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OPEN RIVERS : RETHINKING WATER, PLACE & COMMUNITY

GREAT LAKES, PERIL & PROMISE

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An interdisciplinary journal of public scholarship rethinking water, place & community from multiple perspectives within and beyond the academy.

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The cover image is courtesy of Owen Holroyd.

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INTRODUCTION

INTRODUCTION TO ISSUE 29 GREAT LAKES, PERIL & PROMISE

By Laurie Moberg, Editor, and Joanne Richardson

Dear Reader,

As a river flows, it carries things with it: sediment, debris, but also history and memory. It transforms the landscape around it even as the landscape reciprocally shapes the river. Over the past decade, *Open Rivers: Rethinking Water, Place & Community* has sought to do the same—carrying stories and providing a space where ideas can flow, connect, and transform.

After ten years of publication, growth, and learning alongside our community, *Open Rivers: Rethinking Water, Place & Community* will conclude its work as a journal. This is both a bittersweet and proud moment for all who have been part of this journey.

Since its first issue, *Open Rivers* has served as a gathering place for conversation across disciplines, communities, and watersheds. The journal has published the work of scholars, students, artists, and community partners—from along the Mississippi River and across the world—who have deepened our shared understanding of water, place, and environmental justice.

Lake Superior at sunset. The Duluth Aerial Lift Bridge is just visible. Image courtesy of Owen Holroyd.

We are especially proud of the ways *Open Rivers* served as a gathering place for graduate students. Through editorial internships, the graduate student committee, and ongoing mentorship, the journal became a platform where emerging scholars could learn the craft of publishing, practice public scholarship, and connect their academic work to the needs and voices of broader communities.

The success of *Open Rivers* has also been rooted in its collaborative spirit—in the thoughtful guidance of our editorial board, the energy of scholars and university-based contributors, and the engagement of community partners. All these collaborators shared their expertise, experience, research, and practices to help shape the journal's vision. Together, we built a publication that bridged campus and community, scholarship and story, river and reader.

The work continues in this, our final issue, which explores the perils and the promise of the Great Lakes. In this issue, you will find a team of authors in Duluth, Minnesota, discussing the lasting impact of the sinking of the *SS Edmund Fitzgerald*, not only on themselves and their families but also on the lake itself, which is changing under the growing pressures of climate change. Our second feature discusses the intersection of law and lake on behalf of Lake Erie, and how this affects not only the rights and responsibilities of the people, but also the rights of the lake itself. We also include two columns that discuss the contrast between the Great Lakes as sites of refuge in a changing climate, and how that exact change imperils the lakes themselves and the people who rely on them. Finally, we republish an *Open Rivers* piece from 2019 that centers Lake Mille Lacs and its role as Minnesota's other great lake, particularly with respect to the Indigenous communities who have lived on its shores for thousands of years. By focusing on lakes—specifically the Great Lakes—in this final issue, we bring *Open Rivers* to a natural terminus, where the currents of this project empty into a larger body of shared knowledge, memory, and responsibility.

As we sunset, we do so with deep gratitude. We are grateful to our partners at the University of Minnesota— the Institute for Advanced Study and UMN Libraries Publishing Services—as well as to the many individuals who staffed the journal in various capacities: Joanne, Pat, Phyllis, Nenette, Laurie, and our graduate students.

The complete archive of *Open Rivers* will remain publicly available, preserving the knowledge, creativity, and care that have defined this project and helped it evolve into more than a journal: a community, a practice, and a place for exchanging ideas. We hope these pages inspire reflection and action for years to come.

To all who have contributed their ideas, time, and passion to this endeavor: thank you. *Open Rivers* has always been a collective project, and its legacy continues to flow through the communities it has helped connect.

Warmly,
Laurie Moberg, Editor
Joanne Richardson, Production Manager

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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 PhD 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.

Joanne Richardson is the production manager 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 has a background in landscape architecture, geology, and computer science.

FEATURE

OUR CHANGING RELATIONSHIP TO LAKE SUPERIOR, 1975-2025

By David Beard, Catherine O'Reilly, Joseph M. Lane, Jennifer E. Moore, Timothy Broman, Chance Lasher, Robert Dewitt Adams, Luke Moravec, Moira Villiard, Anastasia Bamford, Nan Montgomery, Sheila Packa, Krista Sue-Lo Twu, and Jennifer Brady

This *Open Rivers* feature is occasioned by the fiftieth anniversary of the sinking of the SS Edmund Fitzgerald.

The *Fitzgerald* was a ship moving taconite (iron ore) across the Great Lakes between Silver Bay, Minnesota, and steel mills near Detroit and

The SS Edmund Fitzgerald. Image by the United States Army Corps of Engineers.

Toledo. On November 9, 1975, the *Fitzgerald* was scheduled to transport taconite from Superior, Wisconsin, to Zug Island near Detroit. The ship never made it; the *Edmund Fitzgerald* was lost in a storm with no survivors—her entire crew of 29 men. She sank in Lake Superior on November 10, 1975, 17 miles north-northwest of Whitefish Point, Michigan. The story is interpreted today at the Great Lakes Shipwreck Museum, near Whitefish Point.

There is still international interest in the tragedy. Gordon Lightfoot inspired popular curiosity with his 1976 ballad, "The Wreck of the *Edmund Fitzgerald*." The song made the tragedy visible to many. But more poignantly, today, towns around Lake Superior get together on the anniversary of the shipwreck. Duluth hosts an annual "Gales of November" conference that commemorates the *Fitzgerald* and uses the history of the shipwreck to fuel interest in the Great Lakes. The Minnesota Historical Society operates Split Rock Lighthouse, which rings its bell in honor of the lost every November. We carry the *Fitzgerald* in our imagination and in our relationship with the lake.

The anniversary of the shipwreck is an opportunity to think more broadly about our relationship with Lake Superior. Of course, the lake has long filled our regional imagination. The Great Lakes Shipwreck Museum is across the Upper Peninsula from the Museum of Ojibwe Culture in St. Ignace, Michigan. The Museum of Ojibwe Culture celebrates the long history of the Ojibwe people on the lake; it is also the final resting place of Pere Jacques Marquette, one of the Jesuit explorers who traveled through the Great Lakes region. In the Twin Ports—Duluth, Minnesota, and Superior, Wisconsin—community members honor Ojibwe traditions at sites such as the Chief Buffalo murals along the Duluth Lakewalk, and the region's Jesuit influences at Montreal Pier, Quebec Pier, and Allouez Bay. We recall the influence of French Jesuits and fur traders across the region—as well as the deep connections between Indigenous communities and Lake Superior's shores.

By the early twentieth century, Montreal Pier and Quebec Pier were sites of commerce. The city of Superior was in competition with Minneapolis as the center of wheat and grain production, and several major companies built grain elevators and mills on the piers (Lake Superior Mills, Anchor, Listman, Cargill, and Belt Line). On the Duluth side, in addition to grain elevators, companies expanded infrastructure to support local iron mines. Today, the ports also transport the gargantuan blades of wind turbines for use in the Great Plains. In the period before federal environmental regulations, heavy industrial commerce caused environmental degradation in and around Lake Superior. Minnesotans imagined the lake to be a giant waste diluter at least until the 1950s, when the U.S. Army and the multinational corporation Honeywell dumped 1400 barrels of munitions waste into the lake. Honestly, in a way, many Minnesotans still viewed Lake Superior this way in the 1970s, if you consider how the lakefront in Duluth was used as a scrapyard. In the 1980s, the city repurposed the scrapyard for tourism in an area called Canal Park.

A lot has changed since the 1970s.

This collection of poetry, essays, and art documents changes in our relationship with Lake Superior in the fifty years since the sinking of the *Edmund Fitzgerald*. The collection is divided into two parts.

In the first section, each contributor examines their changing relationship with Lake Superior. Catherine O'Reilly, Joe Lane, and Jennifer Moore approach the concept of change from their requisite disciplinary frames: ecology, geography, and media history. Memoirs by community members Tim Broman and Chance Lasher chronicle their youth, foregrounding memories of their fathers who lived and worked on Lake Superior. Broman's father, for example, was the captain of a boat operated by the same company that operated the *Fitzgerald*. Lasher's father was an independent diesel mechanic who

serviced many boats in the region. These personal histories, together with the section's scholarly perspectives illuminate how our connection to Lake Superior has shifted in the last fifty years.

In the second section, we look at art shaped by Lake Superior. Artist Rob Adams recounts how his art installations representing shipwrecks on the Great Lakes helped him reconnect with his father. Media personality and author Luke Moravec reflects on his personal history of diving in the lake and how these frigid plunges helped him build resiliency. Anastasia Bamford and Nan Montgomery together present art and poetry in dialogue, where the lake forms a horizon to human relationships. And, finally, we share an excerpt from a longer poem by former Duluth poet laureate Sheila Packa. "Surface Displacements," extracted from the book by the same name, oscillates between a geologic perspective of Minnesota and an individual poet's personal experiences of Lake Superior. The excerpt concludes where Packa begins to describe the rivers that run through our region. We include a link to the rest of the poem as part of a multimedia artwork created by Kathy McTavish,

Hockey on a frozen lake. 'Untitled' by Krista Sue-Lo Twu.

using digital sound and animation to bring Packa's poem to life. Packa's work is a reminder that the brief time of our consciousness and the vast time of geology, especially of the lake and its watershed, are intertwined.

This section of *Open Rivers* concludes with words from Jennifer Brady about the ways that the *Edmund Fitzgerald* continues to resonate today. Throughout the section, art by Krista Sue-Lo Twu, as well as art and photography from contributing poets and authors, brings our conversations to life.

In the spirit of *Open Rivers*, we appreciate the ways members of our diverse community have contributed to this work. Together, we have assembled a picture of our relationship with Lake Superior. *Open Rivers* brings together voices and perspectives of academics, community members, artists, and advocates who are united by a shared concern for our water futures. In this collection, an ecologist, a geographer, a broadcaster, a journalism professor, and several artists, poets, and memoirists—each shaped by the lake—come together to create the fullest articulation of our relationship to this body of water. If this is to be the last issue of *Open Rivers*, we hope we have lived up to the potential the journal set for us all in shaping the future of our relationship to our waters.

