verwyst, “A Glossary of Chippewa Indian Names,” 259.

[41] Miigwech to Michael Zimmerman, Jr. for helping me understand this. “Kinnewabic R.,” Bayfield, *Survey of Lake Superior*; “Kinewabik River,” Owen, *Report of a Geological Survey*, 354; “Kinewabik Sibi,” Trygg, *Composite Map*, Sheet 15; and “Shonia-zibiwishe, Silver creek,” Gilfillan, “Minnesota Geographical Names,” 454.

[42] OPD, s.v. “Biitoo-,” <https://ojibwe.lib.umn.edu/main-entry/biitoo-pv-lex>, accessed October 24, 2023; “Bitobigo-zibi,” Gilfillan, “Minnesota Geographical Names,” 454; and “Bitobigo sibi, pond river, from bitobig, pond,” Verwyst, “A Glossary of Chippewa Indian Names,” 271. Verwyst’s translation is incorrect: not all ponds would be referred to as “Biitooibiigo,” and any body of water that was intersected by a land mass could be named this way. Henry Bayfield recorded it as “Bitabig R.,” although he also identified a river between Silver Creek and Encampment River as “Stuart R.” (*Survey of Lake Superior*).

[43] “Kitchi-bitobig, the great duplicate-water,” Gilfillan, “Minnesota Geographical Names,” 453. Verwyst’s translation is incorrect: “Kitchibitobigong, big pond, from bitobig, a pond” (Verwyst, “A Glossary of Chippewa Indian Names,” 260). Pond is waanzhibiiyaa (OPD, s.v. “waanzhibiiyaa,” <https://ojibwe.lib.umn.edu/main-entry/waanzhibiiyaa-vii>, accessed November 9, 2023).

[44] Fritzen, *Historic Sites and Place Names*, 7; “Mokoman Sibi,” Owen, *Report of a Geological Survey*, 356; “Mokamon Sibi, Knife River,” Trygg, *Composite Map*, Sheet 15; “Mokomani-zibi, Knife River,” Gilfillan, “Minnesota Geographical Names,” 454; and “Mokomani sibi, knife river, from Mokoman, a knife,” Verwyst, “A Glossary of Chippewa Indian Names,” 262.

[45] Fritzen, *Historic Sites and Place Names*, 6; and “Namebini-zibi, Sucker River,” Gilfillan, “Minnesota Geographical Names,” 454.

[46] “French river is Angwassago-zibi or Flood-wood river,” Gilfillan, “Minnesota Geographical Names,” 454; “Manissisug (Riviere des Francais),” Owen, *Report of a Geological Survey*, xviii; and “Manissisug Sibi (Riviere des Francais),” Trygg, *Composite Map*, Sheet 14. Verwyst transcribed it as, “Ga-minissagokang, where there are large dry pine trees standing, from manissag, a dry pine tree.” The difference is the inclusion of the prefix Gaa- indicating a place and the final -kaa, indicating abundance. Pine trees are not explicitly part of the word (Verwyst, “A Glossary of Chippewa Indian Names,” 260). OPD, s.v. “-sagw-,” <https://ojibwe.lib.umn.edu/word-part/sagw-final>, accessed October 24, 2023.

[47] Fritzen, *Historic Sites and Place Names*, 6; “Passabika River,” Owen, *Report of a Geological Survey*, 345; “Passabika Sibi ‘Gap Rock River,’” Trygg, *Composite Map*, Sheet 14; and “Busabika zibi, Rocky canon river, or the river that comes through a worn hollow place in the rock,” Gilfillan, “Minnesota Geographical Names,” 454. OPD, s.vv. “Bas-,” <https://ojibwe.lib.umn.edu/word-part/bas-initial>; “-aabik-,” <https://ojibwe.lib.umn.edu/word-part/aabik-medial>; and “Baas-,” <https://ojibwe.lib.umn.edu/word-part/baas-initial>, accessed October 24, 2023.

[48] Cathy Wurzer, Gracie Stockton, and Lukas Levin, “Indigenous history is one of the newest requirements in Minnesota classrooms,” *MPR News*, August 16, 2023, <https://www.mprnews.org/story/2023/08/16/indigenous-history-is-one-of-the-newest-requirements-in-minnesota-classrooms>.

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## About the Author

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FEATURE

# ON THE PHYSICALITY OF HOPE

By Joanne Richardson

*The following piece is also available as a StoryMap. StoryMaps combine media, maps, and text in richly activated ways to offer new perspectives. For the best experience, read this StoryMap [online here](#).*

We depend on water to sustain us, yet threats to our biogeophysical and social systems, which directly impact our water, are numerous. However, people are not sitting idle. They are tackling these challenges with analysis and action, in ways that ignite hope.

Hope can grow in both grand and unassuming ways. The drama and magic of a new law, policy, or initiative may be fleeting, but these small, unromantic efforts are the bedrock of our water futures, shaping them into more just and sustainable paths.

The maps, tools, organizations, and individuals shared in this article are not just symbols of work, but of meaningful change in our water systems and our relationships with them. These efforts, born from hope, ignite our imagination, showing us the potential for a better future and motivating us to take action.

*[See video: The Mississippi River flows through downtown St. Paul, Minnesota. Footage provided by Storyblocks.](#)*

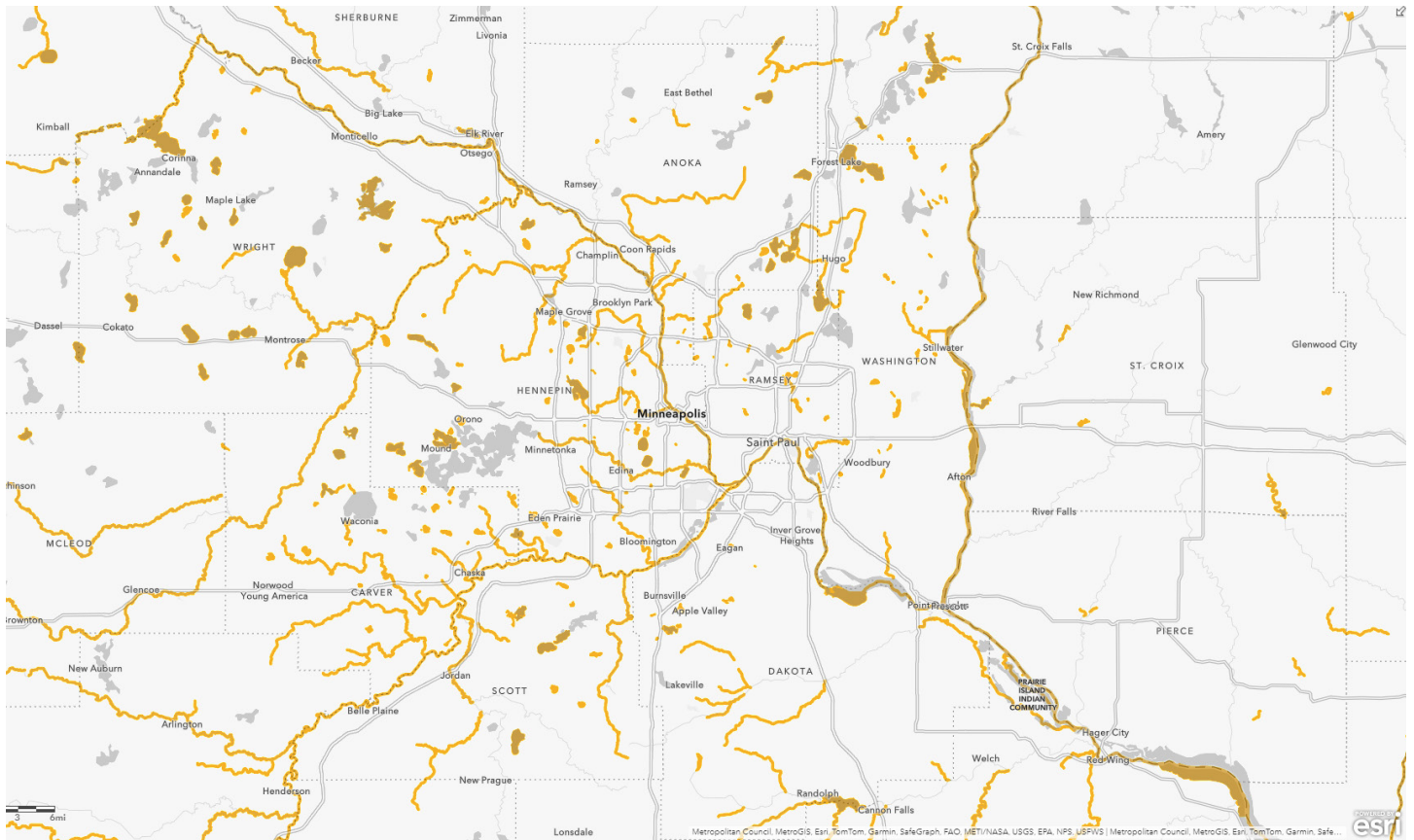


*Aerial photograph of Minneapolis and St. Anthony Falls over the Stone Arch Bridge.  
Image via Unsplash by Nicole Geri.*

# Clean Water Act

The Clean Water Act (CWA), passed by the United States Congress in 1972, was a proactive measure that sought to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters” (Federal Water Pollution Control Act Amendment 1972, 816). This legislation was a significant stride toward reducing pollutant discharges into United States water bodies by setting wastewater standards and funding the construction of sewage treatment plants. It also granted the Environmental Protection Agency the authority to implement and enforce pollution control programs, instilling hope for a cleaner water future.

While the CWA and its subsequent enforcement have undeniably improved water quality throughout the United States, it’s disheartening to see that rivers and streams still bear significant impairments, as indicated on the map below. In 2017, the National Water Quality Inventory: Report to Congress and the National Rivers and Streams Assessment 2008-09 reported that “46% of river and stream miles are in poor biological condition” across the United States (EPA 2017, 2). Rivers and streams do not bear the brunt of the hazards to water alone; lakes, ponds, reservoirs, coastal waters, and wetlands are similarly affected.

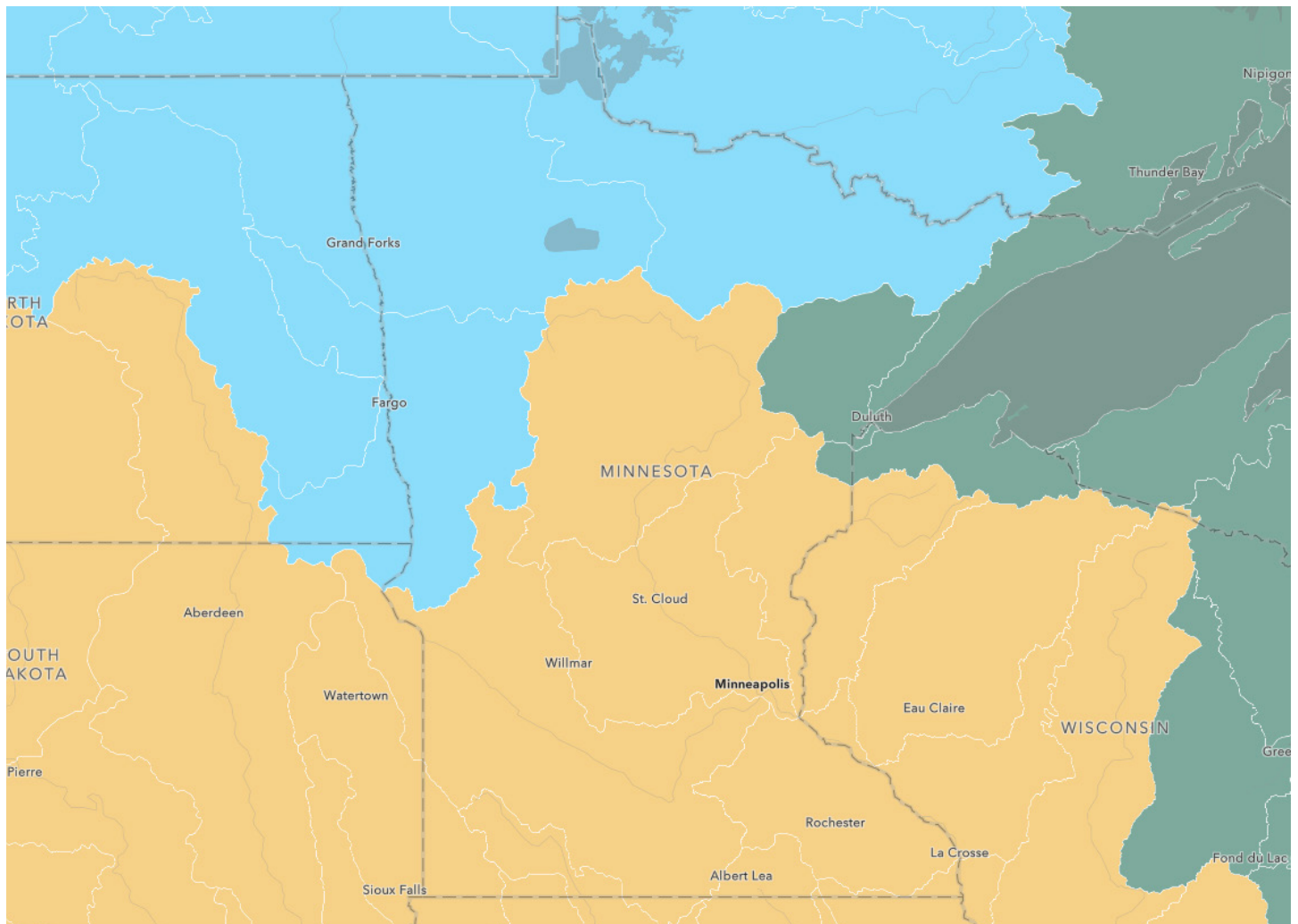


*This map shows polluted waters in the area around the Twin Cities in Minnesota according to Environmental Protection Agency data from 2015.*

# Minnesota

Minnesota, the source of the Mississippi River, is a touchstone for the history and future of impaired waters in the U.S. and beyond. It is situated at the top of three watersheds, which correspondingly drain to Hudson Bay, the Atlantic Ocean, and the Gulf of Mexico. According to the Minnesota Department of Natural Resources

(MN DNR), Minnesota is unusual because very little water flows into the state (Minnesota Department of Natural Resources 2010, 26). Still, it is considered to be water-rich; there is a perception that there is enough water for all demands, even though much of that water is impaired.



Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS | Commission for Environmental Cooperation (CEC). 2010. "North American Atlas - Basin Watersheds". Natural Resources Canada... Powered by Esri

*This map shows the three major watersheds of Minnesota. The yellow watershed drains to the Gulf of Mexico, the blue watershed drains to Hudson Bay, and the green watershed drains to the Atlantic Ocean. Visit the [map online](#) to zoom in to see significant water bodies, including lakes, rivers, and streams. Zoom out to see the rest of the major watersheds in North America. Click on the watersheds to see the names of the river systems and the bodies of water to which they drain.*

Water Ways, a water primer published by the Division of Ecological and Water Resources and MN DNR, observes that:

Lakes, streams, or wetlands cover one out of every five square miles of surface area in Minnesota. Of all the states [in the U.S.], the U.S. Census Bureau ranks Minnesota eighth in the amount of surface area covered by water—and that’s not counting numerous wetlands, bogs, and lakes smaller than 40 acres. (Minnesota Department of Natural Resources 2010, 17)

The scale of Minnesota’s unique water environment makes it vulnerable to water quality issues; a high proportion of the state’s surface area is covered with water and there are a very high number of stream miles that the state’s residents and agencies must manage. Much of this bountiful water is increasingly imperiled despite the protections afforded by the CWA.

However, the scale of Minnesota waters also offers a unique stewardship opportunity for the residents and ecosystems of Minnesota and the downstream reaches.

## Sustainable Development Goals

Water quality and stewardship issues are addressed at more than just the state and national levels. At the international level, the United Nations (UN) developed a 2030 Agenda

for Sustainable Development, which outlines 17 Sustainable Development Goals (SDGs) adopted by all UN member states in 2015. These goals foster action and ambitiously address five critical

# SUSTAINABLE DEVELOPMENT GOALS



*The 17 Sustainable Development Goals were adopted by all member states of the United Nations. Image via the United Nations.*

priorities: people, planet, prosperity, peace, and partnership (UN General Assembly 2015).