— David Beard

Part One: A Concept of Change From Disciplinary Frames

Then and now: Lake Superior in the time of the *Edmund Fitzgerald*

by Catherine O'Reilly

When the *Edmund Fitzgerald* sank in 1975, Lake Superior was slightly different from today. On one hand, it remains a large lake, holding approximately 10 percent of Earth's liquid surface freshwater, and an important natural resource. But the lake has changed—for both better and worse—in the fifty years since that stormy November night.

There has been an increase in the frequency, intensity, and unpredictability of storms on Lake Superior, especially in the fall and winter. Stronger storms bring higher wind speeds, larger waves, and more extreme precipitation events. One of the most striking trends is the rise in the average and peak wind speed over the lake. Average wind speeds on Lake Superior have increased by 5 percent each decade since the mid-1970s, with peak gusts during fall storms increasing by as much as 20–25 percent. These winds generate larger waves—some exceeding 25 feet during major storm events.[1]

In the late 2010s, when water levels in Lake Superior were particularly high, stronger storms led to the rapid transformation of coastlines. Storm events have eroded beaches, overwhelmed outdated seawalls, flooded waterfront communities, and damaged harbors and piers. For example, along Minnesota's North Shore, powerful storms in 2017 and 2021 tore away segments of walking trails and sections of scenic highways. Several popular beaches on Wisconsin's Apostle Islands have disappeared due to erosion over the past decade, with some areas losing over 30 feet of shoreline in a single season.

Precipitation over Lake Superior has increased by roughly 20 percent over the past fifty years. Extreme storms are also becoming more frequent, delivering more water in shorter periods. Heavy rainfall intensifies surface runoff, overwhelms stormwater infrastructure, and increases water pollution. In 2012 and 2018, Duluth experienced two "500-year" floods, which caused landslides, destroyed culverts, and heavily damaged roads and riverside infrastructure. These storm and precipitation trends not only reshape the lake's coastlines but they also affect fish spawning grounds and water quality.

This growing vulnerability of shoreline infrastructure has prompted significant investment in resilience planning. Today, communities are adapting by mapping erosion hotspots, funding shoreline stabilization and green infrastructure projects, and updating stormwater management plans to prepare for more frequent climate extremes. Policy consultants and city officials in Duluth, for example, have put forward the Duluth Climate Action Work Plan.

The R/V Blue Heron is the research vessel of the Large Lakes Observatory on Lake Superior. 'Blue Heron' by Krista Sue-Lo Twu.

Shifts in Fish Communities

The introduction of new species in the lake has continued. In 1975, researchers recorded about 40 non-native aquatic species in Lake Superior.[2] Non-native species such as rainbow smelt were dominant and outcompeted the lake's native ciscoes, further altering predator-prey dynamics.[3] At the time, ships could still freely exchange water in their ballast systems with water from the Great Lakes as needed. This was the source of most of the non-native species in the lakes, a pattern that continued into the 1990s and 2000s until ballast water regulations substantially reduced the rate of introductions.[4] Today, there are many more new species compared to when the *Edmund Fitzgerald* sailed on Lake Superior fifty years ago.[5]

Native fish populations on the lake have revived. While sturgeon were rare in 1975, today these fish are slowly returning to spawning tributaries. Populations remain small and highly vulnerable, but in places like the St. Louis River Estuary, sightings are becoming more frequent—and some fish now exceed 100 pounds.[6] Cisco numbers have rebounded in parts of the lake, particularly in the western regions, benefiting from targeted population restoration, habitat protection, and the reduction of rainbow smelt populations. While the Great Lakes Fishery Commission declared shortnose cisco extinct in Lakes Michigan, Huron, and Ontario in 1980s, the fish were observed in Lake Superior in 2022—where they previously did not exist.[7]

Change in Winter Climate

One of the biggest environmental changes is the decline of winter ice coverage over Lake Superior. In the winter of 1975–1976, ice extended over 75 percent of the surface of the lake, which was considered normal at the time.[8] Average ice cover on Lake Superior has decreased by more than half since the 1970s, with some years seeing virtually ice-free conditions. The most recent winter ice coverage (2024-2025), for example, maxed out at 45 percent.[9] The shorter ice season causes the lake to heat up more quickly in the summer, and these warmer water temperatures, in turn, prolong the time it takes for the lake to cool enough to freeze in the winter.

Although less ice coverage has extended the shipping season for several weeks compared to the 1970s, it is unclear if the potential economic benefits will offset the long-term ecological consequences. There are also other less quantifiable impacts. Ice cover affects how exposed shorelines are to wave action and winter storms, and reduced ice coverage accelerates erosion and threatens coastal habitats. Warmer water temperatures also affect water quality and fish habitats, particularly for cold-water species like lake trout and whitefish, which rely on cooler, oxygen-rich waters.

Water Quality and Ecological Changes

In the mid-1970s, water quality around the lakeshore was poor. Pollution linked to heavy industry, sewage discharge, and mercury contamination impacted nearshore waters, especially near industrial ports like Duluth-Superior and Thunder Bay. Fish consumption advisories for toxic contaminants like mercury and polychlorinated biphenyls (PCBs) had just been issued in the early 1970s.

Water quality concerns helped drive binational cooperation with Canada through the Great Lakes Water Quality Agreement (1972), followed by the passage of the U.S. Clean Water Act (1972). This led to significant improvements in wastewater treatment and point-source pollution controls along with the creation of "Areas of Concern." Today, many historically polluted harbors have been cleaned up, industrial discharge curtailed, and "Areas of Concern" have shown measurable improvements in sediment loads, fish and wildlife health, and opportunities for recreational use. [10] Our desire to protect the Great Lakes extends to new efforts that would reduce the loading of sediment and nutrients in smaller tributaries, improving trout habitat and nearshore water quality.

Today, new water quality challenges have emerged. In the 1970s, plastic bags were not yet widely found in grocery stores and were only beginning to be used in large retail stores like J.C. Penney and Sears. The crew of the *Edmund Fitzgerald* never got to experience fleece fabrics, which were developed in the late 1970s. Today, even the middle of Lake Superior contains microplastics derived from sources like degraded plastic bags and fleece. Periodic algal blooms have developed in shallow bays like Chequamegon Bay and St. Louis Bay. These blooms often contain cyanobacteria, including some microorganisms that have the capacity to produce toxins that are harmful to animals and humans. Fish advisories still exist, including for new contaminants such as "forever chemicals" like PFAS (per- and polyfluoroalkyl substances), highlighting the enduring legacy of chemical pollutants in waterways.

Would the *SS Edmund Fitzgerald* recognize the lake? Probably, but it would know that things are different now.

Beacons of Understanding: Maritime Heritage and the Power of Informal and Place-Based Learning

by Joseph M. Lane

Learning often extends far beyond the walls of the traditional classroom setting, as it is driven by an individual's curiosity, personal experience, and desire to understand the world from a firsthand perspective. This is the foundation of informal learning, which Jeffs and Smith (2011) describe as taking place outside the boundaries of formal schooling and within the lived contexts of everyday life. Place-based learning, as defined by Yemini, Engel, and Ben (2025), emphasizes the relationship between learning and the physical environments where humans live and work. Place-based learning draws on the meanings, memories, and personal experiences embedded in those places. Informal and place-based learning complement one another. Taken together, they form a tightly connected set of practices that ground meaningful learning. For many people, including myself, the combination of these types of learning matter, because they are anchored in the places we move through, the people we connect with, and the contexts that surround us (Dierking et al. 2003).

Background

Maritime heritage, on the North American Great Lakes, has held my imagination for as long as I can remember. Growing up near Lake Michigan, I learned a little about the *Edmund Fitzgerald* along with general facts about Great Lakes shipping, but I wanted to know more. In the late 1990s, when the internet became more readily accessible, one of the first things I researched was ships on the Great Lakes. None of my friends could understand why.

Before I knew it, I was hooked. I went to the library; I found old magazines describing what life was like onboard. I read articles explaining weather and climate. I dove deep into learning about ice coverage and the impact it has on the lakes throughout the year. I even met a couple of old sailors who spent time detailing their personal experiences with me. And, of course, I scoured the internet. As time went on, I learned more than just routine facts about the *Big Fitz*. I gained a more comprehensive understanding of the complexities that define this tragedy.

Consequently, the more I learned about the broader world of Great Lakes shipping, the more I appreciated the essential role of the lighthouses that served these vessels. For generations, lighthouses along the Great Lakes were dependable aspects of maritime navigational technology, helping mariners find safe passage through unpredictable waters. These remote and weathered structures hold countless stories of the region's maritime past. Today, many of these sites are being reimagined, shifting from navigational beacons to sites of informal, place-based learning that connect visitors to the lakes in new and meaningful ways. In contemporary society, Great Lakes lighthouses offer a chance to think differently about where, when and how learning happens. These structures invite people to step out of the classroom and learn directly from the landscape and explore history, ecology, and culture. Lighthouses and their surrounding landscapes create a rarely identified opportunity for hands-on, place-based learning that is rooted in historical and scientific understanding through community and lived experience (Lane & Stoltman 2016).

St. Helena Island, Michigan: Informal and Place-Based Learning

The evolving role of lighthouses as spaces for informal learning becomes especially clear at the St. Helena Island lighthouse. This place—two miles south of Michigan's Upper Peninsula on the remote Lake Michigan side of the Straits of Mackinac—feels far away from any classroom. What began as a nineteenth-century navigational outpost has grown into a place where history, stewardship, and hands-on experience intersect in meaningful ways. Maintained by the Great Lakes Lighthouse Keepers Association (GLLKA), this 1873 lighthouse has hosted summer education programs for more than twenty years, offering students, scouts, educators, and volunteers a rare opportunity to learn directly from the landscape through immersion. Blending social issues, historical interpretation, and scientific instruction, St. Helena Island offers a model for informal education that is meaningful, interdisciplinary, and deeply rooted in the water-rich landscapes of the Great Lakes region.

On a warm July evening, a group of visitors hauled buckets of water from a nearby well into the summer kitchen at the lighthouse on St. Helena Island. These visitors came to this island with more than a tourist mindset; they came to reenact the duties of a nineteenth-century island

lighthouse keeper on the Great Lakes. Guests are quite literally keeping this old lighthouse alive, and for those who've volunteered here, it may be one of the most memorable classrooms they have ever experienced. The work that volunteers complete is physical, but it also holds a strong historical significance. Visitors' time on the island varies from hours to weeks, during which they are exposed to the many types of projects that are needed to keep the lighthouse functioning. From building latrines to painting the tower to cooking stew to feed the crew, today's volunteer lighthouse keepers get a hands-on experience of the lives of those who once kept these lights burning. While the lighthouse utilizes some modern conveniences, the physical nature of the work helps visitors get in the mindset that they are there to learn from experience. By the time they leave, many feel they have gotten a small peek into what it might have been like to operate a lighthouse 150 years ago.

Among the many stories preserved at St. Helena is the often-overlooked role that women played as lighthouse keepers during the era when the station actively aided navigation. Women were officially classified as "assistants," and a woman could only assume the position of keeper if her husband died. As head keepers, women balanced domestic responsibilities with the physically demanding work of lighthouse maintenance. In many cases, women's labor was essential for tending lamps, hauling oil, keeping ship logs, and performing essential maintenance. Today, these women's stories prompt discussions about technology, labor, gender, and how history is remembered.

In addition to its rich lighthouse history, St. Helena Island has become a living laboratory where visitors explore science topics such as climate variability, biodiversity, sustainability, and the physical forces that shape the Great Lakes. On St. Helena, these ideas come to life. Visitors learn by being immersed in the environment, by working, observing, and moving through a landscape that has been shaped by the same forces that surround them.

Learning in Unique Place-Based Settings

The St. Helena Island lighthouse shows how informal learning can genuinely add to what happens in a traditional classroom. It offers a place-based experience where science, history, and community engagement come together in ways that are grounded in reality. The site includes stories that are often overlooked and lets visitors step directly into the work and daily rhythms of island lighthouse life. This is a place where visitors can be a part of the landscape that shapes Great Lakes navigation, the weather patterns that lead to shipwrecks, and the infrastructure that has kept shipping moving for generations.

For many visitors, being here makes the material "sink in" in a way that lectures or reading material rarely do. Visitors typically arrive with a genuine interest in the operation of the St. Helena Island lighthouse. In that sense, the lighthouse is more than just a historic landmark, it has become a place where curiosity grows and conceptual understanding develops.

How Would Today's News Media Tell the *Fitzgerald* Story?

by Jennifer E. Moore

Before I took the ferry to Wisconsin's Madeline Island this past June for a weekend camping trip, I stopped into the Bayfield Maritime Museum to see what was new since my last visit. The volunteer docent spotted the University of Minnesota Duluth (UMD) sweatshirt I was wearing and struck up a conversation. He graduated in the 1970s and shared his fond memories of Duluth and his time on the shores of Lake Superior with me. While covering the highlights of the museum's collection, he pointed me in the direction of the *Edmund Fitzgerald* installation. "Have you ever seen taconite?" he asked. "Yes, of course. Remember, I live in Duluth," I replied with a smile. He told me he saw the *Fitzgerald* several times moving in and out of the harbor while attending UMD. I pressed a bit further about his memories of the *Fitzgerald*. I was particularly curious about what he remembered about the newspaper and broadcast reports from when the ship sank. He admitted he didn't recall much about the news coverage, but he remembered when Gordon Lightfoot's "The Wreck of the *Edmund Fitzgerald*" hit the airwaves less than a year later. "That's when people really started talking about it," he said enthusiastically.

The volunteer's vague recollection of news reports about the *Fitzgerald* tragedy—and their vivid memory of Lightfoot's ballad—reveals something about the mid-1970s media environment. For those of us who live along the shores of Lake Superior, the *Fitzgerald's* tragic story still resonates. The massive iron ore carrier passed through our waters, with its last trip departing from the Superior, Wisconsin, ship canal. While the *Fitzgerald* vanished hundreds of miles down the shoreline, one can't help but think about the Lakers (shipping vessels that primarily travel the Great Lakes) gliding through the shipping canal today. It invites a haunting sense of scale that illustrates how the storm quickly overwhelmed the massive vessel, giving the crew no time to call for help.

As we approach the 50th anniversary of her tragic sinking, the story continues to carry special meaning for many of us who live and work in the Twin Ports. We still watch massive ore carriers come and go from both the Duluth and Superior ports throughout the shipping season. Had the *Fitzgerald* survived, there is a good chance she'd still be hauling taconite across the Great Lakes. After all, her companion on the night she broke into two and plunged to the bottom of Lake Superior, the *Arthur M. Anderson*, is still operating on the Great Lakes today.

In reading past anniversary remembrances and news coverage, I've found myself wondering what reporting would look like if the *Fitzgerald* were to vanish under similar circumstances today. With advancements in real-time geolocation tracking and mobile livestreaming, nearly anyone can document a historic event as it unfolds, creating a staggering volume and variety of content. News organizations that once acted as the primary gatekeepers of information have seen their roles diminish as they contend with countless unofficial sources—competition unthinkable in 1975. While some social media platforms push out news from official news outlets, they also act as echo chambers that amplify speculation over verifiable facts. The mysterious *algorithm* that shapes what we see online today would inevitably compete with journalists' efforts to verify facts and report the truth.

Today, breaking news of the *Fitzgerald's* disappearance would not come from a professional journalist working for a wire service as it did in 1975. Families with maritime connections and industry workers might be among the first to take to Facebook to share what they know and speculate on what happened. Citizen drone pilots would try to get their aircrafts as close to the wreckage as possible, providing the world with images that would have previously originated from official maritime sources, or professional news media. YouTube, TikTok or X (formerly Twitter) would serve up this early amateur video before traditional news outlets would be able to confirm what was happening from official sources. Hashtags about the ship sinking might trend before any official press conference was held.

As in 1975, we'd expect stories drawing parallels between the *Fitzgerald's* fate and previous shipwrecks on the Great Lakes in the modern era. But, unlike the mid-1970s, this follow-up coverage would unfold at a dizzying pace across many media platforms. Today, we have an ever-expanding array of news media through which we can seek out around-the-clock updates. Perhaps we'd see explainer pieces on maritime safety, interactive maps embedded with weather data, or other multimedia packages from local and national news outlets.

News organizations would race to humanize the crew, mining social media accounts to help reconstruct the lives of the missing. Reporters would search Facebook and Instagram for photos, birthdays, recent posts, and personal milestones, and LinkedIn for insights into their career histories. They would also use social media to locate and contact friends and family members who had shared tributes online. A single tweet or photo caption might become the emotional hook to frame broadcast and digital media reporting. Producers would scramble to locate family and friends for interviews, capturing raw grief within hours of confirmation of an accident.

I can imagine podcasts, radio's digital-age successor, playing a prominent role in storytelling. In today's media ecosystem, podcasters contribute to both credible reporting and fringe speculation. Established investigative units would produce compelling deep-dive series that would examine every detail leading up to the wreck, as well as the aftermath of the tragedy. At the same time, less reputable voices might exploit the format to spread harmful narratives and misinformation.

Roughly two and a half years passed before the Coast Guard published the results of its official investigation of the *Fitzgerald* disaster. The final report identified defective hatch covers and cargo hold flooding as the likely cause of the Laker's demise. Today, could the public tolerate waiting that long? People running Reddit feeds would attempt to dissect the evidence in real time. Some of it might be insightful. It's easy to imagine that much of it would be wrong. Long-form investigative work takes time, but public pressure would demand answers fast, especially if early reporting could not explain why no distress signal was sent or how such a massive vessel could vanish without a trace.

Lake Superior and the storm it fueled was framed as a killer in 1975 reporting. But in 2025, what would the dominant narrative be? Would the story still portray the lake as a monstrous force, or might it evolve into something else? Today, human-caused climate change would almost certainly become the central news frame. With storms on the Great Lakes growing more intense and unpredictable, the sinking would be interpreted not as an isolated tragedy, but as part of a broader pattern linked to global warming. Additionally, with Indigenous perspectives becoming more visible in public discourse around water sovereignty and climate justice, the idea of being "water protectors" might push this environmental narrative further. These perspectives encourage greater reflection on the consequences of our own actions rather than the fury of the lake. In our age, the *Fitzgerald*'s

demise would be less about the uncontrollable forces of nature and more about how human decisions, policies, and inaction set the stage for disaster.

It's also hard to ignore a significant cultural moment that likely influenced reporting in 1975: the release of the movie *Jaws*. That film famously sparked widespread anxiety about shark attacks and the unseen dangers that lurk beneath the water's surface. It's a fear that permeates today, even jokingly on tourist t-shirts that Lake Superior is "shark-free." Today, concerns embedded in modern reporting about the tragedy might include the real fear that politicians are ignoring climate change. News reports might also discuss the influence of the superhero films that help shape how we perceive power struggles between the so-called "villains and heroes" in the real world.

In interviews, Gordon Lightfoot explained that he drew inspiration for his ballad from a *Newsweek* article on the disaster that included an Anishinaabe expression that Lake Superior "never gives up her dead."

> The legend lives on from the Chippewa on down
> Of the big lake they call Gitche Gumee
> The lake, it is said, never gives up her dead
> When the skies of November turn gloomy
>
> —Gordon Lightfoot, "The Wreck of the *Edmund Fitzgerald*"

Imagine if Lightfoot hadn't read that article. Would his song—and the cultural memory it helped share—even exist in the first place?