The UN describes the agenda of these SDGs as “a plan of action for people, planet and prosperity [that] seeks to strengthen universal peace in larger freedom.” (United Nations General Assembly, 2015). Many of these SDGs align with the work of the CWA, including, but not limited to, Clean Water and Sanitation, Sustainable Cities and Communities, Life Below Water, Life on Land, and more. The SDGs represent global hopes and ambitions to build a better future for all people and offer a way for the nations of the UN and beyond to coordinate efforts, share triumphs and challenges, and create a hopeful culture of change and action. By having distinct and measurable indicators linked to the SDGs, progress can be measured, managed, and made repeatable. Lofty

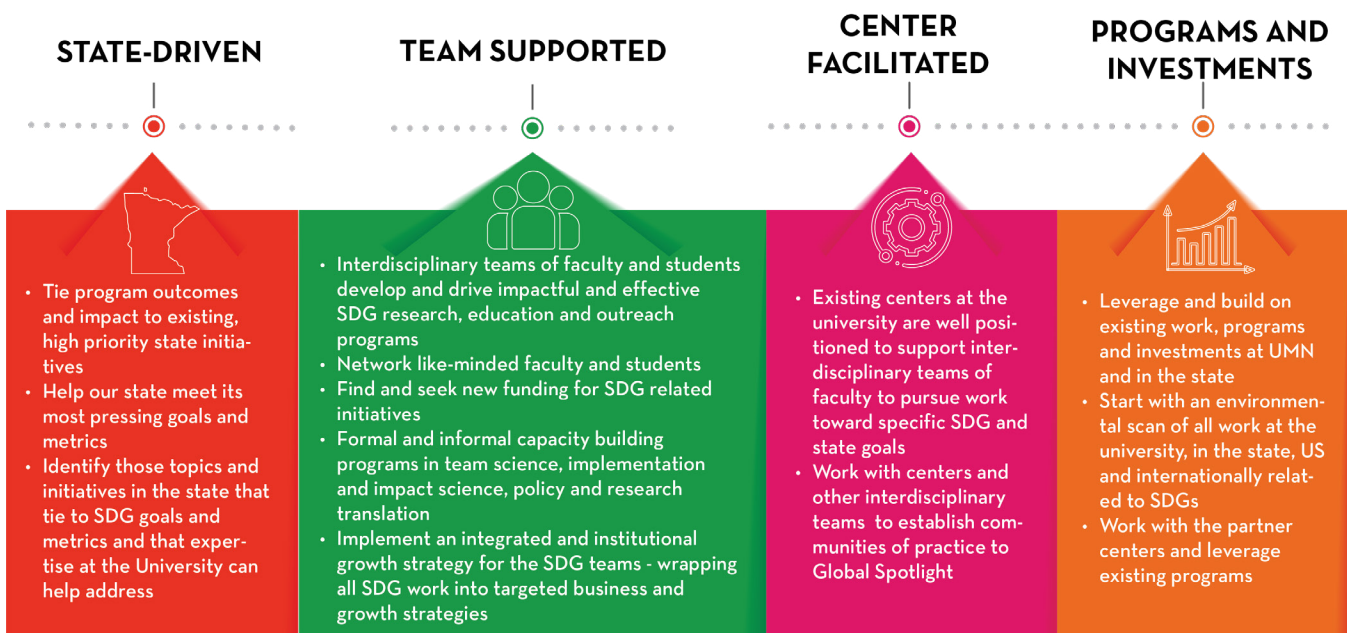
ideals, which can be tenuous to grasp and hard to implement, are made achievable with solid and measurable real-world indicators. As the UN agenda explains:

The SDGs framework includes 17 Sustainable Development Goals (SDGs) that provide a shared blueprint for peace and prosperity for people and the planet, and drives efforts at local, national, and global partnership levels. The SDGs offer an inherently integrative and interdisciplinary approach highlighting linkages between ending poverty, improving health and education, and addressing climate change and other environmental degradation. (United Nations General Assembly 2015)

## UMN & the SDGs

The University of Minnesota (UMN), home of *Open Rivers*, has also adopted these 17 goals as a framework “to mobilize the resources at the University to advance a more socially and

environmentally sustainable future in Minnesota, the U.S., and the globe through grants, information, and opportunities” (UMN Sustainable Development Goals Initiative 2024). Universities,



*The four prongs of this approach guide University teams seeking to align their work with the SDGs. Image via the [University of Minnesota SDG Initiative](#).*

with their twin responsibilities to teach and research, are uniquely well situated to connect the policy work of nations, the advancement of knowledge, and the education of the next generation of policymakers, researchers, and residents. By embracing the SDGs, UMN not only supports the goals of the SDGs themselves but also fosters a future that advances the work to attain these goals, whether it be in the fine detail of the

## The Spatial University

The SDGs are described precisely on the UN website as a series of discrete, measurable indicators. Many of these indicators are mappable, helping nations understand where progress is being made and identifying areas in crisis. This helps organizations allocate resources efficiently and analyze approaches that are effective to possibly replicate elsewhere. In particular, SDG Goal 14, Life Below Water, is precisely described in terms of data that can be displayed on a map, from “plastic debris density” to the “number of countries using ecosystem-based approaches to managing marine areas,” and more (United Nations Department of Economic and Social Affairs: Sustainable Development n.d.).

At UMN, U-Spatial works with people and departments to develop maps and other spatial products to help enrich their research and effectively communicate their results, including

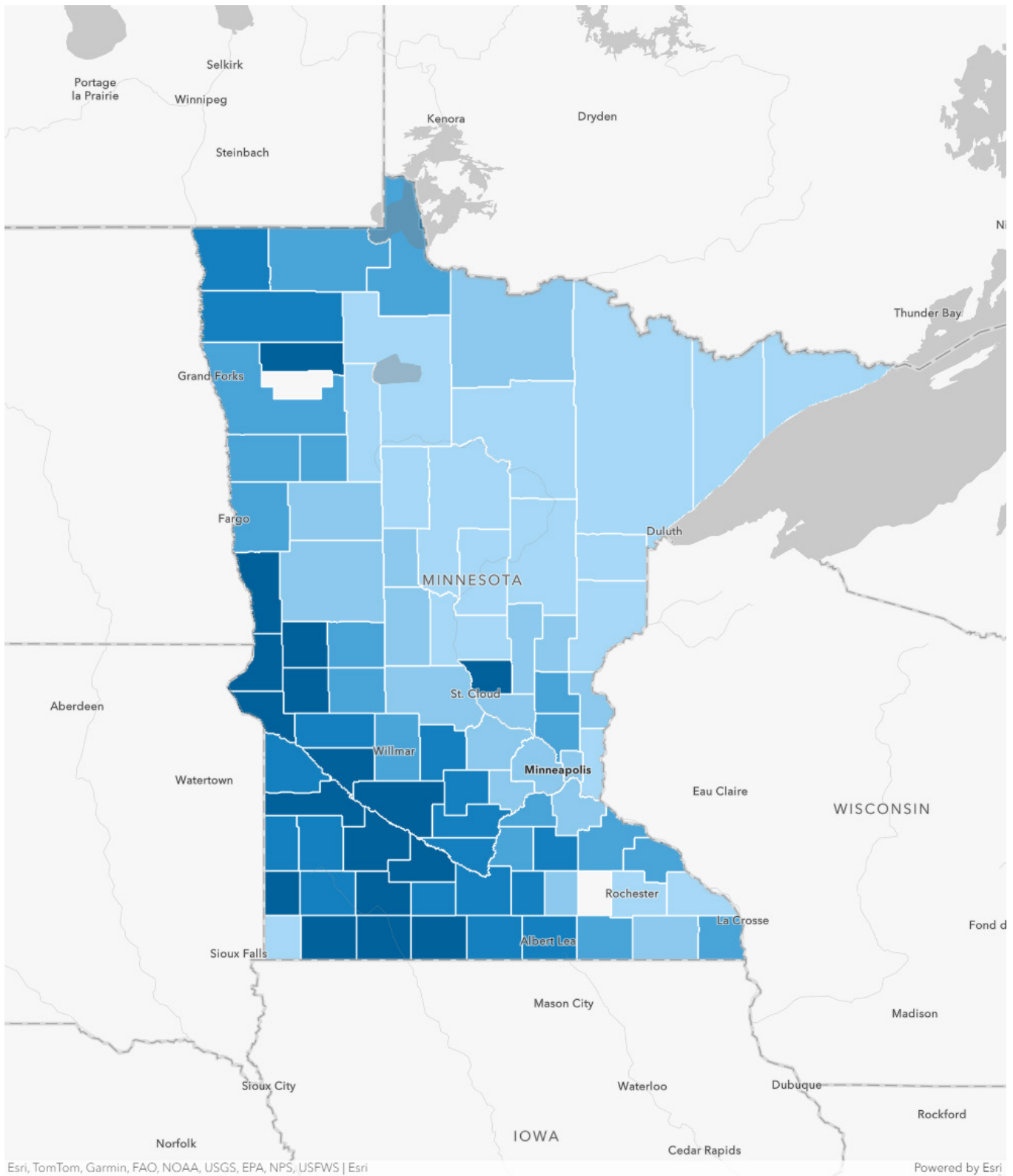
individual indicators or in support of the hopeful ideas that underpin the whole movement.

UMN’s approach seeks to “leverage all corners of the University to achieve state, national, and international metrics” using the basic framework described in the graphic (UMN Sustainable Development Goals Initiative 2024).

work connected to the SDGs. They developed a richly interactive spatial resource to help people and agencies navigate the specifics of SDG progress in Minnesota and “to support partners throughout the state to share data and access the most relevant information and analyses cued to their location” (U-Spatial n.d.).

This map, centered on Goal 14: Life Below Water, is “used by government agencies to monitor indicators for SDG Goal 14 and communicate relevant progress” (Crosson 2023). The map clearly shows the areas of Minnesota where the resources to mitigate water pollution, as correlated with water cloudiness, would be most effective and efficient. This targeted approach improves the stewardship of Minnesota waters and benefits not only the residents of the region but also the downstream reaches all the way to the ocean.





*This map, developed by U-Spatial, shows indicators across Minnesota relating to SDG Goal 14: Life Below Water, explicitly relating to target 14.1, “prevent and significantly reduce marine pollution of all kinds.” Visit the [map online](#) to click each county for a measure of average water cloudiness or turbidity recorded; the darker blue counties have cloudier water. For more information, visit the [UN’s Goal 14 Targets and Indicators page](#).*

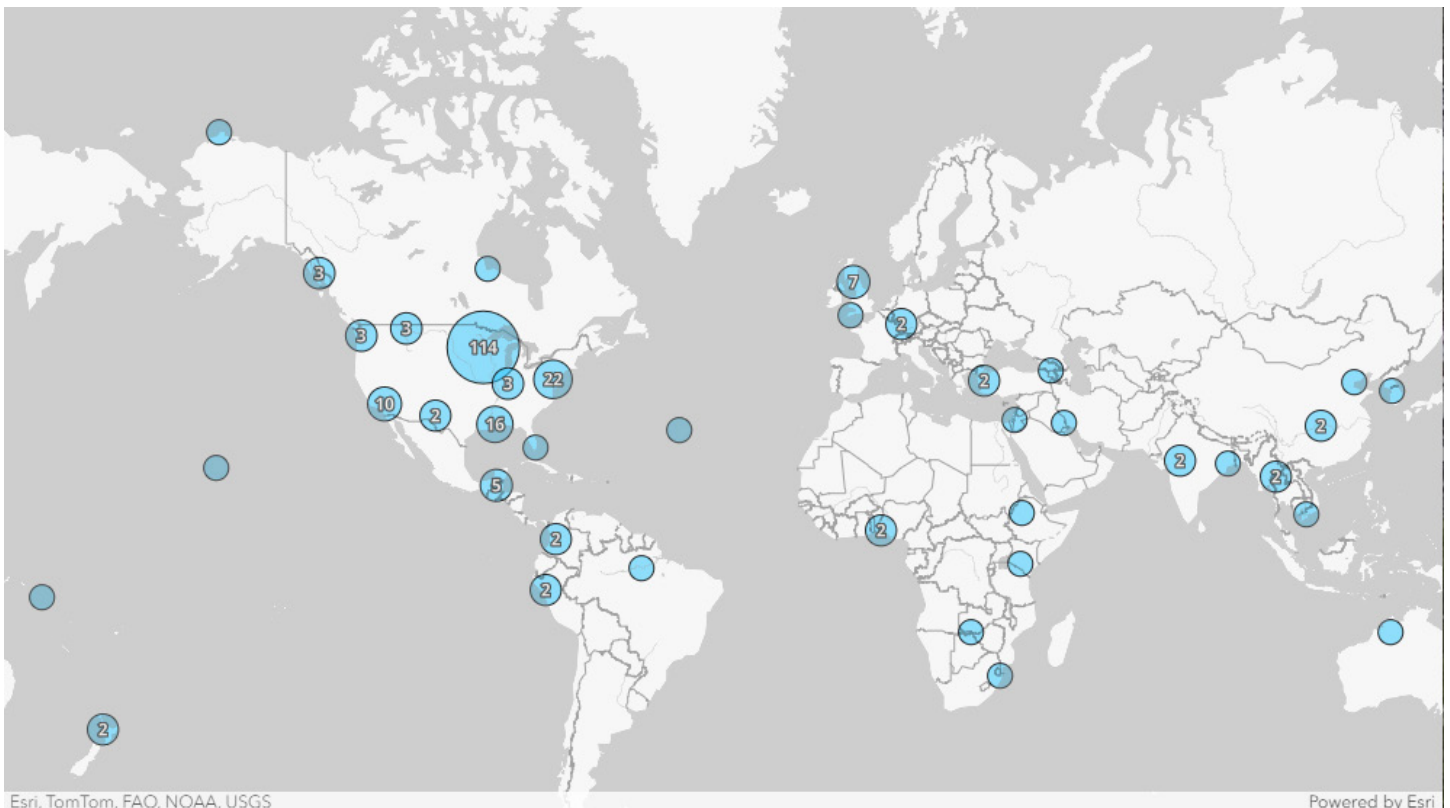
# Public Scholarship

An increasingly essential strategy for telling the stories of these policies, goals, and reporting tools is public scholarship, which seeks to improve communication between the worlds of traditional academic research and the public. It encourages the sharing of experiences, interests, and knowledge by showcasing the work that bridges different kinds of expertise. *Open Rivers* is one of a variety of platforms that draws together disparate ways of knowing to catalyze change and transform our water futures for the better. *Open Rivers* publishes public scholarship by people working in academics, policy, and diverse communities and written for non-specialist audiences. By not charging authors to publish their work and not charging readers for access, the journal

reduces barriers to the sharing of knowledge and facilitates discussions that inform public action.

The map below illustrates the global reach of the articles published in *Open Rivers* since 2015, including content which concerns the issues and goals of the SDGs.

As you can see, there is a large cluster of points in Minnesota, *Open Rivers*' home state, and along the Mississippi River. The tour of *Open Rivers* content that follows explores some of these articles, many of which are along the Mississippi, our home river. The Mississippi, whose headwaters are in northern Minnesota, flows through the Twin Cities and



*This is a map of articles published in Open Rivers, each associated with a location significant to the article's content. Visit the [map online](#) to zoom in using the controls on the screen and you can see specifics on each article by clicking on the associated blue spot.*

the Minneapolis campus of the University of Minnesota all the way to the Gulf of Mexico. Its watershed is the fourth largest in the world, draining much of the United States between the Rocky and Appalachian mountains. The Mississippi is representative of many global water

issues, and our stories of work and hope on our home river illustrate the advocacy, analysis, and stories of water work worldwide just as stories from other places inform understandings of our local waters.

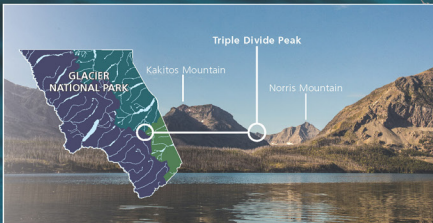
## Where the Water Flows: Understanding Glacier's Triple Divide Peak

This [article](#) by Quinn Feller (2018) discusses the interpretation of Triple Divide Peak by the National Park Service in Glacier National Park, Montana, for their visitors. In this place, three

watersheds come together as they do in northern Minnesota. Centered 851 miles west of the headwaters of the Mississippi, the sign shown on the right begins, “Triple Divide Peak, the


Glacier National Park
National Park Service  
U.S. Department of the Interior

# It's All Downstream From Here



Triple Divide Peak, the distant mountain peeking out across the lake, is one of the few places in the world where streams feeding three major watersheds originate. Glacier National Park's waters flow across the continent to very different places: the Pacific Ocean, Hudson Bay, and the Gulf of Mexico.

Melting snow and ice provide a critical source of water, sustaining habitats for countless plants and animals, here and downstream. Protecting these pristine waters also supports agriculture, recreation, and industry across the continent. As the climate warms and glaciers recede, the store of water that nourishes the continent will diminish. Though Triple Divide Peak seems far away, what happens here has effects that reach close to home.



- Columbia River Watershed
- Saskatchewan/Nelson River Watershed
- Missouri/Mississippi River Watershed

West Glacier  
Apparatus Village  
Lake McDonald Lodge  
Kahlanatche Creek  
The Loop  
Logan Pass  
Jackson Glacier Outlook  
Rising Sun  
St. Mary

ELEVATION	DIRECTION	DISTANCE
Logan Pass 6646 ft 2026 m		West Glacier 45.3 mi 72.9 km
Current Location 4512 ft 1375 m		Logan Pass 13.5 mi 21.7 km
St. Mary 4551 ft 1387 m		St. Mary 4.7 mi 7.6 km

*“Triple Divide Peak, the distant mountain peeking out across the lake, is one of the few places in the world where streams feeding three major watersheds originate. Glacier National Park's waters flow across the continent to very different places: the Pacific Ocean, Hudson Bay, and the Gulf of Mexico.” Image of the sign courtesy of Glacier National Park.*

distant mountain peeking out across the lake, is one of the few places in the world where streams feeding three major watersheds originate. Glacier National Park's waters flow across the continent to very different places: the Pacific Ocean, Hudson Bay, and the Gulf of Mexico.”

This sign and the article help the visitor and reader understand the connectedness of landscapes and the issues that trouble them. A Montana mountain is as profoundly connected by water to the Mississippi River as to the Pacific Ocean and Hudson Bay. At the core of the National Park Service's mission, this outreach and education work communicates the scope and scale of water landscapes. This knowledge and awareness are fundamental to protecting water in all its forms.