A recent transportation disaster offers a real-time glimpse into the very media dynamics I'm imagining. Consider the mid-air collision that happened in January 2025 between a commercial passenger airplane and a military helicopter over the Potomac River in Washington, D.C. Static traffic control cameras captured the mid-air collision, providing unfiltered footage for the public to view and repeatedly rewatch. News organizations created timelines and graphic representations of the crash. Speculation surfaced on social media platforms and cable news outlets, with some commentators immediately and unfairly blaming overworked air traffic controllers. Human-interest stories also appeared featuring commercial passengers such as the Olympic hopefuls of the U.S. Figure Skating team returning from a training camp. In short, a cacophony of news circulated representing the best and worst of mass media. The chaos of the media environment surrounding this tragedy offers glimmers of the coverage that might unfold if the *Fitzgerald* sank in 2025. Conspiracy theories might quickly take hold on social media platforms as well as cable news channels. Was it corporate negligence? A government cover-up? Social media influencers might seize the moment to spin stories untethered from journalistic principles, prioritizing engagement over truth and speculation over verification. In the twenty-first-century economy, sensationalism is more important than accuracy.

Despite our romanticization of the past, there has never been a golden age of perfectly reliable news. But what has changed is the scale and speed at which "alternative facts" and divergent versions of news spread. In an era where deepfakes can do real harm through monetized social media posts and platform algorithms shape what people see, the media landscape has shifted. In such a world, a tragedy like the *Fitzgerald* might not become a solemn ballad but rather a battleground of competing truths. What might have once taken years to investigate would be dissected in real time by TikTok sleuths and YouTube "truthers." The story would not just be about what happened to the ship, but about who gets to tell the story, and whose version wins the attention war.

The story of the *Edmund Fitzgerald* continues to anchor something deeper for those of us who live and work near Lake Superior. The lake shapes our lives economically, culturally, and spiritually.

Whether remembered through song, scholarship, or other forms of storytelling, the tragedy of the *Fitzgerald* is a reminder that some stories reach beyond history and headlines. Speculating about how the tragedy would be reported today helps us see not only how journalism has changed, but also what we risk losing: a shared understanding of the world around us, trust in news media, and an appreciation for how time ultimately allows a story to find its own truth.

A Father and a Family on the Edge of Lake Superior

by Timothy Broman

My father's name was Orval J. Broman. He retired as a captain at the Oglebay Norton Shipping Company in 1987. The corporation was an ore mining company that operated shipping freighters on the Great Lakes. At one point the company's flagship vessel was the *SS Edmund Fitzgerald* through their Columbia Transportation Division. From my recollection, being a merchant marine was the only job I ever knew him to have.

When I realized what his job was as a child, he held the rank of third mate, the fourth-in-command on the ship. During his time off, my father would study, applying himself in the hopes of getting promoted. He eventually got promoted to second mate, then first mate, and lastly, when he retired, he served as captain.

My father would work about eight months out of the year and then come home for the other four months—sometimes more, sometimes less. He would usually return sometime between Thanksgiving and Christmas, as the lakes froze. In some warmer years, he would stay out later than Christmas. It didn't feel like Christmas if he was not home. When he finally came home, it would normally be only for a few months. Then, when the winter weather started thawing (usually March or April), Dad would get the phone call summoning him back onto the boats. It was a phone call he would avoid for as long as possible.

During the summer months, his company gave him vacation time. I remember him being at home for periods during the summer but only for a few weeks. Then he'd have to get back on the boats.

My father hated the job. I never knew this until later in life. He had been in the Navy during his military career, and I don't believe that the experience made him want to go back out on the

Broman family snapshots. Image courtesy of Timothy Broman.

water ever again. However, he was a husband and a father. As his family grew to include four children, he realized the best way to feed them was to go back onto the Great Lakes as a merchant marine.

His shipping routes kept him on the western half of the Great Lakes, from Ohio west to the Twin Ports. My father's usual routes on the ships took him to Silver Bay, Minnesota and occasionally to Duluth. He would load up taconite pellets, and then take them "downlake"—wherever they needed to go. His ultimate destination was usually to Michigan or someplace in Ohio, perhaps Toledo or Cleveland.

Occasionally, children of the crew were allowed to travel the route with their father. According to my mother, I rode with my father once, to Toledo, on the *Edmund Fitzgerald*.

Family Together in Silver Bay

When my father came to Silver Bay during the summer, we would go visit him. Silver Bay, a small port city in Minnesota on the North Shore of Lake Superior, was about an hour or so north of Duluth. Unfortunately, I almost always suffered from car sickness. I would feel dizzy, and nauseous. I never threw up—I just always felt like I would. To help me with the trip, my mother gave me Dramamine. I would take one, and an hour later, we were in Silver Bay.

Once we arrived in Silver Bay, we would have to wait for my father to come off the boat. Once his ship docked at the pier, he would climb down the ladder that the sailors placed against the boat. As he climbed down that ladder, my little kid brain worried that he would fall into the lake. When he was safe on land, he'd hop in the car and we would travel up to Baptism River State Park near Finland, Minnesota.[11]

In Baptism River State Park, there was a picnic site where two rivers that ran from different directions converged. At the picnic grounds, we would sit together and grill food for our meal. We usually barbecued burgers or some hot dogs. From time to time, our parents gave us marshmallows to roast.

After a couple of hours, Dad would have to go back on the boats. The rest of our family went back to Duluth. For some odd reason, I never seemed to have motion sickness on the ride home—just the ride up.

Family Together in Duluth

If Dad ever pulled into Duluth port, he would get off the boat, and we would go out for dinner.

Initially, dinner consisted of hot dogs at a little station down at the Lift Bridge. (Memory fails me as to the name of the place.) Once Dad started making more money and my siblings and I were older, dinner plans changed. If Dad pulled into Duluth, we went to Joe Huie's. (This was before the Chinese Lantern restaurant opened.)

The best way I can describe where Joe Huie's actual restaurant was located is like this: if you're getting onto Lake Ave. to turn onto I-35 heading South, the entrance point where you get onto the ramp is roughly where Joe Huie's was located.[12] The restaurant was a little hole-in-the-wall joint, with tabletop jukeboxes on every table. We could drop our coins in and press a button for whatever popular music was available at the time. I loved the Beatles but my father hated to pay for

them because he didn't care for their music. The menu at the time was filled with items that were mostly less than a dollar. Cheaper entrees were 95 cents or less. Deluxe items were $2.50.

As my father did better economically, we might go to the Jolly Fisher, in downtown Duluth. The old location was between Lake Avenue and 1st Avenue East on the upper side of Superior Street. [13] From the old location, I remember the lobster tank, cloth napkins, and Shirley Temples with cherries on top. Was the Jolly Fisher Northland fine dining? You betcha.

Eventually, the Jolly Fisher burned down. They later reopened in what is now the Minnesota Power Building. They closed in 1992 after Red Lobster came to town and battled them for existing customers. There were grumblings that the chain was non-Union, and Jolly Fisher had an organized union. For my Dad, that mattered a whole helluva lot.

November 10, 1975

I've told this story before.

The night the *Edmund Fitzgerald* went down, I was home alone. I was 15 years old, with three siblings. I have no idea where they could have been—maybe working, or babysitting. Who knows?

My mother was at an auxiliary meeting at the Ship Masters' club.[14] The Ship Masters' club (I'm not sure where it was located) was a local Duluth chapter. It was a social club like the Elks club or the Lions club. It had a private bar, and it was for men who worked on the boats, and their wives.

The phone started ringing at home sometime after dark. People were calling with a panic in their voices, wanting to know if my father was currently serving on the *Edmund Fitzgerald*?

My Dad worked for the Oglebay Norton Company, who had leased and operated the *Fitzgerald*. He worked for different boats every year, and there were a few boats that had funky names like the *Armco*, the *Wolverine*, and the *Reserve*. The rest of the Fleet had formal names (something) like the *William T. Jones*, the *Robert Thomas*, and also the *Edmund Fitzgerald*. These were names of people that I did not know.

I could always remember the names of the ships like the *Reserve*. I could never remember the names of the ships formally named after people.

So, the calls were coming in. Maybe a dozen or so. They all kept asking, "Is your Dad on the *Fitzgerald*?"

And I would answer with, "I don't really know. Every year it changes. Why do you want to know?"

The caller responded, "They said the *Fitzgerald* had sunk."

"It did?"

Apparently the only local TV station that was reporting it at the time was WDIO—our ABC affiliate.

But I didn't know if Dad was on the *Fitzgerald*. And the only person who would know was my mom. And she did NOT like to get phone calls at her meetings if they were not important.

After getting several panicky calls from people, I had to call the Ship Masters' club.

The wives were members of the Ship Masters' Ladies Auxiliary club. Their membership was

based on their being married to a member. They themselves weren't actual members—if a husband who worked on the boats divorced his wife, she could no longer come to the club. (Remember, this was the 1970s.)

I knew when I called she would not be happy to be interrupted. And she wasn't. She had made it very clear that we weren't to bother her at her auxiliary meetings unless it was super important.

The bartender answered the phone. I said, "I need to speak to Georgeann Broman, please. It's extremely important."

He hesitated for a moment, so I had to tell him again, "It's extremely important." It takes a few minutes for her to come to the phone.

I was sitting there, listening to the people at the club in the background—people chatting, drinking, arguing, laughing. I got the feeling they didn't know, yet.

My mom finally came to the phone, and she started snapping at me because she thought that I was home with one of my siblings and that we were having one of our stupid fights. She was upset, and she told me I shouldn't have called and that whatever it was it could have waited.

I'm trying to get my words in and she just wouldn't let me. So, I finally blurted out, "Mom, the *Edmund Fitzgerald* sank."

She went dead silent. I said, "Is Dad working on the *Fitzgerald*?"

Her quick reply was, "NO."

She tells me which ship he is on, but I forgot it as soon as I heard it ("No" was the only answer I needed at that moment).

Her next question was, "How do you know it sank?"

I said, "WDIO is announcing that the *Fitzgerald* has supposedly sunk in stormy waters on Lake Superior."

Mom turned to the bartender—I could hear her turn her head away from the phone—to ask him to change the TV to Channel 10.

The second he switched the channel over, the whole room went silent. I could hear it over the phone.

I needed to wrap up the call. My mother now had other things on her mind—lost friends and people she knew who were on that ship.

I said, "Okay. I'm just getting a lot of calls from people who are panicking but now I can tell them that Dad isn't on the *Fitzgerald*. I'm sorry I had to call you." And then she hung up the phone.

As a side note, when Gordon Lightfoot sings about the cook on board the boat telling fellas "it's been good to know ya," it's because the regular cook was off the boat in Duluth and was really sick with the flu. The company had to find a substitute cook. Poor fellow.

My dad retired in 1987. Oglebay filed for bankruptcy in 2004. In a way, this was the bookend of a way of life and being for a family in Duluth, Minnesota.

Blue Giants Waiting

by Chance Lasher

I have a distinct childhood memory of riding in the backseat of my family's 1999 Chrysler minivan, leaning my head into the center aisle, looking out the front windshield, and thinking I had entered a different world.

We were at the intersection of Central Entrance and Missabe, which sits just below the crest of the hill above the city of Duluth. I could see right over the slope of the road, past the Coppertop Church's rusted green roof, and over the trees. There, the vast blue face of Lake Superior peered up at me with a sun-gleamed smile. I stared back, in wonder and in fear.

My family lived in Hermantown, at the top of the hill. You'd think we would visit Duluth more often, given that we only lived 30 minutes away, but our whole world existed on the top of that hill—schools, groceries, friends, all of it. Duluth, and by extension the lake, existed as an Elfland in my mind. We all knew once you crested the hill, time stopped—reversed, even. Only on special occasions, like a doctor's appointment, or if family came from out of town and wanted to see the sights, would we drive into Duluth.

I would gawk at the city from my car seat window. Those red brick facades and roads and the schools with high clock towers and crenellations seemed like they were from a different time and reality. How could a city so old exist on such steep slopes? Surely a strong storm would wash all the old houses off the rock and into the lake.

Lake Superior watched us from the gaps between buildings. It loomed—even if you couldn't see it, you knew it was close. I knew there were songs about the boats that had sailed there and the storms that sank them. I knew the waters were cold enough to preserve your body, even after death. I had once dipped my feet in the waters as a kid. It stung, and I was too scared to go back in. Every time we drove over the Bong Bridge connecting the Twin Ports, I wondered if the whole thing would just collapse and the lake would swallow us, as she had done to many other boats.

Dad knew the lake. He worked as a diesel mechanic on the thousand footers–the long, ore carrying boats that sailed the Great Lakes. In the summer, he found the occasional job, but when the water froze and sealed the boats in port, winter work began. By January he'd be gone. He wouldn't return until March or April, sailing to Toledo, Detroit, Marquette, Cleveland, Ashtabula, and Sault St. Marie, places that all seemed like foreign lands to me as a child.

The rest of the house didn't get out much. Ma had to take care of four kids alone. All of our family was from North Dakota, another vast and isolated place. Home for us kids was the house and the surrounding woods and prickly raspberry bushes. As kids, we plucked the berries we didn't eat into white ice cream pales. Inside, we read *Garfield* and *The Magic Treehouse*. We played *Pokémon*, *Super Mario*, and *The Legend of Zelda*. Mom would only let us play our Game Boys for one hour each, so the rest of our free time we'd end up drawing all our favorite characters from these games and stories. And the maps. We'd all lay on the carpet, each with our own drawing pad, sharing color pencils, and sketch out a game's overworld map. We were seasoned adventurers. We knew those worlds better than we knew our own street name and our parents' phone numbers.

As I went from elementary to middle school, my social world became more impossible to navigate, and I retreated—or remained—in those other worlds. My imagination was my resolute, steady friend. Soon I was drawing maps for a world of my own creation: Arca. The mountain range there was the literal spine of a dead giant, with treacherous, tortuous roads from summit to foot. The great city of Isa Augusta sat on the coast, off the northern foothills of mountains. The Isabellacan Ocean beat ceaselessly at its eastern shoreline. Beyond that shore, I didn't know where the ocean ended, but I dreamed of its cold, dark depths and knew something lived down there, something older than humankind.

I would ponder such *horrendities* until a thump of boots on the stairs interrupted my reverie. Dad. I'd freeze. Other times, I'd hide under the covers or hop into the closet. Usually, I wasn't fast enough.

Dad stood in the doorway. He called, "Come out to the shop. We gotta work."

The shop was a dingy place with ruddy overhanging lights, a rough workbench, and shelves of screws and O-rings. I remember the cardboard slung across the concrete floors, and above all, the smell of diesel. His blue coveralls always stunk of it.

Dad always found work for me and my siblings to do. He didn't like to see us drawing or playing video games, although he never said so. He worked with his hands and valued that more than anything. "It's a good skill to learn," he'd say, slow and emphatic, whenever he was dooming us to a particular task. "It's good to learn."

I hated working in the shop. Sure, I learned a few things. We changed the oil in the minivan, jacked up the car, rotated tires, changed brake pads—all good things to learn. I wore the knees of my blue jeans into stringy white lipped holes. But more often, Dad would give me the most menial and meaningless tasks. Unscrew screws from scrap, clean the grease out of this, file the edge down of that, wash the cars, squeegee the cars—grunt work. Work for work's sake.

When you don't get to practice making choices in what you do, you learn that others will make them for you. *Do the grunt work and you'll be taken care of. Work is your worth as a man. If a man wasn't working, then he wasn't worth anything*. These were the beliefs I internalized.

Dad did not consider art to be work. This could not stand.

So anytime I worked with Dad, I half-assed it. Summer became the season of excuses, hurried plans, obfuscation—anything to not go out to the shop. Anything to take back my own time, back to the maps and the games and the stories. I found my own way to be busy. I saw the disappointment in his eyes. Winter was a blessing. It meant he had to go out to distant lands and work on the thousand footers, and I would have my time.

Despite my avoidance towards Dad's antics, I found it hard to leave home as a young adult. I had just learned how to drive, and expanded my mental map of Hermantown (and my map wasn't big to begin with). I'd never driven in downtown Duluth, or the Twin Cities, on my own. Despite all the maps I'd created, and despite my unconscious hunger for adventure, I played it safe. I had really good grades. I could have gone to a lot of colleges across the country, but I picked a local community college. I'd save money living with my parents instead of having a dorm. Lake Superior College was still on top of the hill, so it was easy driving. When I transferred to the University of Minnesota Duluth, it was also on top of the hill. When I got my own job to avoid working with dad, it was also on top of the hill.

COVID-19 hit. My college classes went virtual, and I took a gap year. I stayed home. I watched the news from my laptop and felt like the world was constantly ending. I finished a novel that will never see the light of day. I despaired.

Dad came in before the winter of 2021 and said, "You need to get a job. I could use help with winter work out on the ships. It would be a good experience."

No amount of money in the world would have convinced me. My sister called it being banished to Ohio. To be gone for months at a time, living out of a hotel, unable to see friends, and working with Dad every single day—sounded like a hell personally crafted for me.

I quickly applied for a different job in Duluth. I'd have to drive, but hell, it would be better than being banished.

I had nightmares. I'd be driving one of Dad's old trucks into Duluth for some reason. The road would start solid, but then I'd get on a thin bridge with no guard rails. By some perverse dream logic, the road would narrow, and the longer I drove the narrower it got, until the tires slipped and my car plummeted into the blue waters below.

I woke up in a sweat. I thought of quitting my job before I'd even started.

But I didn't, and that job taught me a lot.

I worked with folks with disabilities. That meant driving them to work and to community activities across Duluth and Superior. I had to brave steep roads, the Bong Bridge, and parallel park on the downtown streets. People lived in Duluth, not just sailors and ghosts from the 1920s. I talked with my coworkers. They liked Pokémon and books too. I made friends.

Soon enough the vaulting streets of Missabe didn't paralyze me with fear (although you should always be nervous on that road in winter). I could navigate the city without being married to GPS. Duluth was no longer mythic to me. It is a real, traversable place.

In the summer of 2025, I moved out of my parent's place. I settled in the foothills of West Duluth. Closer to town. Closer to the lake.

Late that summer, I swam in Lake Superior. I took a trip up the North Shore, to a beach in Knife River. The stone beach baked the soles of my feet so badly, I stepped into Lake Superior. It was so cold it burned. I retreated to the shore, teetering between the sun-baked stones and the icy water. I remembered Taliesin Jaffe's words, "If it scares you, you should probably do it."

I walked until I was knee deep. Waist deep. Chest deep. Under. Into a different world.

Water, like a vice grip, seized me. I kicked and thrashed to keep warm. Still, I didn't leave. I had to go further. Out deep enough where my feet didn't touch the bottom. I treaded water until I was sore.

Afterwards, I stumbled up the shore, laid a towel down on the hot stone beach and thawed. A tension I didn't know I had evaporated under the sun.

I thought back to the conversations I'd had with my Dad. The basic pattern of our relationship hadn't changed, even after I moved out.

> *I suppose the new job is keeping you busy?*
>
> *Yes, very busy.*
>
> *How's the truck?*
>
> *Good, it drives good.*
>
> *I just got done with a job on the American Spirit. Boy, that ship is a disaster. You know, I could always use help this winter. It'd be a good opportunity…*

As I sat, I saw a ship, merely a blip, on the horizon. As it disappeared, a pining filled me. I thought of how little of the world I had seen because of my fear. I thought of my old maps of Arca and the ocean. I thought of all the secrets in the frigid depths of Superior.

I trailed my feet through the shallows of the lake. My world had expanded, but the wide world was much vaster. There are places I have yet to be, I thought. There are stories I have yet to tell.

There are more giants waiting.

Part Two: A Relationship to the Lake, Mediated by Art

Lake Superior horizon. Image courtesy of Nan Montgomery.