*First snow at Triple Divide Peak. Image courtesy of Daniel Lombardi.*

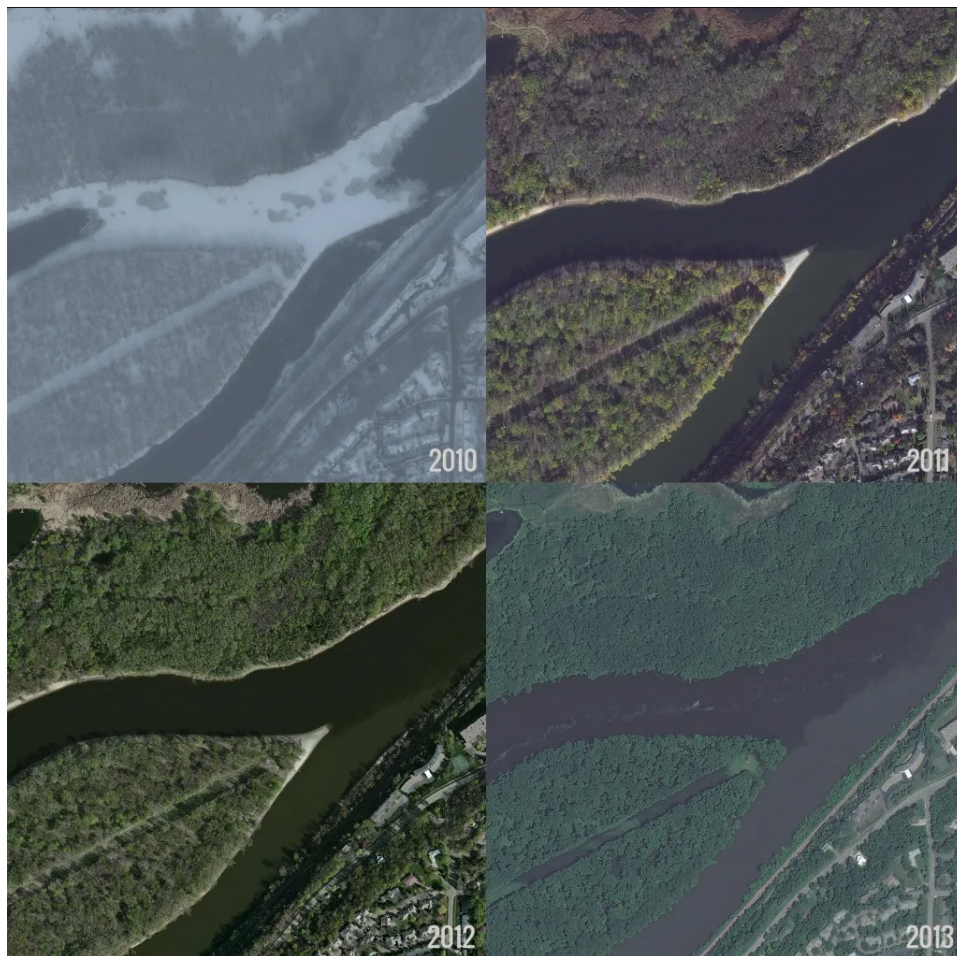
## Maps, Geographies, and the Mississippi

Far away from the rarefied mountains of Montana, the Mississippi River flows through the urban core of the Twin Cities. The challenges of the river and the watershed are made visible by the joining of the Mississippi and Minnesota Rivers, as seen in the image below. The viewer may well wonder why these rivers are so different. What tools do we have at our disposal to investigate and understand?

A powerful tool for addressing these questions is described in this [article](#) which discusses the university's role in "helping people discover and

analyze geospatial data," that is, information that can be put on a map, such as the differing water qualities in the Minnesota and Mississippi Rivers (Kne 2016). Author Len Kne (2016) of U-Spatial remarks that "creating informative maps has gotten easier, thanks to several web-based GIS tools [used to] make compelling maps that can be easily shared."

These resources that Kne mentions are critical to the work of the university which then feeds the hopeful actions and initiatives aligned around the global SDG goals and other environmental work.



*This image from the article shows the confluence of the Minnesota and Mississippi rivers. Kne (2016) says, "Using satellite imagery, we can compare the amount of sediment coming into the Mississippi River from the Minnesota River (the lower river)." Satellite Images Courtesy of DigitalGlobe Foundation.*

## Why so much sand in the Lower Minnesota River?

The images of the confluence of Minnesota and Mississippi Rivers seen above beg the question of why the waters are so different. Carrie E. Jennings (2016) wrote about water cloudiness in the Minnesota River remarking, “The Lower Minnesota River, from Carver Rapids to the confluence with the Mississippi, is a low-gradient, broad reach of the river. If you waded into the brown water you may be surprised to find that the bottom is actually sandy. Based on the yearly gaging data, about half an inch of sand would accumulate in the channel each year if it were not dredged. That is about six times more than the average, pre-European-settlement accumulation rate.”

The sand and the water cloudiness impact the ecosystems of the river, burying riverbeds that fish use for spawning, and reducing the light available in the water for aquatic plants (Marohn 2020). The dredging necessary to keep the main channel of the river clear of the sand deposition also harms the river bottom and the ecosystems that thrive there. The deposition is costly to remove, and threatens navigation. These impacts travel with the water and can cause the same problems for all of the downstream reaches.

Jennings’ work communicating the complexities of the Minnesota River’s physical constitution promotes understanding. The geography of the



*This image shows the Minnesota River during high flows in 2016.  
Image courtesy of Carrie E. Jennings.*

river, its history, and the historic and present management practices all contribute to the river's current condition, and the solutions are far more complex than just addressing any one of the

issues. This nuanced perspective is important, and while describing a river in peril, also embodies hopefulness in describing practices that are likely to help.

## Agriculture and the River: The University's Role in Societal Learning, Innovation, and Action

River work goes beyond the scope of protecting water quality, as evidenced by Nicholas R. Jordan, Carissa Schively Slotterback, David Mulla, and Len Kne (2017) who describe rivers as “critical connectors across our communities, states, and national boundaries. They offer essential benefits in the form of drinking water, recreation, transport, food, and aesthetics.” The

authors continue to observe that “we believe that universities...are well positioned to play a distinctive and necessary role in addressing these complex problems” (Jordan et al. 2017).

The article outlines an approach that includes learning, innovation, and coordinated action, acknowledging that “significant shifts” are required



*The image above shows an example of eroded stream and river banks that allow excess sediment—primarily clay and silt—into waterways. Sediment is considered a contaminant and contributes to cloudy, murky water and degrades fish and aquatic life habitats.*

*Image via Flickr by MPCA Photos.*

(Jordan et al. 2017). The authors highlight the Forever Green Initiative as one such shift; the Forever Green Initiative seeks to “substantially increase the quantity and variety of marketable agricultural products produced by Midwest agriculture and thereby to achieve previously unattainable solutions to the state’s water-quality challenges” (Jordan et al. 2017). A recent report,

on the effectiveness of their Continuous Living Cover cropping systems, “found that even modestly integrating these [systems] can cut nitrogen loss, reduce soil erosion, blunt greenhouse gas emissions and increase farm profitability,” which offers great hope for the areas of Minnesota that struggle with issues of water quality (Friends of the Mississippi River 2023, 1).

## Mosquitoes, Muck, and Mussels: A Look Into Scientific Research

The work of universities is also to prepare the next generation of river workers, thinkers, and doers. Through coursework and research opportunities, students get to do meaningful work that has real effects. For example, in 2018, Lea Davidson, James Doherty, Laura Gould, and Hayley Stutzman, then undergraduates, discussed their experiences analyzing water quality in northern Minnesota. The fieldwork was grueling and beautiful as they worked “amid swarms of

mosquitoes, wading into the dark, murky brown waters of agricultural rivers” (Davidson et al. 2018). The students were “monitoring...native freshwater mussel populations [which] provides insight into the health of a river system. Without mussels, streams lose an important source of riverbed stability, because mussels anchor the sediment as they burrow [and] filter the water column” (Davidson et al. 2018).



*This image shows the students digging up the river bottom in a study area. The load is lifted from the water and dumped onto the mesh-covered middle of the inner tube. Then it is thoroughly searched for mussels (live or dead) and shell fragments and assessed for sediment composition. Image courtesy of Mark Hove.*



These students found themselves digging sediment out of rivers for analysis, and they engaged deeply with the communities in which they worked. They remark, “People were amused to see us decked out in wetsuits, digging in the

river, but simultaneously genuinely interested in the ‘clams’ in their own backyards. They, too, are curious, about the details of the environment in which they live” (Davidson et al. 2018).

## Collaboration for a Common Goal

Work that inspires hope is neither limited to Minnesota nor to universities. In Iowa, work with the land and policy come together to create a culture and practice of meaningful change for agriculture and the river. In 2022, Mollie Aronowitz,

Jennifer Terry, Ruth McCabe, and Mary Beth Stevenson shared their work with *Open Rivers*

to tell a story that demonstrates how combining a common goal with compromise



*Soil leaving the farm reduces the return on investment for landowners and farmers. The soil moving here may seem minimal in the grand scheme, but the damaging effects can multiply over time. Image courtesy of Mollie Aronowitz.*

and deliberate action leads to creative solutions and meaningful progress. Our professional backgrounds and experiences are diverse—our group includes a professional land manager, a clean water policy attorney, a conservation agronomist, and a municipal watershed manager. [Our stories] focus on the impactful change that comes from setting aside ego and agenda in favor of intentional action with a shared goal: sustaining Iowa’s agricultural legacy while improving Iowa’s water quality one field and stream at a time.

On the impact of their work and methods, they say,

In the current state of political affairs in Iowa and the nation, ‘partnership’ has almost become a dirty word. But never has the need been greater for us to set aside our differences and identify a path forward to achieve our goals. Now is not the time to sit on our hands. Partnership matters. Collaboration matters. Joining our voices together matters. And through these partnerships, we are effecting change. (Aronowitz et al. 2022)



*These waterways are purposefully shaped and planted with strong-rooted grasses to help channel water above ground and off the farm after weather events. The lighter area in the photo has been shaped and planted with grass seed in a straw mat to help with establishing the grasses. Image courtesy of Mollie Aronowitz.*

## Water, Conflict, and Peace

The impact of work to protect water quality and access is universal. Embodying the hope for a better and more just future, the UN says of the SDGs that “this Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom” (UN General Assembly 2015).

Water is often inextricably at the center of issues of conflict and peace. In 2018, Peter Gleick wrote that “for humans, fresh water is critical for life, health, our economies, and vibrant ecosystems.”

He continues:

There is no lack of water crises: toxic water contamination, water-related diseases, inadequate access to safe and affordable drinking water and sanitation for billions of people, death and destruction from extreme hydrological events, collapsing fisheries and disappearing wetland ecosystems, and now human-caused climate change. These crises cause widespread human suffering. The United Nations estimates that more than a million people die every year from preventable water-related diseases.



*Qadisiyah Reservoir on the Euphrates River, Iraq. This image, taken in 2009, shows the reservoir at less than half its size in 2003 due to human consumption of water for drinking and agriculture. Image via NASA.*

The issue is not “water wars,” despite the euphonious and alliterative nature of the term and the attractiveness to headline writers. Wars are big, brutal, miserable things, and they start for complex economic, political, ideological, religious, and historical reasons. Rarely is any “war”... attributable to a single cause. Yet it is indisputable that fresh water is—and has been for millennia—a trigger, weapon, and casualty of conflict, violence, and war. (Gleick 2018)

The work of the SDGs specifically addresses these water issues along with other drivers of conflict such as poverty, hunger, inequalities, and injustice. Together they promote peace, by removing or ameliorating the issues that cause conflict, not just around water, and not by the brutal work of war, but through the hopeful building together of a more just world.

## In Conclusion

Gleick’s (2018) hopeful and cautionary conclusion echoes the work and findings of so many others:

Water is a critical resource for the production of food, goods, and services, the health of humans and natural ecosystems, and the successful functioning of modern society. Violence and conflict related to water resources are worsening for many reasons, including growing populations and water demand, expanding economies, widespread water contamination, worsening human-caused climate change, and weak water management and governance. Strategies for reducing water-related conflicts exist, including improvements in technology, more sustainable water supply and demand options, and a wide range of legal, political,

and institutional tools. But unless these are more quickly and widely deployed, the risks of conflicts over water seems likely to continue to worsen.

We can achieve measurable and repeatable success by using the considerable tools at our disposal, leveraging our common resources and information, and sharing our goals, challenges, and triumphs. We learn through this work about the things that work and those that don’t. We start to understand where we have gaps in our knowledge and skills, and we can begin to see a way forward. Solutions may be puzzling, but action can be clear and measurable and embody the hope that is so very human and necessary.

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FEATURE

# RIGHTS OF NATURE AND THE ST. LOUIS RIVER ESTUARY

By Emily Levang

What if we related to water as our kin? I went to the St. Louis River estuary in early January together with my friend Cristin, who shares a dedication to care for this ecosystem. This estuary is the largest tributary to Lake Superior, which holds 10 percent of our entire world's fresh surface water. As our world heads deeper into the water crisis, protecting this source of life is ever more vital. I try to begin with listening.

I am part of a small organization in Duluth, Minnesota called *Waankam: People for the Estuary*. We are a collective of both Anishinaabe and non-native members who are dedicated to raising awareness about rights of nature as an approach to protecting the headwaters of Lake Superior. We work to connect our community with the sacredness of water and all life, and to eventually pass a rights of nature law for the estuary with the hope of protecting it for all



*The St. Louis River in Jay Cooke State Park in northern Minnesota.  
Image via Unsplash by Ricky Turner.*

future generations, putting an end to the cycle of repeated harm. I come to this work as a white person of settler ancestry who grew up near this body of water named Gichigami-ziibi in Anishinaabemowin.

Cristin also works to protect the estuary as an organizer for the Minnesota Environmental Partnership. We visited the estuary together to learn from the water. Cristin laid a woven blanket on the dock, and we knelt down, gazing into the swirling white and gray of snow and ice. We gave offerings to the estuary: a stone, an acorn, a jar of

purified water. We asked for guidance, then sat in silence to listen.

I felt immediately the immanence, the presence of the body of water, alive. But then heaviness, and my mind went to all the trauma this water has endured—the U.S. Steel Superfund site, the heavy metals and PCBs (or polychlorinated biphenyls), the logging that once choked all the oxygen out of the river, the time not so long ago when raw sewage was dumped here. Growing up near the estuary, it was not safe to go in the water, not safe to fish.



*This peaceful wintery landscape near the estuary shows industrial buildings in the distance.  
Image courtesy of Michael K. Anderson.*

I reached my palm down to the frozen surface, traced my finger, gently melting lines of touch in the snow. I was here to listen to the water, to allow this relationship to inform my organizing work for rights of nature, but these thoughts of the past made it hard for me to hear.

Since the beginning of colonization, this place has been damaged and to this day faces devastating potential threats. A massive effort to remediate and restore this ecosystem has been underway for decades, and some of that work is nearing completion. I honor the enormous dedication, energy, and love that so many individuals and organizations have put into mitigating a legacy of harm done to the St. Louis River estuary. This work is important and needed. At the same time, I am critical of the dominant system that normalizes a cycle of repeated harm and the false narrative that leads us to believe that “fixing” and “cleaning up” pollution is a sustainable long-term solution.

The dominant culture has not shifted the underlying belief system that allowed the estuary to be so harmed in the first place—the idea that we are separate from and above nature, and that nature is an object here for us to exploit and control. Even though regulations are now in place, the

estuary is still just as vulnerable to harm as it was 100 years ago. We need a different approach.[1]

Big snowflakes began to fall; the wind rustled through cattails. We completed the silence, and I was grateful that Cristin had been able to hear more clearly. She told me what she heard the estuary say: *We are tired of the suffering. What if we could harmoniously coexist?*

Our conversation turned to how: How can we envision coexistence with this place? Can we attend to the harm while also creating a very different path forward? What would it take to collectively say, “We’ll never let this happen again.”

Cristin and I fell back into silence, listening. Then something shifted: the swirling dance of ice, snow, and wind emanated a kind of radiance, revealing a beauty that spoke to my heart instead of my mind. *Witness my beauty. Strengthen what is already here. Anything that you do, do it from love.*

It was an answer to the question of how to coexist. Not in a practical sense, but as an anchor for how to show up: with love.

Love occurs in relationships. In order to be in a relationship, we have to recognize that the other exists—and most importantly, has a right to exist.

## Indigenous Cosmologies, Western Frameworks, and the Rights of Nature Approach

Our current western systems do not recognize the St. Louis River as a living entity with the right to exist; rather, they view this body of water as an object to exploit. What if instead, relationship and reciprocity were central to how our systems relate to this ecosystem?

Rights of nature is one approach to center interconnection with nature in our communities and in our legal system. Rights of nature is an emerging legal movement to recognize that ecosystems,

bodies of water, and species have the inherent right to exist, thrive, flourish, and regenerate.

Rights of nature is based in Indigenous worldviews, calling upon communities to not only shift the legal standing of the environment, but to also decolonize how our society relates to nature. Rather than seeing water just as a resource to use, this approach centers the view that nature has its own right to life.



Around the world, Indigenous groups are leading the way to assert a reciprocal relationship with nature into the western legal model. In New Zealand, the Maori people led the nation to legally recognize “Te Awa Tupua;” the Whanganui River is a living being. [2] Ecuadorian Indigenous groups campaigned for rights of nature, and with support from U.S.-based legal organizations, became the first country to include rights of nature in their constitution in 2008. Article 71 states, “Nature, or Pacha Mama, where life is reproduced and occurs, has the right to integral respect for its existence and for the maintenance and regeneration of its life cycles, structure, functions, and evolutionary processes.”[3] In the United States, at least seven tribes have passed rights of nature laws, including the White Earth Band in

northwestern Minnesota, which passed a rights of nature law recognizing the rights of Manoomin (wild rice).[4]

Here in Northern Minnesota, the city of Duluth was built on the traditional homeland of the Anishinaabe people, and before them the Dakota people. The inherent rights of nature are fundamental to their traditional worldview and its application in daily life. As I’ve learned from Ricky DeFoe, Anishinaabe Elder and a leader of Waankam, “In Anishinaabe/Indigenous worldview, there are four orders of life that make up this home of ours on Mother Earth: First came the mountains and the rock nations. Second came the seeds, grasses, plants, trees. Third came the animals—the flyers, the swimmers, the crawlers, then finally the walkers. All of the others can



*Rapids in the St. Louis River in northern Minnesota illustrate the complex and layered nature of these landscapes. Image courtesy of Michael K. Anderson.*

live without humans, but we cannot live without them. All are interdependent on one another for life.”

In the Anishinaabe cosmology, rivers, streams, and lakes are the Earth’s lifeblood. This is recognized not only spiritually, but also legally and practically. According to *Revitalization of Anishinabek Legal Traditions*, “The traditional legal principle of ‘*all our relations*’ is a sacred law that all things in the universe are gifts from Creator and have meaning and purpose. All beings (people, plants and trees, insects, birds, fish, four-leggeds, etc.), all elements (earth, fire, wind, and water), Mother Earth and our land bases are to be considered to be alive and to possess each’s own purpose.”[5]

Ricky compares this cosmology to the western worldview: “In the West we are all socialized to believe in the great chain of being, a hierarchy of life.” The concept of the great chain of being dates back to Aristotle and Plato and ranks white people above people of color, as well as above all aspects of nature. Ricky says, “In the great chain of being you have a male god at the top, a rock at the bottom. In the great chain of being, the rock nation is just inanimate, it has no spirit. In our Indigenous worldview the rocks have spirit, they were here first.”