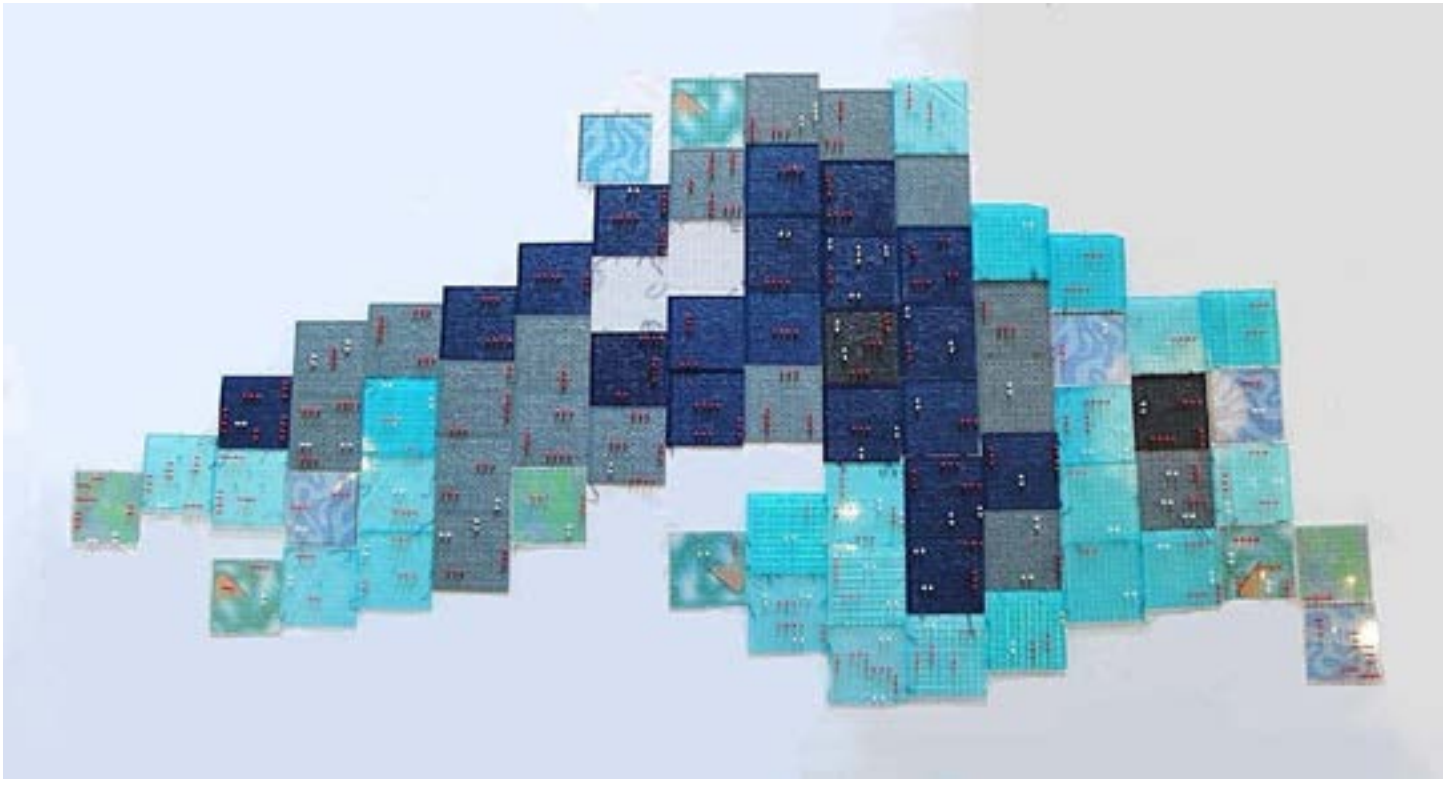
Wrecks of Lake Superior

by Robert Dewitt Adams

Superior, Wisconsin, felt like the middle of nowhere, but it turned out to be fascinating—like nowhere else. I'd spent most of my life on the east and west coasts. Then, my wife and I moved with our two-year-old to the Upper Midwest for her new job. I couldn't believe she'd chosen it over a job in Oregon. At least the snow was a novelty. Growing up in the Washington, D.C. area, school was usually delayed or canceled at the first thin accumulation of the white stuff. The thrill of winter weather was so entrenched, it got me through each dark season in the Northwoods. There were the crazy shoreline ice pileups, ice caves, and ice roads across the Apostle Islands, a frozen amusement park under the ripple of the northern lights.

As a history nerd, I love learning about the places where I live and visit. So, as the baby slept in the car seat, retiring Professor Dick Hudelson, whom my wife was replacing, took me on a tour of sites around the Twin Ports. I used that experience for a series of work, "In-Site: Labor History of the Twin Ports," funded by my first Arrowhead Regional Arts Council (ARAC) Grant.

I'd remembered seeing Minnesota as an island of blue on the TV maps of Reagan Red in the 1984 election. I felt honored to learn more of the region's progressive labor history, especially as I joined the American Federation of State, County, and Municipal Employees (AFSCME). Marveling at the huge freighters on the ocean-sized 'lake' from Canal Park, our daughter Geneva and I



Art and image courtesy of Robert Dewitt Adams.

would watch them squeeze under the lift bridge, cover our ears for the horns, then get ice cream or popcorn. I thought about those mariners, the mine workers, and the dockhands who sometimes got crushed between train cars. One afternoon as we explored the Twin Ports, I noticed sets of my favorite childhood game, *Battleship* while shopping at a thrift store. My dad had spent his career in the Defense Intelligence Agency after his time in the military. As a result, my childhood was filled with strategy games, war toys, battlefield tours, war movies, and *M*A*S*H*. I mused about what art I might make with these sentimental objects.

The Prove Art Collective opened in Duluth the same year we arrived, and I started applying for their calls for work. I showed my first Lake Superior *Battleship* map in 2012 at Prove's one-year anniversary celebration. Researching wrecks on the lake, I used the game's red pegs to indicate the different sizes of power-driven vessels that sank and white pegs for capsized sail vessels. I reimagined the militaristic game as a battle of humans vs. nature to depict the present threat of human-induced climate change. The nurturing influence of the work's quilt-like squares also contrasted the war game elements.

Robert Dewitt Adams with his daughter, shown in front of the Lake Superior piece. Art by Robert Dewitt Adams. Image courtesy of Justin Anderson.

"You Sank My Freighter! (Wrecks of Lake Michigan)" 2014.
Thrift store Battleship game boards and pieces, thread, wire, glue, 45" x 89."
Art and image courtesy of Robert Dewitt Adams.

Next, I made a larger-scale Lake Michigan piece for the "45th Parallel" show at Wisconsin's Phipps Center, (that latitude line runs through the lake). For that piece, I began adding lake depths symbolized by different colors of game boards from the forty years of different *Battleship* editions I'd personally collected and from the 100+ sets that my family had lovingly shipped to me from the D.C. area.

The Duluth Art Institute (DAI) accepted my proposal for an installation of all five Great Lakes, and the ARAC awarded me a grant for the show that ultimately became 2017's *PLAY*. I had initially envisioned hanging them on a giant wall, but the DAI proposed hanging them mid-air. The idea was brilliant, as the assemblages moved like a wave in passing air currents and became more interactive as viewers moved through and "under" the lakes.

I collaborated with my friend John Finkle, who had worked on tall-ship riggings. John gladly clambered up into the gallery rafters to hang my pieces. Acknowledging that viewers would be drawn to play with the game pieces, I provided a wall where people could play with extra game sets. The show was well-received and fostered discussions of the role that seemingly benign influences like play and games have on people's enculturation into society. Guggenheim Fellow Elizabeth LaPensee also exhibited her video game *Thunderbird Strike*, which draws

Art by Robert Dewitt Adams. Image courtesy of Dr. Sarah LaChance Adams.

on North American Indigenous mythology, at *PLAY*. The game is a battle against oil pipeline infrastructure around the Northland region of the Upper Midwest and the Great Lakes. It was great connecting with other game lovers, discussing the escape that games provide, their ethical considerations, and their metonymic qualities (for me, symbols of connection with my father).

My plan to mount a traveling exhibition of the *Battleship* lakes at art centers around the Great Lakes was interrupted by another job move to Florida. However, I hope to achieve this goal someday. Currently, I'm digging into this state's odd history while hoping to find some shipwreck treasure.

I've Gasped and Bled Because of Those Waters

by Luke Moravec

For twelve and a half years, beginning in the early 2000s, I jumped in Lake Superior at least once a month. That's 150 months in a row. Always fully submerged, always cold, always to fulfill a self-imposed challenge. This was important to me.

Luke Moravec is shown in front of Lake Superior on a gray day. Image courtesy of Luke Moravec.

After five years, when the TV news covered my anniversary of plunging, it was clear that my hobby was, if not important to others—at least interesting.

So, I kept doing it.

Sometimes, keeping the streak alive was through a narrow path that required strategy, stoicism, and a dash of stupidity.

My coldest jump in the lake was at Shovel Point in February of two thousand and something—the years have all bled together.

The temperature outside was -12 and there was no open water in town. Prepared to hatchet my way through the ice, if necessary, I found a slushy mess near the pebbled shoreline. With the car still running, I made a dash for the water, dunked under, and scrambled back to the car.

Though none were colder as the thermometer goes, plenty of months caused me real concern and chilled me to my heart. I've gasped and bled because of those waters. I've fought for my life in that lake.

And I'm not alone. Many have fought for their lives in and against the lake. And, yes, sometimes the haunting melody of "*The Wreck of the Edmund Fitzgerald*" plays as an echo from some ignored corner of my mind. My routine is dangerous, and it's worth repeating that I have literally struggled for my very life, but isn't it all a bit pedestrian? Aren't I still just a guy who likes to play in the water?

Life threatening or not, there is a difference between me and many who are still on the lake floor. Those who perished in shipwrecks—those who did not manage to exit the icy waters—didn't fail because they lacked the will, but because the will of the lake was stronger. Maybe I've just been lucky. Maybe the lake has just never chosen to rage against me. Maybe I'm just one of the spared.

I gave up the streak years ago. Gone are my days of aggressively charging the waters, fleeing from its force, tallying my conquests, and quantifying my value in relationship to one of the world's most consistent killers. However, my visits to the lake are still frequent. I believe the years of dutiful attendance to the waters have made me more at ease with Superior. I used to be afraid of its size, its depth, its wildness, but after a youth of flirting with boundaries and challenging Mother Nature, I now feel comfortable there.