This Western worldview perpetuates dominance over other living beings, whether that be dominance over Indigenous people or dominance over the living entities of nature. Ricky explains, “For generations, Indigenous peoples were

seen as part of the flora and fauna—they were looked down upon as second-class people, as subhuman.” As European settlers colonized this land, they also sought to control and dominate Indigenous peoples by stripping them of their land and cultural practices, including those that connected them in reciprocity with the living world.

“The world we’re in is upside down,” Ricky asserts. “It’s our challenge to right-side it up.” Rights of nature is a movement sourced in these Indigenous worldviews, attempting to integrate this view into the western legal system. In Duluth, we have seen a cycle of repeated harm to the estuary, stemming from the mindset of separation from and dominion over nature. While important work is being done to remediate the estuary, it isn’t enough to protect the estuary into the future. We need an approach that transforms Western worldviews, one that centers Indigenous perspectives and leadership.

Waankam begins our work with the recognition that water is a living being, one with whom any of us (Indigenous or not) may enter into direct, reciprocal relationship. As a living being, water deserves to be honored and recognized as a holder of rights. In order to transform public awareness and codify this status into law, we seek to amend our city charter, to recognize the estuary as a living, rights-bearing entity with legal standing. Let’s contextualize this vision within the estuary’s past and present circumstances, which have led us to believe that this transformation is necessary.

## Legacy Contamination and Remediation

Prior to colonization, Gichigami-ziibi was an abundant place of rich biodiversity where sacred wild rice grew on water.[6] The Anishinaabe, and the Dakota before them, lived in reciprocity with the water and land.

Beginning in the 1850s, more than a century of unchecked industrial pollution degraded the estuary into one of the most polluted waterways in the entire United States.[7] The riverbed's sediments are now contaminated with mercury, dioxins, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons, and other toxins; the estuary was designated an Area of Concern (AOC) by the U.S.-Canada Great Lakes Water Quality Agreement in 1987.[8]

In part because of this AOC designation, over several decades, hundreds of millions of dollars is going into remediation and restoration work carried out by four organizations with assistance from many collaborators. By the time of completion, millions of cubic tons of contaminated material will have been dredged and removed, capped with cement, or amended with activated carbon.[9] Wild rice has been carefully seeded and tended, and sturgeon are being successfully reintroduced.[10] There are nine “Beneficial Use Impairments,” and when each of these has been sufficiently addressed, the estuary will be delisted as an AOC. As of this writing, four of the nine impairments have been removed.



*Contrasting sharply with the rapids in the above image, this image shows the rich and accessible wetlands of the estuary. Image courtesy of Michael K. Anderson.*

Body contact and fish consumption advisories are among the remaining impairments.[11]

One requirement for delisting this AOC is that *fifty percent* of degraded aquatic habitat must be restored.[12] The estuary will not have been returned to its original state.

As public attention turns toward an eventual completion of this work, I feel immense gratitude for all those who have contributed significant efforts to caring for this place. Yet I am critical of the narrative that we can be “done with this,” which sends a false message—that we can simply fix pollution without changing how we fundamentally relate to nature. I worry that commonly used phrases, such as “once polluted,” give the impression that when this work is done, the river will be completely restored, no longer polluted. The way I hear people talking, you’d think the days of damaging this ecosystem are a bygone era.

This is clearly not so, both in terms of future threats and still existing pollution. Mercury, for example, is an ongoing concern that will not be addressed by the completion of this work. Mercury contamination diminishes insect, bird, and fish reproduction. For humans, one in ten babies born in the Lake Superior basin have elevated levels of mercury, high enough to impair health and development. The river is still polluted and is still being polluted today.[13] This is an environmental justice issue for communities relying on fish for cultural identity or subsistence.

Federal funds for restoration only cover work done to remediate historical contamination. However, unregulated mercury contamination from taconite mining and related facilities is ongoing, and in the future could become even more dangerous with an increase in sulfates from proposed copper mining upstream.[14] The ecosystem is an intricate balance where past, present, and future mingle in ways that we are still coming to understand. While many individuals doing this work are motivated by care for the estuary, the system that this work happens within is not designed to account for interconnection. “Completion” is based on external metrics given by the EPA, not the lived experience of the human and more-than-human world within the estuary ecosystem.

I celebrate the return of the wild rice and sturgeon, and increasing safe access for humans, yet I worry that the message that the estuary has been “fixed” plays into the narrative that we humans have the power to harm nature and then fix it afterwards, which is untrue and is used by corporate interests as a justification for more pollution to be allowed. I don’t want to see our community right back in the same place 20 years from now, with another devastating contamination to the very same body of water. Without acknowledging the deeply rooted beliefs in the dominant western culture that allowed the river to become so harmed in the first place, the estuary will remain vulnerable to more abuse in the future.

## Future Threats to the Estuary

Of the numerous potential harms to the St. Louis River estuary, one of the most egregious is the proposed NewRange (formerly PolyMet) copper-sulfide mine, which would be situated 60 miles from Duluth, upstream from the estuary and Lake Superior. As of 2023, NewRange is a wholly-owned subsidiary of Glencore, a multinational corporation with one of the worst human and environmental rights track records in the world.[15]

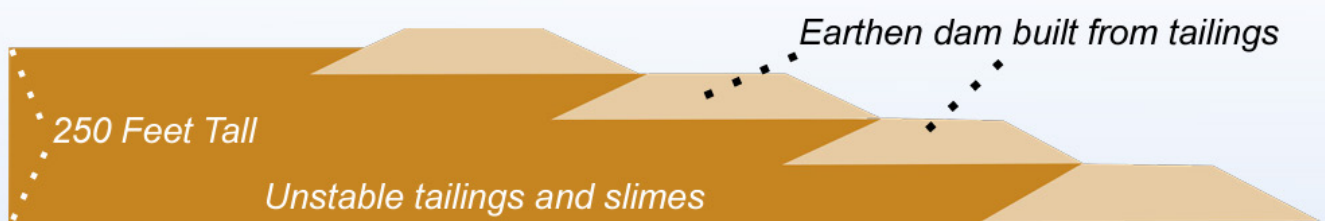
At the same time as many individuals have spent decades remediating the river, others have spent many of those same decades working to protect the river from the future threat of upstream extreme extraction. The NewRange (PolyMet) copper mine was permitted by the state of Minnesota with disregard for ecological and human safety, which has now come to public light through legal battles resulting in revocation or reversal of nearly all of NewRange's permits. [16]

NewRange proposed removing vast amounts of earth, destroying about 1000 acres of wetlands and indirectly impacting 7000 more.[17] The immense amount of sequestered carbon currently held in those wetlands would be released into the

atmosphere as greenhouse gasses. Contamination from atmospheric mercury and past mining that is currently held in the peat bogs would be released into the watershed.[18]

Copper-nickel mining exposes sulfide ores to water and air, which releases sulfuric acid. [19] The already existing mercury contamination in the river from historic mining and coal burning plants would then be exposed to sulfates and converted into methylmercury, a bioaccumulating neurotoxin that would move up the food chain in fish, birds, mammals, and humans.[20] Past, present, and future intermingle here, a chemistry of impacts we cannot control.

Over 20 years of operation, NewRange proposed to dig and blast 500 million tons of rock with explosives. Only 1 percent of the targeted ore is economically valuable, requiring vast amounts of energy to grind it into a powder to extract the metal. The remaining 99 percent—the tailings—would be stored as a slurry behind a dam constructed on top of an old, deteriorating taconite tailings dam built in the 1950s. [21] NewRange would construct their tailings dam using an “upstream” construction design, the cheapest and riskiest way to build a tailings



This type of “upstream” dam is the cheapest and least safe, and is increasingly banned around the world due to catastrophic failures. In other words, this obsolete dam design is destined to fail.

*The instability of the upstream tailings dam is apparent in this diagram. Image via Duluth for Clean Water, Friends of the Boundary Waters Wilderness, WaterLegacy, and MCEA, used with permission.*

dam.[22] The NewRange tailings would contain arsenic, asbestos, cadmium, lead, and mercury. [23] The World Health Organization lists these as five of the ten most toxic contaminants for human exposure.[24]

In November 2023, a state administrative judge recommended that the DNR deny NewRange’s permit to mine because their plan to use a bentonite clay liner to contain the contaminated waste was proven insufficient, meaning that hazardous waste would enter the environment even under normal operating conditions (which don’t account for the increased risks associated with climate change.)[25] NewRange’s own assessment of the “best case scenario” is that it would release 16 million gallons of toxic water into our groundwater per year, as stated in the environmental impact statement.[26]

Beyond NewRange’s expected daily leakage, there is also the risk of a total dam collapse, which has happened with upstream dams in both British Colombia and Brazil. [27] The dam would be built up over time using toxic tailings and sand reaching 250 feet. These dams are susceptible to “liquefaction” and complete failure.[28] A plume from a failed dam can travel hundreds of miles into the watershed.[29] There’s a 50 percent chance that the dam would fail in the first 54 years; there’s a 0.5 percent chance that it *wouldn’t* fail for 500 years.[30] While several other countries have made this type of dam construction completely illegal, the Minnesota DNR, the US Army Corps of Engineers, and the Minnesota Pollution Control Agency gave the go-ahead to PolyMet in 2018, issuing permits that have since been almost all rescinded, remanded, or revoked.[31]



*The aftermath of the dam disaster in Brumadinho, Brazil in 2019 shows the risk of upstream tailings dam failures. Image via Wikimedia Commons by Romerito Pontes.*

*See the video: [Aerials of destruction caused by Mount Polley Mine tailings pond breach.](#)*

*See the video: [Terrifying moment of Brazil dam collapse caught on camera.](#)*

And I wonder, did anybody kneel down on this land, ask for permission, and listen? How out of place this question appears here amidst an onslaught of the worldview that nature is an object.

Fortunately, the Fond du Lac Band and a coalition of nonprofit environmental organizations demonstrated the faulty logic behind the issuance

of these permits. No one, especially not the Fond du Lac Band, which is supposed to have treaty rights to unlimited hunting, fishing, and gathering of medicinal plants on this land, should have had to spend decades stopping this mine. And although it is currently halted, there is nothing preventing NewRange from challenging the court decisions or starting the process all over again by submitting a new application.[32]

Thus, in the absence of a transformation in how our community and laws relate to this ecosystem, we have not broken free from the cycle of harm.



*The devastation following the dam disaster in Brumadinho, Brazil demonstrates the immediate and long-term effects of this kind of dam failure.*

*Image via Wikimedia Commons by Romerito Pontes.*

## Environmental Regulation Legalizes Pollution

Since the very beginning of the PolyMet proposal, numerous experts, scientists, tribal representatives, health officials, and citizens have detailed extensive evidence as to the grave risk of this mine. Tribal reviews were repeatedly ignored, and although tens of thousands of people submitted comments on the environmental review process, these too, were disregarded.[33] No human Health Impact Assessment was conducted, though 46 health care workers detailed their concerns to the permitting agencies.[34] There was never an evidentiary hearing, which would have allowed for an unbiased review of the data. [35] The permits were granted solely on the data provided by the corporation attempting to profit. This is how pollution is legalized.

Our current system of environmental regulation stems from the worldview that nature is a commodity to use and control. From this standpoint, regulation is determined at a state level, with heavy influence from the corporations that seek to benefit from the use of those resources.

Regulation determines how much pollution is allowed and where it is allowed. “Where” is often low income and BIPOC communities. NewRange would be directly upstream from the Fond du Lac

reservation and the low-income side of Duluth located along the estuary, where the [US Steel Superfund Site](#) and dozens of toxic hotspots are located.[36] These are already the [communities](#) most affected by historic contamination from over 150 years of unchecked industrial pollution in the estuary.

*See the video: [Mercury in the St.Louis River](#).*

NewRange is a case of legalized pollution of epic proportions. While the historic impetus for environmental regulation was well-intentioned and indeed has served to protect and restore many places that would have otherwise been continuously degraded, I believe it does not have the capacity to go far enough to preserve vital ecosystems, in large part because it is fundamentally based in a worldview that sees us as separate from nature and does not recognize ecosystems as interconnected living entities.

Within the framework of the regulatory system, there are a set of predetermined ways that concerned citizens can engage. It does not allow us, as a community, to simply say *no* to something that would harm the very ecosystems upon which all of life depends.

## The Rights of Nature Legal Movement and Its Intersection with Environmental Justice

Rights of nature steps completely outside of the state permitting system and begins with knowing that nature is alive. As a living entity, we can enter into a reciprocal relationship with the estuary, recognizing that this ecosystem has the right to exist.

Within the western legal system, [this approach](#) was first proposed by Christopher D.

Stone, an American legal scholar, in the 1970s. He argued that within the regulatory system, a plaintiff must prove that harm has been done to property. This is incredibly difficult to prove and is inherently based in the idea that nature is an inert object to use and exploit. Rights-based law expands who and what has rights, with rights of nature working to include nature as a rights holder.[37]



Rather than working within the predetermined actions allowed by the state permitting system, rights of nature places the power in people's hands to establish constitution-type rights for nature that could eventually take precedence over regulations.

Historically, we can look to the precedence that legal rights have expanded to include women, enslaved people, children, even corporations. Women, at one time, were seen as property under the law. As a white woman in the United States 200 years ago, I would not have had the right to run for office, vote, own property, attend college, use birth control, or even have bodily autonomy. These rights have expanded over time. For women of color, many of these rights were not legally recognized until much later and are still heavily challenged today.[38] Indigenous people were the last to be legally recognized as citizens under the law in 1924, and even then, were not eligible to vote in some states until the 1960s.[39]

While some argue that we should focus on human rights before turning our attention to rights for nature, the two are deeply intertwined, both because we humans *are* nature—we are not separate from nature—and because those who are most harmed by environmental destruction are often those who are most oppressed and whose human rights are already most in question. It is not a coincidence that the rights of the original people who have lived on and cared for this land for millennia were the last to be legally recognized as rights holders in this country. In what is now called northern Minnesota, traditional Dakota and Anishinaabe cultures live in caring reciprocity with the water. Worldwide, 80 percent of all existing biodiversity is protected by Indigenous communities.[40] One might assume that those communities who are protecting the majority of our ecosystems would have access to clean water themselves, yet race is the strongest predictor of lack of water and sanitation access in the U.S.[41]

Thus, rights of nature works at the intersection of human and nature rights. This movement seeks to recognize the inherent rights and interconnectedness of all living beings, human and more-than-human, and is inextricably linked to justice and equity for Indigenous people.

As we see with civil rights, rights-based law is an ongoing long-haul effort. Rights of nature is not a quick fix. But it is a potential way out of the cycle, integrating Indigenous wisdom into the western legal system. It is an approach that holds the long view of future generations, beyond just the issues of today.

Anyone can participate in rights of nature movements. There are grassroots initiatives popping up in towns and cities around the country motivated by individuals and communities who are committed to transforming how we relate to nature, both culturally and legally.

In the U.S., this approach typically expands rights at a local level, working within a municipality, or within tribal law (which is more akin to the state level). Tamaqua Borough, Pennsylvania, was the first place in the world to recognize the rights of nature in law in 2006, when the community banned the dumping of toxic sewage as a violation of the rights of nature. Since then, dozens of communities in the U.S. have passed rights of nature laws.[42] The more communities take this on, the more powerful it will become. No specific skill set is needed to contribute; I fully believe anyone who wants to get involved can bring their love for the land and water to this effort. I encourage anyone who is interested to begin by searching for initiatives in their area, and reaching out to volunteer if there is one. If there isn't an existing initiative, start learning more, find others to collaborate with, and in particular for white folks, begin with the lifelong work of “decolonizing our minds,” as Ricky often says.

An important part of this work is taking back our power—from regulatory agencies, from corporations, from the idea that someone “out there” has this all under control. Communities tend to know best what they need, and it is in our communities that we live in direct relationship with the land and water. As such, nature rights and community rights are interrelated, because we humans *are* nature, our communities *are* nature, and because it is at a local level that people most directly experience the effects of environmental destruction. Practically speaking, this means that in the U.S., a rights of nature law is often passed along with a community bill of rights. Community rights are generally more human-oriented, expanding on democratic rights, such as the right to clean water, which goes along with

a river or lake’s rights to exist, thrive, flourish, and regenerate. We see these human and natural rights as interconnected and interdependent.

Work around the rights of nature is growing. This year, a rights of Manoomin/Psín resolution is being introduced to the Minnesota state legislature.[43] Internationally, rights of nature laws have been passed at the national level in New Zealand, Ecuador, Bolivia, Uganda, and Spain. Many other countries have local laws recognizing the rights of specific ecosystems or species.[44] In 2023, a major legal victory halted a copper mine from entering Ecuador’s Intag Valley, one of the world’s most biodiverse forests, on the grounds that the mine would violate the rights of nature. [45]



*The estuary is a rich and varied ecosystem. Image courtesy of Michael K. Anderson.*

# Azhe-mino-waankamitoodaa: “Let’s return the water to its original pristine condition!”

Efforts to recognize legal rights for Gitchi-gami-ziibi could protect the estuary for the long-term and could also bring together the concentrated efforts of many individuals and groups who are working to protect and restore this body of water. If passed in Duluth, a rights of nature law would enable any resident of the city to stand for the St. Louis River estuary ecosystem in court, to defend these rights against polluting industries.

As we celebrate the return of the wild rice and sturgeon to the estuary and the current halting of NewRange, perhaps this moment offers an invitation to reflect. With the upcoming increased access to the estuary, new trails and access points will provide more opportunity to connect with this ecosystem, to strengthen our collective love for this place.

Groups like the [St. Louis River Alliance](#) offer programming to support the community’s knowledge of, connection with, and stewardship of the estuary. Waankam hosts a seasonal ceremonial gathering to connect the community to this sacred place. [The Indigenous Women’s Water Sisterhood](#) is working to create an outdoor classroom and ceremony space along the estuary at Munger Landing.

In this moment of fruition, as the hard work of so many has paid off, what would it take to envision a future in which we are, with each passing year, returning the water more and more fully to its original pristine condition? In this future, we have ceased to cause more harm and are together building on the beauty and strengths of this place. Our group’s name, *Waankam*, is an Anishinaabe word that represents this vision. Waankam is the most pristine state that water has ever been in, in its original state of being. This name was given to our work in traditional fashion, by an Anishinaabe Elder. The full phrase is a call to action: “Azhe-mino-waankamitoodaa,” which means “Let’s return the water to its original pristine condition!” This is the vision we hold, through our collective prayers for the water and through our practical organizing work. We see a rights of nature law as a path to bring this vision into concrete form. With the passing of a rights of nature law, and the change in consciousness that would necessarily accompany that change to our system, we can envision a future where we will continue to cultivate the estuary’s strength and learn to coexist within this ecosystem.

## Footnotes

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## About the Author

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GEOGRAPHIES

# LIBRARIES BURNING

By Phyllis Mauch Messenger

*For much of the planet, 2023 was the warmest year on record, and the 12 warmest years have all been documented since 2005.<sup>[i]</sup> The repercussions of this warming pattern, of undeniable climate change, are both dauntingly real and not yet fully knowable, both immediately problematic and also intensifying over time.*

*The article republished here demonstrates a commitment to action and hope in the face of climate change. In 2019, Phyllis Mauch*

*Messenger detailed the work of several archaeological projects across the Arctic region focusing on salvaging materials long held in permafrost landscapes that are at risk due to warming temperatures. Messenger explains that this data contributes to understanding the history of human relationships with these places and that their loss would make parts of our human past irretrievable. Now, nearly five years later, the situation seems even more dire, the threats even more pressing, and the work ongoing.*



*Crew excavating eroding house at Walakpa in 2017.  
Image courtesy of the Walakpa Archaeological Salvage Project.*



Concerns in the Arctic, however, are not limited to archaeological materials, and concerns about losing fragile datasets due to climate change are not limited to the Arctic. Researchers are sharing their work and their concerns about threats to irreplaceable data in the physical landscape and the ramifications of this loss. Here are a few examples of work that demonstrate the ongoing distress of the Arctic and the ways these concerns resonate beyond the Arctic, too.

### ***Arctic Rivers Face Big Changes***

Thawing permafrost and increased precipitation are leading to changes in river ecosystems. As permafrost melts and more waters move through these river systems, researchers posit that these changes wrought by climate change will perpetuate and magnify the effects.<sup>[ii]</sup>

### ***Rain Comes to the Arctic, With a Cascade of Troubling Changes***

Rain events in the Arctic are becoming increasingly common and increasingly problematic. From changing the constitution of ice caps and glaciers to spurring avalanches to hardening snow layers, Arctic rains affect the people and wildlife of these regions and far beyond. These rain events happen because of a warmer climate, and they create conditions for more melting of glaciers and rapid sea-level rise.<sup>[iii]</sup>

### ***Melting Mongolian Ice Reveals Fragile Artifacts***

In the grassy steppes of Mongolia, climate change is melting snow and ice patches and revealing artifacts that change how prehistoric life in these places is understood. Even as some artifacts are recovered, it is impossible to know what data is not recovered and how the absence of these ice patches affects the broader ecologies of Mongolia.<sup>[iv]</sup>

### ***The Big Data of Ice, Rocks, Soils, and Sediments***

What do we do with the data that we rescue from the Arctic's thawing landscape? The work of collecting and curating materials—whether they tell the story of humans or the longer story of the physical planet—is invaluable, critically important, and also materially complicated. The varied ways that data sources, from ice cores to marine sediments, need to be stored in order to maintain integrity brings up questions about classification, indexing, what data needs to be saved, and how.<sup>[v]</sup>

### ***Partnering with Nonhumans for Climate Action***

Innovative technologies offer strategies to counter the loss of sea ice, posing ameliorative solutions to the disastrous effects of climate change. These strategies could reinforce ideas of human control or they could be opportunities to see relationships with nonhumans—like sea ice—as collaborative partnerships.<sup>[vi]</sup>

— Laurie Moberg, Editor

The impact of climate change on archaeological and heritage sites in the Arctic region is devastating. New techniques of research and analysis are providing increasingly rich data about the long history of humans in the environment. Evidence from archaeological sites, which has long contributed to this story, is becoming recognized as a “distributed long term observing network of the past” (Sandweiss and Kelley 2012). Just as the value of these sites is being recognized more fully, the sites themselves are being destroyed by thawing permafrost, rising sea levels, and increasingly violent storms. Nowhere is this being felt more intensely than in the Arctic, which is warming two to three times as fast as the rest of

the planet (Hoag 2019). In addition to increased threats from insects, extreme weather, wildfires, and the release of long-buried pathogens, this rapid warming is destroying the archaeological record (Hollesen et al. 2018). These environmental changes are destroying invaluable and irreplaceable evidence of human history.

Archaeologists and other scientists, realizing the extent and urgency of the threat not just in the

Arctic but globally, liken it to the burning of the ancient libraries of Alexandria, multiplied many times over (McGovern 2017).

For many years, in situ preservation in the Arctic and elsewhere worked very well. Now researchers from universities, museums, and government agencies, working with Indigenous and descendant communities, are scrambling to collect materials before they degrade and disappear.



*This map shows the regions of the three Arctic research sites highlighted in this piece: the Walakpa site, the Avayalik site, and the Kangeq village.*

Researchers declare that this may be the last generation to be able to recover even a fraction of the record of the archaeological global recording network. Analysis can come later.

In some cases, forward-thinking scholars and sponsors have managed to cobble together funding and teams to gather ice cores to be stored for future analysis. Similar efforts are being mounted at archaeological sites, with the recognition that only a fraction of known sites can be sampled.

In the 2017 Society for American Archaeology (SAA) President's Forum, the opening session of the 82nd Annual Meeting, SAA President Diane Gifford-Gonzalez described how global climate change is affecting archaeological and heritage sites "at a scale and rate unprecedented in the experience of archaeologists over the last 150 years" (Gifford-Gonzalez 2017). Panelists in the

session discussed the need to monitor and document sites along coasts from Alaska to Greenland and Northern Europe. They described innovative strategies to engage local communities in protecting threatened sites and in documenting those that will be lost.

According to organizers of another 2017 SAA symposium on environmental impacts on heritage, "This generation will see the destruction of thousands of sites—some already famous and of recognized heritage value and others that are exposed by one storm only to be destroyed by the next. At the same time, archaeology is increasingly recognized as a global-change science that is making significant contributions to resource management, environmental conservation, and more effective scenario building for a genuinely sustainable future" (McGovern 2017).

## Global Initiatives

The urgency of this situation has led to new initiatives to share resources and to identify and disseminate best practices. One such example is the *Integrated History and Future of People on Earth* (IHOPE 2015). This global network of researchers and research projects uses integrative frameworks and long-term, human-scale perspectives to combine earth system science (which focuses on the operation of the whole earth, including the basic elements of air, water, land, and life) with the social sciences, the humanities, and communities of practice.

One of IHOPE's teams focuses on threats to heritage and the distributed observing network of the past. This team includes archaeological fieldworkers, biologists, and modern resources managers working closely with citizen scientists and local communities. They face a dilemma of epic proportions. They have access to new analysis tools that promise to revolutionize what

we can learn about the past of humankind, so they must try to collect as much data as possible before it is gone. Yet, for the most part, they do not have strategies in place to document which sites are most at risk or to make decisions about which sites to focus on and which to let go. They must also deal with funding agencies that are used to supporting hypothesis-based research, not quick-turnaround salvage recovery. There are a host of other bureaucratic and logistical hurdles facing these researchers.

Another innovative collaboration that seeks to overcome disciplinary and institutional barriers is the Resilience Alliance (RA). Established in 1999, the RA is an international, multidisciplinary research organization that explores the dynamics of social-ecological systems. RA members collaborate across disciplines and with local communities on issues of resilience, adaptive capacity, and transformation of societies and ecosystems.

They participate in many international projects, including the International Panel on Climate Change.

The RA carries out comparative research and synthesis at a global scale, rooted in local and regional context-specific studies (see, for example, a [video on scenario planning](#) for Arctic sustainability in 2050). The organization's online

journal, *Ecology and Society*, serves as a resource for other organizations and programs around the world.

What follows is a glimpse of the issues and opportunities currently facing archaeologists who work in the Arctic, using sites in Alaska, Greenland, and Labrador as proxies for the ancient stories in a region that is rapidly thawing and eroding away.

## Loss of Sites in Alaska

University of Alaska archaeologist Anne Jensen studies endangered sites in coastal Alaska. She works in close collaboration with recognized Native communities on the North Slope and is the senior scientist for the Ukpeaġvik Iñupiat Corporation. The Walakpa site on the North

Slope of Alaska is an example of an iconic site with “spectacular preservation” that began eroding rapidly in 2013 (Jensen 2018). This sudden degradation is due to multiple forces: permafrost thawing, freeze-thaw cycles, and wave action during storms. At Walakpa, well-preserved



*Ancient Walakpa wooden structure slumping into the sea.  
Image courtesy of the Walakpa Archaeological Salvage Project.*

wooden structures and 11 meters of stratified deposits dating back over 3,000 years of history of semi-nomadic Alaska Natives are now slumping into the sea.

Until just a few years ago, this house (above) had stood literally frozen in time. It held not only millenia-old cultural data, but biological data, as well: basic zooarchaeological data, stable isotopes, ancient DNA[1], cortico steroids, and trace elements. All these can be analyzed for ecosystem reconstruction and change, climate and habitat reconstruction, evidence of extinctions and

bottlenecks, and species response to specific types of change (Jensen 2012, 2015, 2017). Jensen calls this a “tissue archive,” similar to the samples of frozen animal tissue that biologists have been collecting for the past 30 to 40 years, but holding thousands of years of data rather than decades. Proto-Inuit peoples hunted animals and plants from land and sea, sampling large areas and bringing these needed resources back to their villages. The preserved remains have the potential to show climatic cycles over these millennia, something that current biological sampling cannot do.



*Walakpa house with overhang gone. Image courtesy of Anne Jensen.*



*Walakpa slump block strata showing remains of a storage pit or ice cellar (reddish layer) and possible earlier abandoned ice cellar below (ice lenses separated by soil). A baleen (whale-bone) bucket is visible in the lowest ice lens, just to the right of the post. Image courtesy of the Walakpa Archaeological Salvage Project.*

See video: *Threatened Heritage and Community Archaeology on Alaska's North Slope.*

After a fall 2014 storm uncovered Walakpa, international volunteer efforts to salvage data from the site began in 2015, with support from the landowner (an Alaska Native village corporation) and many individuals (Jensen 2018). Another storm in 2017 nearly destroyed the site, exposing human remains and more cultural and biological materials. The urgency of the situation and the need to move quickly to begin recovery

(including the appropriate handling of human remains) outpaced traditional funding cycles for such a project—exemplifying one of the many challenges facing researchers in the Arctic zone. Things are different now because of climate change, says Jensen (2015). There is an urgency to collecting data, rather than doing hypothesis-driven research. Sites often aren't on federal land, so federal agencies do not have oversight or responsibilities. Reviewers of proposals for funding often don't understand the need for immediate funding, before the next storm hits.



*Crew excavating eroding house at Walakpa in 2017. Image courtesy of the Walakpa Archaeological Salvage Project.*

In short, funding cycles aren't geared toward this crisis mode.

At another North Slope site, Nuvuk, or Point Barrow, local residents sounded the alarm when eroding coastal bluffs began exposing human remains and cultural materials several decades ago. This was a village site with a long history that had been relocated more than once due to erosion (Krus et al. 2019). Excavations showed that human occupation there had stretched back not decades but over a thousand years, predating

when the Thule, or ancestral Inuit, lived there, making Nuvuk a key site for understanding the Thule migration across the North American Arctic to Greenland over the next several centuries (Jensen 2017; see also, Krus et al. 2019, Tackney and Raff 2019).<sup>[2]</sup>

Current research on hunter-gatherer burial practices at Point Hope, Alaska by Justice and Temple (2019) makes use of materials and research reports from the 1940s, as well as recently uncovered material. These researchers, too, are



*3000 years of cultural deposits all over the beach at Walakpa.  
Image courtesy of Anne Jensen.*



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sounding the alarm about both ancient sites and modern villages: “As permafrost continues to thaw because of human-induced climate change, coastal areas are eroding, placing villages and communities at risk of complete loss” (Melvin et al. 2017 in Justice and Temple 2019, 237).

For more on Walkapa and Nuvuk, visit <https://iceandtime.net/>. See also [https://www.youtube.com/watch?v=hh\\_KEQ-ayBI](https://www.youtube.com/watch?v=hh_KEQ-ayBI) for excavation

of a seventeenth-century village in Quinhagak, Alaska, which began eroding away in 2009. Referring to the imminent danger to organic materials normally seen only in museum collections, project director Rick Knecht described the situation as “like museums on fire, libraries.”



*Ipiutak paddle in situ at Nuvuk. Image courtesy of the Nuvuk Archaeological Project.*

## Melting Middens in Greenland

The largest island in the world, Greenland lies east of the Canadian Arctic Archipelago between the Arctic and Atlantic Oceans. Greenland is an autonomous constituent country within the Kingdom of Denmark, though geographically it is part of the continent of North America. The island's 57,000 inhabitants are clustered on shorelines, especially in Greenland's many fjords. Three quarters of the island is covered by a permanent ice sheet. Thus the melting of Arctic

ice has a direct effect on Greenland's towns and villages, both past and present. Add increasing coastal erosion to this scenario, and the need to identify sites and remains most at risk becomes urgent.

Researchers face the task of salvaging what they can of the remains from 4,000 years of human occupation in coastal settlements. Until the late twentieth century, these data have been preserved



*During the REMAINS of Greenland project, scientists have visited 14 different archaeological sites in the Nuuk region. Here the state of preservation is being evaluated at the heavily eroded site of Nuugaarsuk. Image courtesy of Roberto Fortuna, National Museum of Denmark.*

in middens protected by permafrost; they were veritable time capsules of material culture to be added to the stories passed down through generations: how people lived, what they ate, the tools they used, patterns of trade and migration. Over the last several decades, archaeological surveys have identified hundreds of midden sites throughout the fjords and archipelagos of western Greenland. Material remains range from wood, bones, and feathers to animal dung and even human hair. However, fluctuating weather patterns are leading to thawing permafrost and accelerating decomposition of the contents of these middens.

Archaeologists and local heritage managers in Greenland are working to understand patterns and rates of deterioration, what sites are most at risk, and how to engage local communities in documentation of annual changes at archaeological sites. One of the projects designed to carry out this work is REMAINS (Research and Management of Archaeological sites IN a changing environment and Society; see Harmsen, Hollesen, Matthiesen, et al. 2017; Harmsen, Hollesen, Madsen, et al. 2018, Hollesen et al. 2019). Computer modeling suggests accelerated permafrost thaw may lead to higher internal heat production, thus exacerbating the impact of climate change on such sites (Hollesen et al. 2016).



*Researchers from REMAINS team are discussing how to evaluate the archaeological state of preservation, the preservation conditions, and asset value of organic deposits. The work of the project has led to the development of a standardized field protocol for site description and risk assessment. Image courtesy of Roberto Fortuna, National Museum of Denmark.*

The REMAINS project is carrying out a regional risk assessment for sites in the Nuuk region related to current and future climatic conditions.

One study is assessing current preservation conditions and processes in a kitchen midden in western Greenland and estimating the impact of future conditions (Hollesen et al. 2017). Currently the site is well preserved, with low ground temperatures, permafrost, and a high water/ice content. Extrapolation of data to the end of the twenty-first century, however, suggests that there will be substantial loss of archaeological evidence due to erosion and oxygen exposure.

A well-known example of site deterioration is the village of Kangeq on an island in the Nuuk Fjord, a twenty-minute boat ride from Nuuk, Greenland's capital.

Kangeq was occupied for some two millennia. Residents adapted their hunting and food gathering to seasonal availability of resources on both land and water. Kangeq was a nexus on important trade routes, and served as an official trading station for the Royal Greenland Trade Department for centuries (Harmsen 2017; Ivanov 2017). It was abandoned in the 1970s, in part due to an effort by the government to consolidate social services.



*The settlement of Kangeq in Southwest Greenland was abandoned in the 1970s. The site had been occupied for thousands of years. Image courtesy of Jørgen Hollesen, National Museum of Denmark.*

Boarded-up houses and an abandoned church still remain at Kangeq. A pool of sludge on the water's edge greets researchers coming to assess the site (see Harmsen 2017). Giant whale ribs, wood, glass, and rusting metal stick out of the pool; it is surrounded by a thick layer of compressed turf, which is actually a midden filled with the bones of what the residents of Kangeq were eating over the centuries. "People were living here for thousands of years, and then suddenly the whole town was deserted," said REMAINS project leader Jørgen Hollesen. "There's so much evidence of human activity—you can still see the playground where the kids used to play"

(REMAINS of Greenland <https://www.youtube.com/watch?v=xBJlhiP6P6s&t=266s>).

Deposits such as those at Kangeq hold rich secrets to Greenland's deep human past. For example, the Saqqaq peoples, who inhabited the area from approximately 2400 B.C. to 800/500 B.C., were part of a broad techno-cultural tradition (Arctic Small Tool tradition or ASTt) and genetically related to ancient populations that originated in the Western Arctic (Siberia/Alaska). Archaeologically, in addition to the Saqqaq, these ancient groups are represented in Greenland by the Independence I (ca. 2400–1300 B.C.) and Greenlandic Dorset (ca.



*Remains of the village of Kangeq as seen from the air.  
Image courtesy of Jørgen Hollesen, National Museum of Denmark.*

800 B.C.–A.D. 1) (Grønnow & Sørensen 2006). Following the Greenland Dorset, the island remained devoid of people for approximately 700 years until the arrival of the Late Dorset (ca. A.D. 700–1300), the last Paleo-Inuit group to settle in Greenland. They probably overlapped briefly with the Greenlandic Norse, whose colonies lasted only a few hundred years. The standard story of the Norse disappearance was that their society collapsed as a result of their failure to adapt to Greenland’s climate. But newer evidence paints a much more complex picture of their withdrawal from Greenland, including “demographic pressures, changing social relationships, a lessened demand in European markets for Greenlandic

exports such as walrus ivory and skins, and microshifts in seasonal weather and the annual returns of harvests,” according to archaeologist Christian Koch Madsen, curator at the Greenland National Museum (Harmsen 2017).