Now, on occasion, you may see me fifty meters off the shore, floating amid the gentle waves, further from land than a younger me ever would have dared venture.

The Chief Buffalo Memorial Mural Space in Duluth, Minnesota

by Moira Villiard

Chief Buffalo was a revered figure in the history of Ojibwe people in the western Lake Superior region. The murals are an ongoing effort to convert a large maze of walls near the Lakewalk to an educational public art space. Painted in collaboration with over 500 local community members, the project focuses on the journey of Chief Buffalo, a story that was previously inaccessible through art and public space in Duluth. In addition to reflecting on the past, the murals also feature contemporary imagery of Native people and our existence and connection to the land today.

"The treaty was not a grant of rights to the Indians, but a grant of rights from them — a reservation of those not granted." US v. Winans (1905).

Flanking a winding staircase in Duluth, Minnesota, the murals serve as a space for reflection and gathering for both Indigenous and non-Indigenous community members. Image courtesy of Moira Villiard, photographer Mike Scholtz.

Chief Buffalo

Chief Buffalo (circa 1759–September 7, 1855), known as Bichiki (Bizhiki, Buffalo/Bison) and Gichi-waishke (Gichi-weshkiinh, literally Great Renewer but referencing the Woodland Buffalo/Bison), was a revered figure in the history of Ojibwe people in the western Lake Superior region. Born around 1759 at La Pointe on Madeline Island along the south shore of the lake, he was a member of the Loon clan. He was seen as a compassionate leader for his people, particularly in his dealings with the British and American governments. Famously, in his 90s, he journeyed from Wisconsin to Washington, D.C. to sign the Treaty of 1854.

In addition to the Treaty of 1854, which contained a provision setting aside a reserve of land for the chief in present-day Duluth. Buffalo also signed the treaties of 1825, 1826, 1827, 1837, 1842, and 1847, which ceded land across what would later become the states of Wisconsin and Minnesota. In 1852, Buffalo and others made a long journey to Washington, D.C. in protest of the policies of Minnesota territorial officials who sought to remove Ojibwe communities further westward.

These murals were designed and painted collaboratively by a team of artists led by Moira Villiard (Ojibwe and Lenape direct descendent), including Michelle Defoe (Red Cliff Band of Ojibwe), Awanigiizhik Bruce (Turtle Mountain Band of Ojibwe), Sylvia Houle (Turtle Mountain Band of Ojibwe), with assistance from over 500 community members and artists. Image courtesy of Moira Villiard, photographer Mike Scholtz.

One of the most historically important events during this period was the 1850 Sandy Lake Tragedy, a scheme orchestrated by Minnesota Territorial Gov. Alexander Ramsey. Thousands of Lake Superior Ojibwe journeyed to Sandy Lake to receive an annual treaty payment, which Ramsey purposely delayed until after the start of winter. The dangerous winter trek resulted in the deaths of several hundred Ojibwe people from starvation, disease, and other ailments. As a result of Buffalo's actions, policies were changed, culminating in the 1854 Treaty. This treaty created permanent homes in reservations throughout the region and recognized the inherent rights of Ojibwe people to hunt, fish, and gather in their traditional lands.

The impact of Chief Buffalo and his story is not limited to just the Native community but is relevant to all who call Duluth and the North Shore of Lake Superior home. His journey is part of our collective histories in Minnesota and the Great Lakes region. Many of the towns and communities established today would not exist without the treaty-making in which he and other Ojibwe leaders participated.

The visitor's experience of moving through the space enriches their understanding of the collective histories of Minnesota and the Great Lakes region. This section of the mural features a wall designed by youth from the Red Cliff Band of Lake Superior Chippewa community. Image courtesy of Moira Villiard, photographer Mike Scholtz.

Traditional florals designed by Michelle Defoe feature prominently. Image courtesy of Moira Villiard, photographer Mike Scholtz.

The walls feature both historical and contemporary depictions of Indigenous people connected to our region, maps of both treaty territories and Chief Buffalo's famous journey, Ojibwe stories, and folklore. Image courtesy of Moira Villiard, photographer Mike Scholtz.

Murals

These murals were designed and painted collaboratively by a team of artists led by Moira Villiard (Ojibwe and Lenape direct descendent), including Michelle Defoe (Red Cliff Band of Ojibwe), Awanigiizhik Bruce (Turtle Mountain Band of Ojibwe), Sylvia Houle (Turtle Mountain Band of Ojibwe), with assistance from over 500 community members and artists, including guest artists Waylon Lanham, Mana Bear Bolton, and Conor Fairbanks. The walls feature both historical and contemporary depictions of Indigenous people connected to our region, maps of both treaty territories and Chief Buffalo's famous journey, Ojibwe stories and folklore, and traditional florals designed by Michelle Defoe. This project was honored in a ceremony in 2019 and continues to serve as a space for reflection and gathering for both Indigenous and non-Indigenous community members.

These murals came about in a partnership between the Duluth Indigenous Commission, descendants of Chief Buffalo, the Zeitgeist Center for the Arts, and countless volunteers and individual donors, including several local and state funders.

Photos by Mike Scholtz (https://www.mikescholtz.com/).

For more information about Moira Villiard, visit https://www.artbymoira.com/)

These murals came about in a partnership between the Duluth Indigenous Commission, the Buffalo family, Zeitgeist Center for the Arts, and countless volunteers and individual donors, including several local and state funders. Image courtesy of Moira Villiard, photographer Mike Scholtz.

fight or flight

by Anastasia Bamford

well
that's the question
but maybe not
the only question

the fire is bright
and lively in the dim room
the wine is smooth and rich
outside in the darkness

'Sunrise' by Anastasia Bamford.

the lake hurls her arms
full of water and stones
onto the shore
the stars are hidden
behind clouds
but they are still there
constant

in the morning
you can make me coffee
and i will hold you
as the sun rises over the waves
the dog will have her breakfast
we'll move through
the dance of our days
until they come for us

perhaps they are never coming
or they are always coming
bravery is in living
life in the open
in spite of fear

~Election night, 11/5/24 10 pm

Our Freya

by Nan Montgomery

As our mother lies dying in hospice,
I recall her playful claim to Viking ancestor,
Eric the Red. So, it seems fitting
to seek refuge by the big lake.
Only blocks away from her hospital room
well-known steps lead to my stone chair
shaped by the caprice of nature. My
snug fit me just right. A great boulder
overhang keeps me lee to the wind.
I burrow into the space.
Superior roars like a storm-wracked sea.
This November, like so many,
brings the famous gales that sink great ships.
She roars the last day I will see my mother
in this world of wind and water. Surely
keening wind informs the forever mist,
receive our Freya.
Valhalla awaits.

'Seen in Passing' by Nan Montgomery.

Surface Displacements

by Sheila Packa

An Acre of Music or a Room Closer To It — Lorine Niedecker

The minerals whisper: iron, manganese,
copper, nickel, platinum, and titanium.
On the Laurentian Divide, a river falls over stones
to Hudson Bay. Another falls south through fields
to the Mississippi. The third river goes east
through the Great Lakes and St. Lawrence
Seaway.

^

Handfuls of water. A body of sea smoke, of wind,
a body of motion, an ocean without salt.
In the benthos, tailings from taconite mines.
In the basin, shipwrecks and broken bottles and
sunken
barrels and bodies the lake has claimed.

^

On a bridge made of paper, my voice turns to
vapor.
On a bridge made of iron and steel
I veer between traction and black ice
wander through beams and woven branches
follow the rain in its tracks through roots and
excavations.
I cross before, almost, never,
the thunder of interior dialogues through heavy
machinery.

^

Practicing the old art, my father crossed a slope
holding a slender branch, calling the water.
Now, in a dark room, a daughter holds a cello to
her breast
divining. In the instrument is the old tree.
The bow rises, glides, floats above the bridge.
The wood turns toward harmonics.

Calls of the geese overhead vibrate
against the windowpane. Her fingers tremble
like strings and the water answers.
A car comes down the street. The driver
locked in a dream, rolls down the hill. Slower
Still. The branch dips and the invisible pours
into the containers. The forked branch
didn't know it had lost its root.
It only had yearning.

^

I call the rivers in the forgotten language
call the Sawtooth Mountains,
forested slopes with snowshoe hares and deer
beds
and bears' dens and lynx.
I call shore's perpetual threshold.
In the city, in a house, I call a moth
caught between two panes of glass.
To catch it will damage the wings.
To leave it means it will perish.
I write with the trapped and desperate flight.

^

No one can follow the map of the bee.
Their business is in every direction,
from tiger lilies into the hives to the chives
to other realms with heads of clover.
Apple blossoms. In the lavender colonnades
of mint through the rooms of June
into purple irises, yellow daylilies, deep inside
delicate tunnels with hardly a foothold
hidden in clouds of pollen.

^

Along Fourth Street, a river climbs a bed of stones
amid revelers, but alone
over a steep slope with winter's melt
below a bridge, a bird on a wire, hidden by trees

past a canvas tent and pillow with nobody home.
The constellation of Orion
roams through clouds and goes on a shifting path
with the sleepless river, plunging deep.

^

A river catches herself as she is falling.
She is a cloud that breaks open and the earth
that holds the seed as it is broken.
The farther she has gone, the closer she comes.
The more she lost, the more she found.
Her body is formed by what she touches.
Blind, she sees. Deaf, she hears.
The wind is her breathing. In her emptiness,
she fills. In her erasures, she is writing.
The colder the air, the deeper she goes.
The more that it rains, the more rain she carries.
The more stones in her path, the more she laughs.

To watch and listen to a multimodal, digital composition by Kathy McTavish and Sheila Packa with the entire poem, as set to McTavish's visuals and music, visit https://wildwoodriver.com/surfacedisplacements/surface.html

Afterword and Conclusion

by Jennifer Brady

As one of the four elements—earth, water, air, and fire—water is rich in symbolism that helps us better understand human experiences in the natural world. Water sometimes symbolizes emotion, life and death, and purification.