The next wave of settlers was the Thule, who eventually became the modern Inuit Greenlanders. Their attention to seasonal rhythms along the coasts and fjords of Greenland is echoed in the remains of Kangeq. There is much to learn from these ancient cultures, especially with the new tools of analysis available to researchers, but the evidence is disappearing faster than it can be gathered.



*Archaeological middens in Greenland often contain large amounts of very well-preserved organic materials. The midden at Kangeq is no exception; here large amounts of wood and bone have survived for centuries. Image courtesy of Roberto Fortuna, National Museum of Denmark.*

## Site Deterioration in Labrador

Similar problems with site deterioration due to thawing permafrost are ubiquitous in north-eastern Canada, including in the province of Newfoundland and Labrador. In 2016, a team of researchers sailed to Avayalik Island 25 miles south of the northern tip of Labrador to study the current condition of important Paleoeskimo sites that had been studied in 1978. In particular, they set out to determine the state of cultural deposits that were frozen and well preserved in 1978 (Kaplan et al. 2017). One such example is Avayalik-1, a Late Dorset house with multiple structures and middens, walrus caches, and other cultural materials. Under the house were a frozen

Middle Dorset house and midden containing organic artifacts and faunal remains, including hundreds of wooden artifacts, strands of musk ox cordage, objects made from baleen or whalebone, and even pieces of worked hide. Analysis of these materials had allowed researchers to begin to develop an understanding of the ecology of the North Atlantic before European whalers removed large numbers of baleen whales resulting in a cascade of changes in the ecosystem. Researchers speculated on trade routes that might have brought non-native materials to the region. They hypothesized that other Middle Dorset sites in Labrador, which had yielded mostly chipped



*Avayalik-1, House 1 in 2016, view looking south. Backfilled site was well sodded over. Photograph taken after archaeologists re-gridded the area in preparation for opening sample excavation units in the structure. Image courtesy of Susan A. Kaplan.*

stone tools and other nonperishable materials, likely would have had similar assemblages had preservation been as good.

Today, with the myriad of analytical techniques available to researchers, the information that might be gleaned from a site like Avayalik-1 is much greater than it was in 1978. That is, if it still exists and has not slumped into the sea or melted into an indecipherable mass. In the 1970s, archaeologists gathered “only tangible, visible, culturally associated materials” (Kaplan et al. 2017, 139). Today they gather soil and organic samples and faunal remains for aDNA testing, identification of collagen-based materials, and paleo-environmental reconstructions that help us understand how people were using the resources available to them.

Thus it was the growing concern about the effects of global warming on Avayalik-1 that sent researchers back to Avayalik Island. They carried out limited excavations at the site to collect wood and charcoal samples to establish a chronology, gather soil samples and faunal remains for archaeometric analysis (unknown in 1978), and assess the stability of Avayalik-1 and other sites in the area. They documented areas that were thawing and eroding. “The dried-out deposits on the edges of the terrace are actively tumbling downslope, scattering lithic materials once contained in the deposits and displacing structural rocks. Whatever organics were once in the deposits have deteriorated due primarily to the thawing and drying out of the soil” (Kaplan et al. 2017, 145). They placed stakes to document



*Profile of 2016 excavation unit in Avayalik 1, House 1. Lower portion of the cultural deposit visible in the north wall of 2N/8E shows faunal remains, a piece of cordage, and a piece of fur protruding from the wall. The light-colored deposit at the bottom of the photograph is sterile deposit. Image courtesy of Susan A. Kaplan.*



erosion and photographed the landscape to create a baseline for future studies of coastal erosion.

The analysis of materials recovered from this site in 2016 will no doubt provide a more robust picture of what life was like some 1,500 years ago, in an ecologically rich area accessible to groups

living as far away as Baffin Island and Hudson Bay. Perhaps it was even a central gathering place or an important stop on a vast trade route. Time is running out for researchers to gather the fragile organic materials that hold the clues to this and other stories in the Arctic.

## Conclusion

This column has focused on the rapidly deteriorating condition of representative sites in the Arctic region. These repositories of irreplaceable data—these libraries—are burning around the

world. Coastal sites from the U.S. to Scotland to Southeast Asia and South America are eroding into the sea due to rising tides and more violent storms.



*Aerial view of Avayalik-1 taken in 2016 using a drone. The 1978 excavation is visible in the top left quadrant of the photograph. The small cove southwest of the excavation showing active erosion is at the top of the photograph. Dark green areas in the center section of the image are where melting permafrost is pooling. Image courtesy of Jamie Brake.*

Researchers have been sounding the alarm and mobilizing for several decades, with increasing urgency. They have joined forces in such international and interdisciplinary collaborations as IHOPE, the Resilience Alliance, and the REMAINS project. Archaeologists are raising awareness among their peers in conference sessions, calling for coordination and collaboration across sectors and geographic regions to share resources, pool expertise, and identify and disseminate best practices. They are working with local communities, training them to observe changing conditions and carry out

salvage projects. They are developing protocols for documenting which sites are most in danger or most necessary to save, given their potential to help tell the stories of human migrations and ecological-human relations. They are seeking funds to triage sites accordingly.

Researchers who work at these ancient repositories of biological and environmental data know they are nodes in long-term ecological observing networks. The alarm bells are ringing; the question is, how much can be saved before it is too late?

## Footnotes

[i] NOAA National Centers for Environmental Information, “2023 was the Warmest Year in the Modern Temperature Record,” Climate.gov, January 17, 2024, [https://www.climate.gov/news-features/featured-images/2023-was-warmest-year-modern-temperature-record#:~:text=The%20year%202023%20was%20the,decade%20\(2014%E2%80%932023\)](https://www.climate.gov/news-features/featured-images/2023-was-warmest-year-modern-temperature-record#:~:text=The%20year%202023%20was%20the,decade%20(2014%E2%80%932023).).

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[iii] Ed Struzik, “Rain Comes to the Arctic, With a Cascade of Troubling Changes,” Yale E360, February 20, 2024, <https://e360.yale.edu/features/arctic-rainfall-climate-change>.

[iv] William Taylor, “Melting Mongolian Ice Reveals Fragile Artifacts that Provide Clues about How Past People Lived,” The Conversation, August 11, 2021, <https://theconversation.com/melting-mongolian-ice-reveals-fragile-artifacts-that-provide-clues-about-how-past-people-lived-164657>.

[v] Shannon Mattern, “The Big Data of Ice, Rocks, Soils, and Sediments: Inside the Material Archives of Climate Science,” *Places Journal*, November 2017, <https://placesjournal.org/article/the-big-data-of-ice-rocks-soils-and-sediments/>.

[vi] Julianne Yip, “Partnering with Nonhumans for Climate Action,” *Sapiens*, January 5, 2021, <https://www.sapiens.org/culture/arctic-sea-ice/>.

[1] For an overview of ancient DNA, or aDNA, see Hofman and Warinner 2019. For a discussion of collaboration between genetic researchers and Alaska Native communities on the North Slope, including best practices for projects involving ancestral remains or living peoples, see Tackney and Raff 2019.

[2] For discussions of recent research on the Thule migration and Inuit expansion east across North America, see Gulløv and McGee 2017 and Friesen and Arnold 2008.

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## About the Author

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IN REVIEW

# STORIES TO THE SURFACE: REVEALING THE IMPACTS OF HYDROELECTRIC DEVELOPMENT IN MANITOBA

By Caroline Fidan Tyler Doenmez

*Author's Note: All photographs included in this piece were taken by photographer Aaron Vincent Elkaim and are shared with his permission.*

Manitoba, although known as one of Canada's prairie provinces, is arguably more defined by its waterways. One story tells that the very name "Manitoba" was born from water, derived from the Cree words Manitou, "Great Spirit," and wapow, "sacred water," to describe the

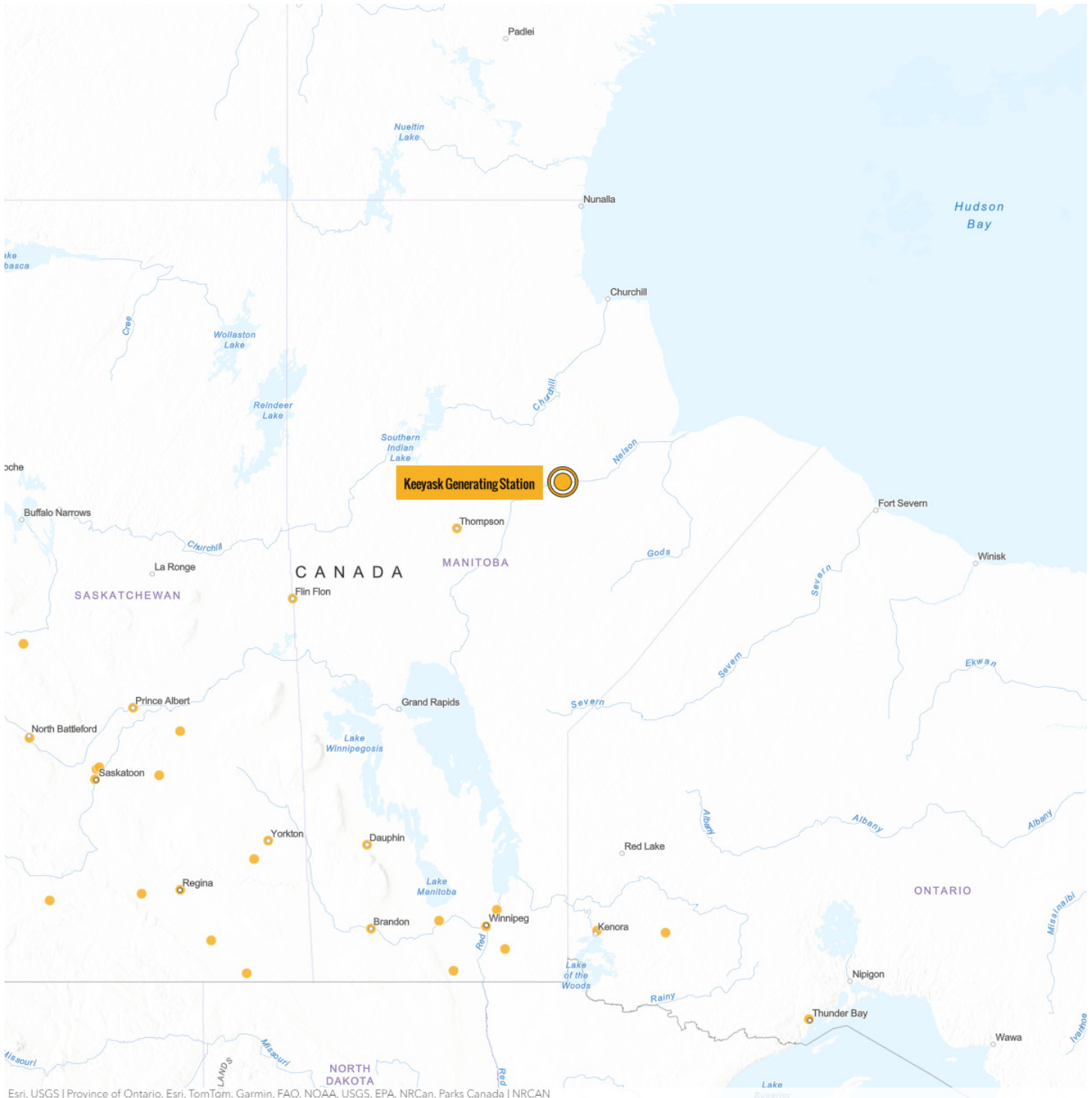
sound of waves crashing against an island on Lake Manitoba (Sinclair and Cariou 2011, 4–5). The Red and Assiniboine Rivers, two prominent entities of movement and memory, meet in the heart of the province's capital city of Winnipeg. The northward-flowing Red River empties into Lake Winnipeg, the tenth-largest freshwater lake in the world. The northern area of the province is dappled and threaded with thousands of lakes, abundant rivers, and watersheds. It is here, in the north, that water has been harnessed and



*Detail from The Keeyask Dam site on the Nelson River, 2019. Image courtesy of Aaron Vincent Elkaim.*

commodified as a source of energy by Manitoba Hydro for the past six decades. Today, according to provincial and Manitoba Hydro websites, a staggering 97 percent of electricity generated in Manitoba is derived from hydropower (Manitoba Hydro 2023a, 9).

The 2022 anthology *In Our Backyard: Keyask and the Legacy of Hydroelectric Development* provides a critical case study of the most recent of six hydroelectric dams built along the Nelson River in northern Manitoba. In operation since 2021, the dam was named



Map of the Keeyask Dam in Manitoba. Image via ESRI.

Keeyask, which means “gull” in Cree. The book is organized into four parts. The first two sections focus on the evolution and impacts of hydroelectric development in northern Manitoba while the third interrogates the nature of the partnerships between Manitoba Hydro and First Nations. The fourth section provides reflections

on the question: What is good development? The fifteen chapters are interspersed with eight brief “Community Voices,” which consist of excerpts of testimony offered by Indigenous people at the Keeyask project’s regulatory hearings. It also features several poems by Ovide Mercredi, former national chief of the Assembly of Nations and



*The Keeyask Dam site on the Nelson River, 2019. Image courtesy of Aaron Vincent Elkaim.*

former chief of Misipawistik Cree Nation. The anthology totals just over 400 pages and is filled with information and analysis of this specific dam and its broader historical and environmental context. This context is crucial for readers to develop a critical understanding of the realities of hydropower. Manitoba is the third-largest producer of hydroelectric energy in the world, and hydroelectric power is often celebrated as a responsible and safe form of energy production. However, the expert voices in this anthology sound a sobering note of caution and compel its readers to grapple with the often-effaced realities of dispossession and devastation that underlie and attend hydro development. They offer incisive and detailed records of harm that have been caused by hydroelectric development and illustrate visions of other possible scales and strategies for living and surviving in good relation to the lands, waters, and more-than-humans around us.

This anthology's content is varied and interdisciplinary, reflecting editors Aimée Craft (Anishinaabe-Métis) and Jill Blakley's commitment to move beyond "the confines of each discipline and world view to draw knowledge together to assess the full scope of impact of the project" (7). The contributors include Indigenous Elders, Knowledge-Keepers, trappers, fishers, hunters, and community members from areas impacted by the Keeyask dam and other hydroelectric development projects. Other contributors are lawyers, scholars, consultants, advocates, scientists, and the former chair of the Clean Environment Commission (CEC). The majority of the contributors took part in CEC hearings held in Manitoba, many of which occurred between 2012 and 2014. Several of the chapters offer notably technical

environmental and legal analyses of concepts such as sustainability, development, social license, conservation, partnership, and the Honour of the Crown, while others center the power and texture of firsthand narratives and lived experiences. Craft and Blakley note that environmental review processes have often fallen short of integrating Indigenous people's perspectives and knowledges, writing, "The weight ultimately given to those voices is arguably not as significant as it should be" (6). This anthology serves as a valuable corrective by sharing the testimony and expertise of various Indigenous people impacted by hydroelectric development.

While grounded in the specific environmental, political, and social context of Manitoba, this anthology asks fundamental questions that concern us all about energy consumption: Where does our energy come from, and who pays the price for the energy we use? Whose expertise guides our energy development, and whose is silenced? Do we really need further development? When will we make energy conservation our "overwhelming priority" (58)? How else might we envision our future beyond the current energy paradigm? The contributors to this anthology look to both the past and the future to offer responses to these questions. On the one hand, they testify to the impacts of hydropower that have already occurred. On the other, they also serve as cautionary tales which disprove the notion that hydroelectric development represents a harmless substitute to fossil fuel energy production, as it is so often touted. Instead, several contributors explicitly ask us to reflect on the violence and unsustainability of our energy consumption habits and to challenge ourselves to imagine living otherwise.



## “Clean” Energy

While this anthology contributes many thought-provoking insights and considerations, there are two dominant critiques of hydroelectric development and the regulatory review processes that are particularly salient.

The first is the notion of hydro as a form of “clean” energy. As the need to shift away from fossil fuels grows increasingly urgent, hydroelectricity has been painted as a “green” climate change solution by the hydropower industry in Manitoba. Indeed, a [teaching resource](#) on the Manitoba Hydro website opens with the statement: “Manitoba’s Energy supply: Good for Manitobans, good for our environment,” and continues, “Manitoba has one of the cleanest and most reliable electricity systems in the world. Our electricity supply is renewable, efficient, cost-effective and environmentally responsible” (Manitoba Hydro 2023b). The provincial government, which has a partnership with Manitoba Hydro, also describes hydroelectricity as “clean and renewable” on their government [website](#) (Manitoba n.d.). As Annette Luttermann notes, Manitoba Hydro supporters “frequently cite climate change as a reason to support dam development in the Canadian North” (173). This anthology calls into question many of the core terminologies, frameworks, and processes used to designate hydroelectricity in these glowing terms. “Clean” energy refers to the reduction of greenhouse gas emissions, but the formulation of hydropower as a clean and responsible form of energy production requires the disavowal of the widespread harm its causes to Indigenous people, waterways, lands, fish, birds, and animals.

The anthology counters this disavowal through its focus on the counternarratives of impacted Indigenous people. Their testimony describes various forms of devastation caused by the sudden flooding of areas due to hydroelectric development. In the various submissions, we learn that these floods have caused buried ancestors to

be displaced from their resting places. They have drowned caribou, beavers, and rabbits; destroyed fish populations; and wiped out important patches of berries and medicines. Contributors also testified to the various disruptions to their ways of life, including being forced out of their homes, hearing loud dynamite explosions, dealing with the construction of access roads and increased traffic, and coming upon piles of dead animals in the bush, wantonly slaughtered by Manitoba Hydro workers for mere entertainment. Another harmful outcome of hydroelectric development is the paradox of both an excess and scarcity of water; lands are flooded due to the dams, but the water itself becomes contaminated. As Ivan Keeper and Robert Spence from Tataskweyak Cree Nation bemoan, “Hydro gets ‘clean’ energy, while we don’t even have clean water to drink” (52). Further, while only mentioned fleetingly, a former Councillor from Fox Lake Cree Nation offered testimony at a CEC hearing in 2013 implying that hydroelectric development had led to uninvestigated beatings, murders, and rapes committed in his community (146). A few years after this testimony was offered, news stories reported that nine cases of sexual assault had been investigated at the Keeyask dam construction site (von Stackelberg). Canada’s 2019 National Inquiry into Missing and Murdered Indigenous Women and Girls recommended an additional inquiry to look into the allegations of sexual violence at hydroelectric project sites. As many Indigenous scholars and advocates have noted, energy infrastructure projects often result in increased rates of gender-based and sexual violence in local communities.

This emphasis on being attuned to the wide range of impacts caused by infrastructure projects is further amplified by Indigenous worldviews in which the existence and survival of animals, humans, waters, lands, and other life-forms are all intimately connected. Aimée Craft emphasizes



*A Manitoba Hydro mural in Winnipeg shows two Indigenous children lying in a lush field of grass next to a calm body of blue water. Images like these play into the narrative of hydro-electric energy as “clean.” Image courtesy of Aaron Vincent Elkaim.*

that these principles of kinship are also integral to Indigenous legal relationships and systems (334). As Tommy Monias (Pimicikamak Cree Nation) expresses in his testimony at a CEC hearing, “We are part of the animals...We gather berries, we heal our bodies, we gather medicines to heal our bodies. We are one with this land, we are one with the water, we are one with these animals. We are also one with the very fibre of such ecological destruction that’s happened to us. So we die inside” (194). Robert Spence (Tataskweyak Cree Nation), references traditional birth ceremonies which connect Indigenous people to their lands when attesting to the harm caused by hydrodevelopment: “My umbilical cord is tied to the land that we walk on every day. I

come here to speak the truth, that what Manitoba Hydro is doing is killing our mother. Every day we watch what Manitoba Hydro is doing. You go out and watch your mother die of cancer [every] day. You watch her die over and over and over and over again” (214).

These testimonies also make vividly clear how infrastructure projects can be a destructive form of settler colonial power which dispossess Indigenous people of their waters, lands, resources, cultures, and ways of life in the service of energy production for settler societies. Infrastructure as a mode of colonial violence has been analyzed in multiple other contexts by Indigenous Studies scholars including



*An old photo held by Jackson Osbourne shows an area before it was flooded by the JenPeg Dam in northern Manitoba. Image courtesy of Aaron Vincent Elkaim.*

Nick Estes (2019), Elan Pochedley (2021), and Anne Spice (2018). This is enunciated in this anthology in the words of Dr. Ramona Neckoway (Nisichawayasihk Cree Nation) in her

testimony against hydroelectric development: “I see this project as another colonial apparatus that will destroy our autonomy creating further dependence and despair” (73). Agnieszka



*A man named Jonathan Kitchekeesik from Tataskweyak Cree Nation collecting medicinal tea on his family’s land on Gull Lake in northern Manitoba. While he originally hoped the Keeyask dam would help bring jobs to the area, he now worries about the destructive impacts of the dam on the land and his community. Image courtesy of Aaron Vincent Elkaim.*

Pawlowska-Mainville adds, “To this day, hydro development continues to represent the largest form of destruction of Inninuwak values, history, and local mino-pimatisiwin (well-being) people have ever seen” (159).

This attention to the coloniality of energy infrastructure is crucial to note in the unique context of the Keeyask dam, which was the result of a partnership forged between Manitoba Hydro and four First Nations in northern Manitoba. Contributors to this book note that some members of these nations supported the partnership and hoped it would bring prosperity to their communities. Yet many of the chapters also highlight voices of dissent from within these nations, complicating homogenizing narratives of community buy-in and consent. Several authors suggest that when maximizing economic profit remains the priority, such projects risk reproducing asymmetrical power relations rather than transforming them.

Such insights trouble the pervasive Canadian discourse of reconciliation, in which politicians and institutions have sought to address and rectify their colonial relations with Indigenous people. This shift was largely catalyzed by the 1996 Royal Commission on Aboriginal Peoples’ report, which discussed the Indian Residential School System and offered a Statement of Reconciliation (Institute on Governance 1997). A subsequent national Truth and Reconciliation Commission

examined the country’s Indian Residential School System and included 94 Calls to Action to ameliorate the ongoing harms and injustices Indigenous people experience in Canada (Government of Canada 2022). This era of reconciliation has been marked by an affective register of goodwill and regret, articulated through promises and apologies.

Audra Simpson (2020) cautions that such public performances of grief, or what she calls “the move to sorrow” by state actors, constitute a contemporary form of governance which often masks the ongoing violence of the state. Against this backdrop of a purported effort to transform Indigenous-settler relations, the voices in this anthology reveal how Indigenous people continue to experience dispossession through infrastructure projects that lay claim to their territories and waterways.

In sum, the voices in this anthology refute the fantasy of an innocent and harm-free form of energy, forcing the readers to confront the underlying issue: our seemingly insatiable consumption of energy. Rather, they demand that we consider the impacts of hydroelectric development on those communities, lands, and more-than-humans that are sacrificed, or “wastelanded,” to invoke Traci Voyles’ (2017) terminology, to meet these relentless demands, showing who is forced to “carry the burden of this sixty-year-old growing energy need” (148).

## Limitations of Regulatory Review

The second critical contribution of the anthology is its focus on the limitations of the regulatory review processes that were conducted prior to the Keeyask Dam’s approval. Various contributors ask: What kinds of underlying assumptions and motivations animate these studies and proceedings? Which kinds of knowledge are excluded from consideration, and at what cost? James P. Robson notes, for example, that environmental assessments are still fundamentally

grounded in “an epistemological Western bias” and “couched in the ‘language of technocratic fixers; of rigorous, rational inquiry; of a world-view which holds the economic as the highest value,’ and guided by the values, structures, and policies of a dominant Eurocentric society” (119). Aimée Craft, in her analysis of the “two-track” approach which sought to bring together Western science and Indigenous Knowledge in the environmental assessment, states that the effort

ultimately privileged Western science, values, and evaluation methods (338). Several examples follow in the book that repeatedly show how the assessments employed narrow frameworks and definitions that failed to account for the full scope of the dam's impacts. One specific example of this myopia is that certain communities, such as South Indian Lake, were not consulted or considered in the environmental assessment processes because the community was not designated as lying within the "footprint" of Keeyask. Co-authors Asfia Gulrukh Kamal, Joseph Dipple, Steve Ducharme, and Leslie Dysart argue that "regulatory gaps and oversimplified narratives" fail to grasp the reality of the *interconnection* between the waterways in the region, and how changes to any given area of the river system ripple outwards towards others (79).

The Cumulative Effects Assessment (CEA) undertaken as part of the Environmental Impact Statement similarly employed a narrow scope. Authors Jill Blakley and Bram Noble explain that the CEA was meant to account for the impacts on the environment precipitated by a certain action in tandem with other actions (past, present, and future). The CEA concluded that the Keeyask Project would result in "no significant adverse cumulative effects" to the environment, despite acknowledging that the environment had already been significantly altered by previous hydroelectric development projects. Blakley and Noble cogently argue that the scope of the CEA eclipsed a rigorous and meaningful consideration of how hydroelectric development affects the environment. The authors soberly conclude with a quote which warns that such CEA processes may actually cause more damage than good (114). This submission, in tandem with several others in the anthology, provide important critiques of the various assessment and review procedures that allowed the dam to be built. They show how processes, put in place to purportedly ensure community input and assess the impacts of this hydroelectric development, often operate from

restrictive frameworks that then fail to account for the very evidence they claim to seek.

In a related example, the Keeyask Environmental Impact (EIS) Statement fell "into the trap of human-centric scales" when assessing the impact of Keeyask on the caribou population. Scholar James A. Schaefer notes that the EIS defined "habitat" as being the area where a population lives. However, this framing did not reflect the critical importance of expansive areas of undisturbed space required for caribou survival, specifically for calving and postcalving females (203). Without being able to account for the "vast spatial and temporal scales" that the caribou occupy, Schaefer explains that "we risk vastly underestimating the loss of caribou habitat due to Keeyask and other industrial developments" (203). Schaefer leaves us with this striking summons to accept the invitation of caribou to expand our temporal and spatial imaginaries: "To conserve this species, we must consider more than the short-term and the immediate: we must embrace whole landscapes and multiple decades. Caribou conservation entails a rethinking of scales—a reassessment of the duration and scope of our desires, plans, and actions...They are an invitation to a world view that is expansive, forward-looking, and hopeful" (205–206).

Schaefer, like other contributors in this book, also expresses deep skepticism about Manitoba Hydro's "mitigation" efforts, which are meant to offset the negative impacts of development. He writes, "Typical mitigation measures—like avoiding calving areas or minimizing blasting during the calving season—are too narrow in space or time to secure the conservation of this mobile animal" (205). Another example we learn of is the "Alternative Resource Use Program," which proposed to transport Indigenous harvesters to other areas in Manitoba that were unaffected by the development. However, contributors to this anthology note that this solution ignores the importance of specific sites for Indigenous people's

land knowledges, cosmologies, and identities, revealing the erroneous fantasy that some of what is lost in these floods can simply be replaced or

recreated elsewhere; as the Trapline 15 family states, “that would degrade who we are because we are about the relation to our land” (348).



*A young girl named Aalaiyah from the Split Lake community wears a hat with the word “Keeyask” on it. Elders grieve the fact that their grandchildren are unable to swim and play along the shoreline as they once did, due to flooding and pollution from hydro development. Image courtesy of Aaron Vincent Elkaim.*

## Speaking Another Record into Existence

Given the incisive, meticulous critiques of the shortcomings of the environmental review processes and mitigation strategies articulated in this collection, some readers may leave this book with deep sense of cynicism and despair concerning the story of Keeyask. And yet, Indigenous people engaged in the review process as a powerful site of articulation of their expertise, philosophies of being, and sense of accountability to past and future generations. They also engaged the process as a way of forging connections with non-Indigenous scholars and practitioners who shared their concerns about the project.

Indeed, in my own reading, one of the deeply impactful contributions of this anthology is the discussion of the Cree concept of *achimowinak*, “stories [seen as facts]/ personal narratives” (150). This concept is presented in a chapter which documents conversations between scholar Agnieszka Pawlowska-Mainville and Noah Massan, an Inninu Elder from Fox Lake Cree Nation. They note that such stories can challenge hegemonic metanarratives of progress propagated by Manitoba Hydro. The *achimowinak* assembled on these pages vividly speak another record into existence, one in which the destruction of the lands, waters, and ways of life cannot be rationalized or disappeared from memory, and other ways of being in the world are possible.

These *achimowinak* also serve as reminders of Indigenous connections to place that precede and exceed the extractive and invasive logics of settler colonial infrastructure development. Massan described his reaction to the “No access” signs put up by Manitoba Hydro around his territories: “This is my trapline...I am more authorized to be here than they are. I don’t need a visitor’s pass—they tell us to get a visitor’s pass now... This is *my* land” (160). Dr. Ramona Neckoway (Nisichawayasihk Cree Nation) grounds her testimony with a declaration of her need to speak on behalf of both her ancestors and descendants: “It is not only my right to voice my concern, it is my responsibility. It is my responsibility to my children and their children as well as to those who came before us...I want my children and their children to know that I did my part to save the land that my grandfather loved” (69, 73). In this sense, the anthology represents both a record of Indigenous people’s dissent to these projects and their insistence on maintaining philosophies and praxes of interconnection and responsibility to the lands, waters, animals, and their ancestors and descendants. These stories are powerful illuminations of expansive and relationship-based ways of knowing and being. This anthology compellingly illustrates that such philosophies and praxes of interconnection and accountability must animate decisions about the waterways upon which our lives and futures depend.

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## About the Author

Caroline Fidan Tyler Doenmez (Kurdish and English settler descent) was raised in the Monadnock region of New Hampshire. She is a cultural anthropologist and assistant professor in the Department of Anthropology at Michigan State University. Her dissertation, *Carrying Water: Indigenous Women Reclaiming Birthing Sovereignty along the Red River*, draws on ethnographic research conducted with Indigenous doulas and midwives in Manitoba and British Columbia. Her work emerges at the intersection of Indigenous Studies, cultural anthropology, reproductive justice, and the politics and poetics of water.

PERSPECTIVES

# REFLECTIONS ON

## *UPRIVER: A WATERSHED FILM*

By Chris O'Brien

As part of the longstanding Moos Family Speaker Series on Water Resources, Freshwater and the UMN College of Biological

Sciences presented a screening of *UPRIVER: A Watershed Film*, on December 5, 2023, at The Main Cinema in Minneapolis, Minnesota. The



*Poster for UPRIVER: A Watershed Film. Image courtesy of Freshwaters Illustrated.*

sold-out event featured a post-show panel discussion with Carrie Jennings (Research and Policy Director, Freshwater), Jacques Finlay (Professor of Ecology, Evolution and Behavior, University of Minnesota), John Whitehead (Filmmaker, Fretless Films), and Patrick Moore (Emerging Systems Consulting).

This hour-long documentary, produced by Freshwaters Illustrated and directed by Jeremy Monroe and David Herasimtschuk, is an inspiring look at the successful conservation efforts underway on Oregon's Willamette River system. *Freshwaters Illustrated* is a nonprofit organization based in Corvallis, Oregon, dedicated to raising awareness of freshwater biodiversity, ecosystems, and conservation.

Employing some impressive aerial and underwater footage, the filmmakers follow the Willamette from alpine tributaries, down through its agricultural floodplain, and finally to the streets of Portland. Along the way, we meet the agencies,

nonprofit organizations, farmers, and activists who are helping to restore watershed health in areas that have been impacted by forestry, agriculture and urbanization.

For example, many mountain streams had been degraded by erosion from historical logging. Public land managers even removed fallen trees, mistakenly considering them to be an impediment to fish passage when in fact the fallen timber provides essential habitat. In some Willamette River tributaries, large trees are lowered by helicopter to mimic natural processes that were previously interrupted by these public land managers. These trees create islands, gravel bars, and other instream habitat used by migrating chinook salmon and steelhead. Signs of success include reintroduction of native bull trout—a larger relative of Minnesota's brook trout—to these mountain streams.

Further downstream, farmers install grassed waterways, floodplain easements, and other targeted



*Salmon migrate from the Pacific Ocean through the Willamette River and its tributaries each fall to spawn, and healthy in-stream stream habitat is critical for sustainable populations of these sensitive cold-water fish. Image courtesy of Freshwaters Illustrated.*

conservation practices to prevent cropland runoff that has long polluted the Willamette. In the process, landowners are asserting a conservation ethic and sense of responsibility that gives hope to the difficult water challenges facing rural communities across the country.

Portland is the Willamette's last stop on the way to its confluence with the Columbia River. A wealth of green infrastructure and urban parkland helps to filter rainwater and protect the river in this urban setting. Recreation on the river is a big part of the city's culture, building a strong connection between the Willamette and the people of Portland.

The film was completed over a period of six years, allowing the filmmakers to track the success of various projects from inception through implementation. This is a meaningful way to tell these

stories, and it contributes to the film's positive, forward-looking message.

There are many parallels between conservation of the Willamette River system and similar efforts underway in the Mississippi, St. Croix, and Minnesota River watersheds, including the urgent need to engage private landowners. For example, the Fishers and Farmers Partnership connects landowners with educational resources and funding to improve soil health and water quality in the Upper Mississippi River basin. In the film, Joe Moll of the McKenzie River Trust explains, "Many of the fish and wildlife populations that we love depend on private lands and private habitats, and those landowners really hold the key to our conservation future."

The film acknowledges that watershed conservation takes decades, even generations, to



*Much of the Willamette River floodplain is devoted to agriculture, and private landowners are key to restoring and preserving the watershed. Image courtesy of Freshwaters Illustrated.*

fully realize. Consistent work and investment over time is vital to the long-term health of the ecosystem.

At Freshwater, a Minnesota-based nonprofit organization, our mission is to inspire and empower people to value and preserve water. We do this through research, education, and policy

efforts that help connect local communities with businesses, lawmakers, and governing agencies. We hope that UPRIVER inspires new thinking on watershed partnerships here in the Midwest—and how we might creatively share our conservation stories.

## Recommended Citation

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## About the Author

Chris O'Brien works on water communications and policy for Freshwater, a conservation nonprofit based in Saint Paul, Minnesota. Throughout his career, he has collaborated with a wide range of scientists and engineers to help tell the stories of their work. An avid fly fisherman, Chris serves on the board of Twin Cities Trout Unlimited where he advocates for clean, healthy streams in Minnesota and western Wisconsin.

PRIMARY SOURCES

# GHOST STREAMS AND REDLINING

By Jacob Napieralski

How ghost streams and redlining’s legacy lead to unfairness in flood risk, in Detroit and elsewhere

In 2021, metro Detroit was hit with a rainstorm so severe that President Joe Biden issued a major disaster declaration at state officials’ request.

Nearly 8 inches of rain fell within 24 hours, closing every major freeway and causing massive damage to homes and businesses. The storm was of a severity historically seen in Detroit every 500 to 1,000 years.

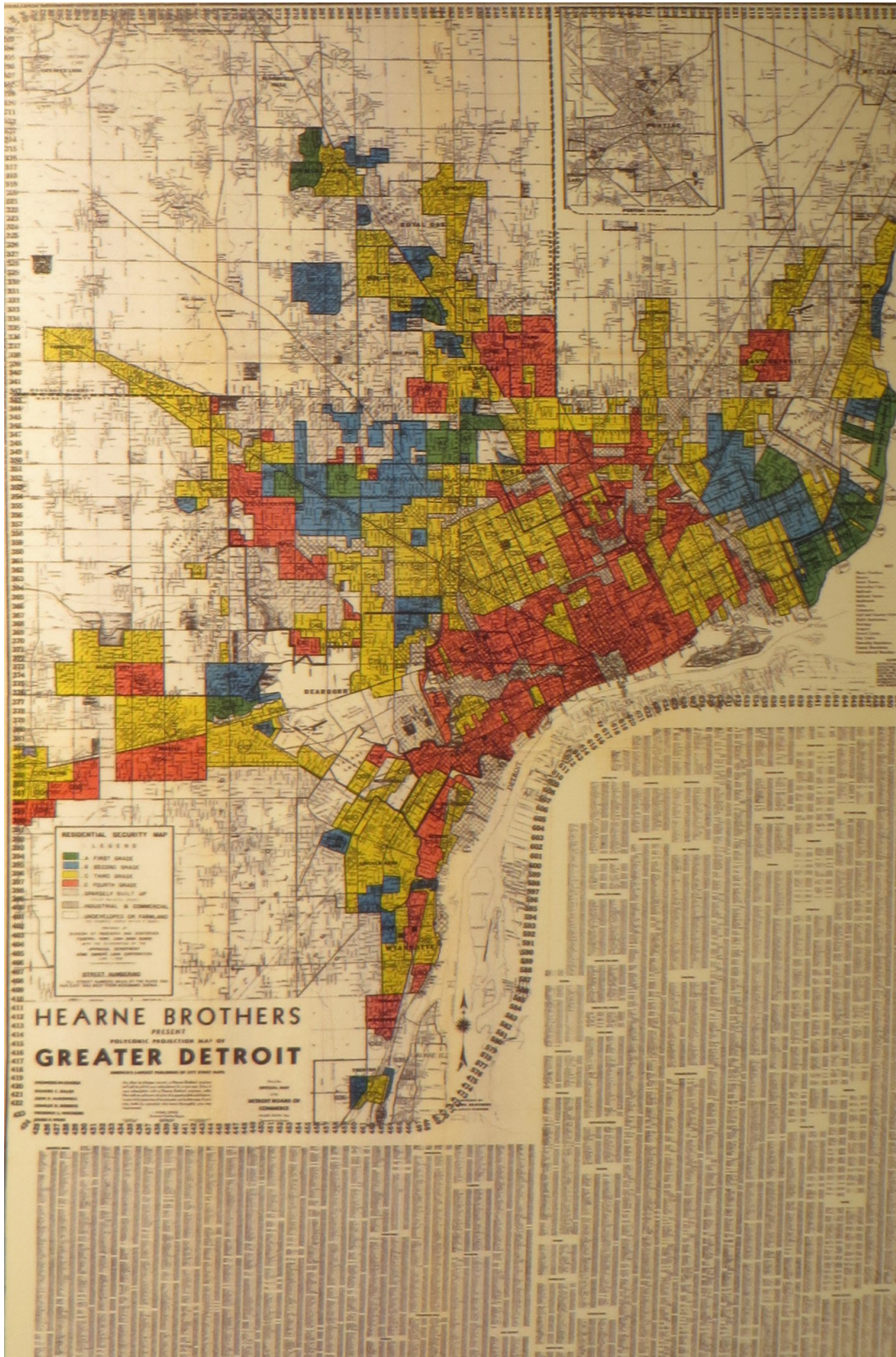
See the video: *Aerial footage of I-94 flooding on June 28, 2021.*

But over the past decade, the region has experienced several other storms only slightly less destructive, one in August 2023.

As the planet warms, severe rains – and the flooding that follows – may become even more intense and frequent in cities like Detroit that



*2014 flood in the Detroit metro area. Image via Flickr by Michigan State Police Emergency Management and Homeland Security Division. CC BY-ND 2.0 DEED*



*A 1939 Home Owners' Loan Corporation map of metropolitan Detroit shows formerly redlined areas that now experience disproportionate flooding.  
Image via Flickr by David Wilson. CC BY 2.0 DEED*

have aging and undersized stormwater infrastructure. These extreme events put enormous pressure on communities, but low-income urban neighborhoods tend to suffer the most

I am a geomorphologist at the University of Michigan-Dearborn specializing in urban environments, water, historical mapping and flood-risk equity.

## Historic decisions have an impact today

Ghost streams and wetlands are waterways that previously existed but, as urban areas built up, were either buried below the surface or filled in to support development. Detroit has removed more than 85% of the total length of streams that existed in 1905. Most major cities in the United States and Europe have removed similar numbers of streams.

Detroit is also a city deeply affected by redlining – a now-outlawed practice once used by the Home Owners' Loan Corporation, a government-sponsored corporation that was created as part of the New Deal, that graded neighborhoods on perceived financial risk.

People living in communities labeled as “high risk” were disproportionately people of color, immigrants and residents of lower socioeconomic status and were systematically denied loans and opportunities to build generational wealth.

These neighborhoods received fewer community investments, including interventions such as stormwater infrastructure and landscape modification, than did higher-wealth neighborhoods.

We looked at whether these decades-old decisions have had any impact on flood risk today and learned that they do.

For this study, we correlated present-day flood risk in metro Detroit with former Home Owner's Loan Corporation boundaries' grades. Flood risk was mapped using the First Street Foundation's

My recent research, conducted with graduate students Cat Sulich and Atreyi Guin, has identified a hidden contributor to flooding in older, low-income neighborhoods that have seen a lack of investment: ghost streams and wetlands.

Although we studied Detroit, our research has implications for cities across the United States.

Flood Factor, which scores every parcel in the U.S. on a scale of minimal (1) to extreme (10).

We then correlated flood risk to the presence of ghost streams and wetlands, which we extracted from old topographic maps from the United States Geological Survey. The goal was to determine whether a history of waterway burial and/or redlining influenced the overall flood risk of communities today.

We found that flood risk was disproportionately distributed, with historically redlined neighborhoods bearing the greatest brunt of flood risk.

Residents living in communities that were graded as “hazardous” (D) or “declining” (C) in the 1940s are today more susceptible to flood risk than the more affluent A and B communities. Over 95% of parcels classified at extreme flooding risk occur in C and D communities, with less than 4% in A and B communities.

Flood risk increases with the presence of ghost streams and wetlands, with C and D communities having a higher risk. In C communities, the presence of a ghost wetland increases flood risk tenfold, while ghost rivers also increase risk, although by a smaller amount.

The percent of properties in D-graded communities that are located adjacent to the 32-mile-long Detroit River and classified at extreme or severe flood risk is 99.9% if they have ghost wetlands or 95% if they have ghost rivers.



In other words, the combined history of redlining and landscape alteration may still contribute to increased flood risk today. When communities

received poor grades, banks, lenders and municipalities neglected those areas' stormwater infrastructure.

## Invest resources where the risk is greatest

If communities want to protect residents from flooding, it's crucial for them to map and understand their "hidden hydrology." Few cities have the data to inform residents that they are at greater flood risk because they are living on a ghost wetland or river.

In Detroit, residents of most of the neighborhoods that show a major to extreme flood risk are not required to purchase flood insurance because

they are not near an active river. This means residents are unknowingly at risk.

Another benefit to mapping ghost wetlands and rivers is that stormwater management is most effective if it follows natural pathways and processes.

Stormwater engineers frequently refer to this as "nature-based interventions" or "green stormwater infrastructure."



*An engineered bioswale is a way to slow and filter stormwater using natural plants and soil and helps reduce flooding. Image by The Guzzardo Partnership Inc. via Wikimedia Commons. CC BY-SA 4.0 DEED*

During a flood, water occupies the lowest areas of a landscape, such as an abandoned stream valley or filled wetland. Those low areas are a good place to build green stormwater infrastructure, such as rain gardens that absorb water or bioswales that convey moving water.

Some solutions can reflect culture or embrace art: Detroit's Charles H. Wright Museum of African American History installed permeable

pavers with a unique West African-inspired design to minimize and manage floodwater following major flooding in Detroit in 2014.

In my view, marginalized communities need to have a strong voice in the search for solutions. Discrimination against these communities helped create the current problem. Listening to them now is key to both minimizing flood damage and beginning to right a historical injustice.

*The author does not work for, consult, own shares in, or receive funding from any company or organization that would benefit from this article and has disclosed no relevant affiliations beyond their academic appointment.*

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Jacob Napieralski is a Professor of Geology at the University of Michigan - Dearborn. He is currently the Director of the Master of Science in Environmental Science and Director of the Environmental Interpretive Center. His expertise focuses on understanding the impact of past and future environmental change on people.

TEACHING AND PRACTICE

# CENTERING WATER: PRACTICES OF COMMITMENT

By Boyce Upholt, Katie Hart Potapoff, Michael Anderson,  
Britt Gangeness, Angie Hong, Coosa Riverkeeper,  
Greg Seitz, and Andy Erickson



*The Coosa River in Wetumpka, Alabama, after rain. This portion of the river is below the Jordan Dam. Image via Flickr by brian\_esquire. [CC BY-NC-SA 2.0 Deed](#).*

**W**ater is part of our everyday lives. We depend on clean water for health and sanitation, for livelihoods and recreation, for habitats, histories, and futures. Since water is so important to humans (and nonhumans) in myriad ways, how do we demonstrate our reciprocal commitment to water?

*Open Rivers* asked several readers and friends of the journal to offer their own personal practices that demonstrate their commitment to water. As the collection of responses shows, there is no single action that proves attachment to water; instead, the behaviors, patterns, and meanings are innumerable and varied.

Several of the contributors discuss practices that foreground a personal connection to water as a critical component for inspiring commitment. Practices that demonstrate gratitude, teach our children, or draw our often busy and distracted minds to water—its differences and changes—can inform daily, lifelong behaviors and relationships with water. Some responses focus on practices of sharing expertise, knowledge, concerns, and data about water systems with others. These practices demonstrate both how invisible the challenges and stresses to our water systems can be and also how valuable it can be to mobilize collaborative action.

These practices are as different as their authors, but they share one thing in common: they center our attention on water. Water, this substance that can be so easily taken for granted as it pours out of a tap or falls as rain on trees and grasses and vegetables, also needs and deserves our attention. While they reveal the commitments of individuals, the examples here collectively compel us as readers to consider our own actions, our own habits, and our own ways of centering water. What do you do to establish a relationship with this vital material? How do you practice your own commitment to water?

## Boyce Upholt

For me, a commitment to water requires knowing water—touching water. When I travel, especially for water-related stories, I try to find a moment to literally submerge myself in the local waterways.

## Dr. Katie Hart Potapoff

As an artist-researcher, a fundamental element of my practice is uncovering ways to “make-with” the places I research and the materials found within. Water is one material that remains ever-present in the landscapes traversed during my field research. Whether it has been seasoned by the sea, is fresh from a mountain stream, or has become acidic in a bog, water offers its unique perspective to the interpretation of a place.

When conducting place-based research activities, I document my bodily engagement through video and sound recordings, as well as gathering water found in situ to paint and draw while on site. I also bring small amounts of gathered water back to the studio to create with as a way to remain connected to those initial encounters. The differing chemical makeup of the gathered water can shift the qualities of watercolor pigments in these documentative artworks, and even some of the visible particles of matter will continue to cling to the surface.

These simple but effective methods offer the opportunity to enter into dialogue with an other-than-human element already present within the landscape. Imbued with its own agency, I find myself on a continuous journey learning to “make-with” water.

## Michael Anderson

Bathtime has become a special moment in my household. It starts when dinner finishes and our family of four piles into our close-quarters bathroom in south Minneapolis, Minnesota. Remnants of the day (and dinner) fly off as our two young kids settle into the bath. Usually, chaotic play ensues with splashing, laughing, and letting go. The water spills and sloshes all over while new memories form. At the center of it all is that sweet, sweet water. I sit back and watch, a silent witness to my kids' evolving relationships with water.

As bathtime comes to an end, we begin our small but meaningful ritual. We pull the drain plug,

and the water begins swirling down; we pause. What started with the adults is now led by our oldest. Her bright, 2.5-year-old voice pipes up while her younger brother watches, "Thank you, water. Thank you for cleaning our bodies. We love you, water." In those treasured moments, we reconnect, give thanks, and express love—all backdropped by our precious water.

## Britt Gangeness

I track rain, hail, and snow at my home through the Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS). I think of this practice as more than collecting data. As Robin Wall Kimmerer writes in *Braiding Sweetgrass* (2013), "Paying attention is a form of reciprocity with the



*Morning swim at Shreve's Bar. From the Atchafalaya Rivergator Expedition of 2015.  
Image courtesy of David Hanson.*

living world, receiving the gifts with open eyes and open heart” (213). This daily measurement is a practice that helps me notice and spend time with water. Despite recent dry years, Minnesota is getting warmer and wetter. The more I can see, feel, and touch this change the more I understand it and feel the joy, sorrow, and stress that water (or its absence) can bring.

## Angie Hong

The two most meaningful ways I commit to water are through my work as an environmental educator and through the native plantings I’ve nurtured at my home in Stillwater, Minnesota. I’ve been working as a water educator in the Twin Cities east metro and St. Croix River valley for nearly 20 years and am lucky to be surrounded by local government partners, nonprofit organizations, community groups, and citizens that are passionate about protecting the environment.

We’re constantly finding new ways to connect with people—at workshops, community events, at their farm, at their school, or even through online platforms—and it is inspiring and gratifying to see people learn and then take action. And it’s making a difference too! We’ve been able to take more than 20 lakes off the state’s impaired waters list in the past five years, and we’ve got a few more anticipated “de-listings” on the horizon.

At my home, I’ve also worked to transform our urban yard into a place that supports wildlife and clean water. I’ve replaced all of the lawn in the front yard with native plants and veggies, created two rain gardens in the backyard, and replaced our backyard turfgrass with low-mow fescue. I feel like it’s important to walk the talk, but I also want to have personal experience with native landscaping so I can better answer questions and share my own experience when I meet new people who are interested in planting native.



*Purple Prairie Clover in a rain garden. Image via Flickr by Erutuon. CC BY-SA 2.0*

## Coosa Riverkeeper

Coosa Riverkeeper believes everyone has the right to clean water. We work to answer simple questions like “Is it safe to swim?,” “Are the fish safe to eat?,” and “What can I do to make the Coosa healthier for my community?” to ensure the public is aware of issues that impact the river, recreation, public health, and property value. We serve over a million people in the Coosa River watershed who rely on the Coosa River for food, drinking water, livelihood, and fun! We utilize the power of The Clean Water Act to hold polluters accountable to their permit limitations and state and federal law by collecting our own data. We are grounded in science and policy to ensure everyone has the right to know what’s going on in the Coosa River basin. We do this through patrolling the waterways, advocating for our communities and their right to use our waterways, and educating the public through campaigns, town hall meetings, free fishing clinics, signage, and so much more!

## Greg Seitz

I write about the St. Croix River and its watershed, from conservation and stewardship to history and humanity. I try to maintain a high level of curiosity and wonder, listen long and hard, and research carefully to share accurate and accessible information. I focus on solutions

to problems as a means of educating about the threats themselves, and I try to connect with anyone who cares about the river, no matter their political, cultural, economic, or other differences. This has been rewarded with more than 4,000 email subscribers and hundreds of financial supporters.

## Andy Erickson

Every sixth grader learns about the water cycle (or should): rain falls from the clouds, seeps into the soil and into groundwater. Snow melts and flows into rivers, lakes, oceans. Water evaporates or transpires. Less known are the often invisible and highly technical water treatment cycles that have emerged in response to our urbanized and industrialized way of life.

I study how to mitigate the impacts of urban stormwater on our water bodies and our groundwater. My goal is to research new and better technologies to move water cleanly through constructed environments, especially in light of increasingly severe flooding and high levels of environmental pollutants. I am also passionate about educating and supporting stormwater management practitioners in Minnesota. Their jobs aren’t glamorous, but everyone who swims in or sips water is enjoying the beauty of their profoundly important work.

## References

Kimmerer, Robin Wall. 2013. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Minneapolis: Milkweed Editions.

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## About the Authors

Boyce Upholt is a freelance journalist based in New Orleans. He is the author of *The Great River: The Making and Unmaking of the Mississippi*.

Dr Katie Hart Potapoff (she/her), a fourth-generation Canadian-born settler, is an artist-researcher based in Scotland. Katie's practice considers the reflexive and attentive perspectives that emerge when elements of poetry, visual art, and theoretical writing are interwoven with place-based responses. <https://linktr.ee/katiehartpotapoff>

Michael Anderson says "The Mississippi River is my home and the source for this bathtime ritual story, as our water comes from it. Fifteen years ago, the River saved my life, and now I return the favor by connecting hearts, minds, and hands in care and action for the River."

Britt Gangeness is an environmental educator at the Minnesota Pollution Control Agency.

Angie Hong is the coordinator for Minnesota's East Metro Water Resource Education Program and shares nature-based adventures, environmental education, and conservation inspiration on TikTok and Instagram at @mnnature\_awesome. Angie lives in Stillwater with husband Gary, son Charlie, dog Molly, and cats Teddy, Twilight, and Clover.

Coosa Riverkeeper began in 2010 after the Coosa River was named the 10th Most Endangered River in the US after the Coosa River witnessed the greatest modern mass extinction in the 20th century from the damming of the river. Coosa Riverkeeper works to protect, restore, and promote the Coosa River and its tributaries in Alabama.

Greg Seitz is the founder of St. Croix 360, an online publication dedicated to the St. Croix River and its watershed. He is a writer and river bum dedicated to connecting people and the river. In addition to publishing new stories every week on St. Croix 360, Greg also does freelance writing for other organizations and publications. Greg grew up in Stillwater, MN and today lives in May Township with his wife, Kate, two children, and a dog.

Dr. Andy Erickson is a researcher, engineer, and public speaker at the University of Minnesota's St. Anthony Falls Laboratory where he studies water quality in urban and agricultural watersheds, develops stormwater assessment and maintenance best practices, and designs innovative stormwater treatment technologies. Dr. Erickson hosts the popular Minnesota Stormwater Seminar Series and serves on numerous committees and boards, all of which share a commitment to water research and conservation. Dr. Erickson is the author of numerous scientific publications as well as "Optimizing Stormwater Treatment Practices: A Handbook of Assessment and Maintenance."