Water is essential and interconnected with all life. The Anishinaabe creation story, for example, recalls a flooded land, purified of conflict, where the muskrat dives down to the water's depths to retrieve a small bit of soil from which the world was created on the back of the turtle.

Water is both generous and dangerous. In Homer's *The Odyssey*, the sea represents personal transformation and the perilous journey home.

Water is a threshold. Diving into the ocean or crossing a river may mark transformation, a change to one's path, or a rupture to one's identity. In Toni Morrison's *Beloved*, the flowing, lyrical narrative is chock-full to the brim with water imagery. As Sethe is escaping enslavement, she gives birth in the river's waters, echoing the forced, violent crossing of enslaved Africans across the Atlantic Ocean. In the novel, water is the threshold between slavery and freedom, death and life, past and present.

Water has been commodified, used for power plays, stolen, and rerouted. Film director Icíar Bollaín's haunting *También la lluvia* (2010) depicts a fictional film crew's production of a historical movie about colonization in the Caribbean. During production, the crew becomes entangled in the real-life events of the Cochabamba Water War, in which Indigenous Bolivians protested the privatization of their water supply by a foreign corporation.

Water is a powerful metaphor for the human journey. The ebb and flow of tides, the gentle lapping of waves, and the intense, cleansing downpours all beautifully reflect the rhythms of life events. Moreover, the mysterious depths of our lakes and oceans serve as profound mirrors to the human psyche.

The underlying tone of this feature of *Open Rivers* sways between nostalgia and commemoration, and between past and present. Remembering tragedies in our waterways reminds us of the power of water. Fifty years after the sinking of the *Edmund Fitzgerald*, 68

swimmers took to Lake Superior to swim the remaining journey of the lost freighter.

In relay teams, the swimmers covered a total of 411 miles—from the wreck site in Lake Superior to the downed freighter's intended destination, Detroit. One news outlet covering the event wrote, "While no one swimmer could handle the entire distance alone, this team effort reflects unity, strength, and remembrance."

At the University of Minnesota Duluth, we also remembered the tragedy on November 6, 2025, with the performance, "The Gales of November." In unity, with music and spoken word, we commemorated those lives lost on the Great Lake.

In all its forms—mythic, literary, political, and personal—water flows through our stories as both a mirror and a force. It reflects our histories, our struggles, our transformations, and our hopes. From ancient creation myths to modern acts of remembrance, water connects us across time and space. As we gather to honor the memory of the *Edmund Fitzgerald* and those lost to the depths of Lake Superior, we are reminded that water is not only a source of life but also a keeper of memory. In commemorating through music, movement, and story, we affirm our shared humanity and the enduring power of water to shape, carry, and connect us all.

All images of artworks in this piece are used with the permission of the artists.

Duluth aerial lift bridge in a snow globe. 'Untitled' by Krista Sue-Lo Twu.

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Footnotes

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[10] Langston, Nancy. *Sustaining Lake Superior: An Extraordinary Lake in a Changing World*. Yale University Press, 2017.

[11] Baptism River State Park later merged with Tettegouche State Park.

[12] The address at the time was 103 Lake Street South, a building which was later demolished. For more information about the institution that was Joe Huie's, see MNopedia at https://www3.mnhs.org/mnopedia/search/index/place/joe-huie-s-caf-duluth.

[13] According to Paul Lundgren, the Jolly Fisher operated from 1942 to 1992. The original location was at 15 E. Superior St., where the Duluth Technology Village sits today. After 1979, it was located at 10 W. Superior St., which is presently the Minnesota Power Plaza. For more information, visit the *Perfect Duluth Day* website at https://www.perfectduluthday.com/2014/03/19/jolly-fisher-if-it-swims-we-have-it/.

[14] The International Ship Masters' Association is a voluntary organization of dues-paying licensed professional mariners and others associated with the maritime community of the Great Lakes and St. Lawrence Seaway.

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About the Authors

David Beard is a professor of Rhetoric at University of Minnesota Duluth, a Fellow in the University of Minnesota Institute on the Environment, and Affiliate Faculty in Religious Studies. He is co-editor of several collections of scholarly work, including *The Rhetoric of Oil* (with Heather Graves), *A Charge for Change* (with Elizabethada Wright), *The Power of One* (with Katy Chapman), and *Advances in the History of Rhetoric* (with Richard Enos). He works in the intersections of health, the environment, spirituality, and the arts in rural contexts.

Catherine O'Reilly is Director of the Large Lakes Observatory (LLO). LLO has a unique mission to perform scientific study of the largest lakes of Earth. LLO researchers are dedicated to expanding and communicating knowledge about the past, present, and future of these critical freshwater systems. Dr. O'Reilly's work, focusing on Lake Tanganyika in Tanzania, explores biogeochemistry, nutrient cycling, and the impacts of climate change and human activity on freshwater ecosystems.

Joseph M. Lane is an Assistant Teaching Professor in the Department of Environment, Sustainability, and Geography at the University of Minnesota Duluth. He holds a Ph.D. in Science Education and an M.A. in Applied Geography from Western Michigan University, as well as a B.S. in Geography from Aquinas College. His research bridges geography education, sustainability, and place-based learning, with a particular focus on the Great Lakes region. Previously, he served as Assistant Professor of Geography and Sustainable Development and Assistant Director of Geospatial Information Technologies at Delta State University (Cleveland, Mississippi). Dr. Lane has published on topics ranging from international geoscience collaboration to informal science education and serves as Vice President of the Board of the Lake Superior Marine Museum Association.

Jennifer E. Moore is an Associate Professor of Journalism in the Department of Communication at the University of Minnesota Duluth.

Timothy Broman is a lifelong resident of Duluth, Minnesota. He currently works in sales, but is best known in his community for decades managing a local sports collectibles, comics, and games store. He is, by his account, the youngest, smartest, and cutest of 4 children.

Chance Lasher has always lived in the castle. In one moment, he writes with bombastic irreverence and in another with gothic, pallid dread. He writes pulpy, fantasy fiction with his characters, Golem and Goblin, who are cursed with the aforementioned characteristics listed above. You can find Chance at the Failed Poets Society on Monday Nights at the Loch Cafe and Games.

Robert Dewitt Adams is originally from the Washington, D.C. area and also lived in the Pacific Northwest 1996–2011. Currently residing in Jacksonville, Florida, he is the manager of the Florida Mining Gallery. He earned his MFA in 2007 from the University of Oregon. His work has been included in exhibitions around the U.S. and internationally, including shows at the Seattle Art Museum Rental/Sales Gallery; the Viridian Artists Gallery in Manhattan; MOCA Jacksonville, and Galleria Vasari in Citta di Castello, Italy. Images of Robert's work have appeared in the *Eugene Weekly*, *Seattle Weekly*, *Art Access*, and *Artweek* magazines. His cartoons and illustrations have won awards from the Society of Professional Journalists and Oregon Newspaper Publishers Association. For more on his art and practice, visit floridamininggallery.com, and Instagram @robertatomsart.

Luke Moravec moved to Duluth to attend the College of St. Scholastica in 1999 and never left. Since then, he's worked as an elementary after-school coordinator, the arts and cultural events coordinator at the Nordic Center of Duluth, and at Solve Escape Rooms where he hosted, built, and designed games. He's now the morning show host on The North 103.3 FM. Luke has been an avid writer for the past two decades, penning semiprofessional scripts for stage and screen, and co-authoring the picture book *The Christmas City Express* with his wife Cheryl. His first novel, *Ghost Town Run*, was released this summer. He loves biking, hanging out with his cats, and fiddling with the Rubik's Cube—his personal fastest time for solving it is 24 seconds.

Through public art collaborations across Minnesota, Moira Villiard (pronounced "Miri") is a multidisciplinary artist with a mixed Indigenous and settler heritage who uses art to uplift underrepresented narratives, explore the nuance of society's historical community intersections, and promote community healing spaces. The outputs of her work include murals, community spaces and programming, exhibits, installations, animated light projections, film, and digital design. .

Moira grew up on the Fond du Lac Reservation in Cloquet, Minnesota, and is a Fond du Lac direct descendant. She currently works as a freelance consultant, designer, speaker, and grant writer, and is the lead artist behind organizing the Chief Buffalo Memorial Mural site in Duluth. Her educational, activism-rooted exhibits "Rights of the Child" and "Waiting for Beds" are currently on tour, and recently she's taken steps to launch a nonprofit called Aanjichigeng, which aims to maintain and protect the site of the Chief Buffalo Memorial while also uplifting Native artists and culture bearers in Northeastern Minnesota.

In 2021 she debuted her first animated work for Illuminate the Lock, a 10 minute, 150' projection piece titled "Madweyaas-hkaa: Waves Can Be Heard", and has since collaborated with Indigenous musicians and writers to create animations for "A Winter Love", "Mináği Kiŋ Dowáŋ: A ZitkálaŠá Opera", "Jonathan Thunder: Good Mythology" (PBS American Masters), and "Extraction" (poem by Tanaya Winder), among other films. She is also the illustrator of the children's book *Ishkode: A Story of Fire*.

Her work has been featured in numerous shows around the Midwest including her solo show, "Rights of the Child" at Zeitgeist, and group shows "Contemporary Anishinaabe Art: A Continuation" at Detroit Institute of Art, the touring "Dreaming Our Futures: Ojibwe and Očhéthi Šakówiŋ Artists and Knowledge Keepers" exhibit, and "We the People" at the Minnesota Museum of American Art. She received her Bachelor's Degree in Communicating Arts (Global Studies Minor) from the University of Wisconsin-Superior in 2016 and an Associate of Liberal Arts degree from Fond du Lac Tribal & Community College. She is currently a student at the Humphrey School of Public Affairs, pursuing her Master of Human Rights (minor in Public Policy), with an anticipated graduation in the Spring of 2026.

Moira Villiard is a recipient of the MCAD-Jerome Emerging Artist Fellowship, 2023 McKnight Foundation Community-Engaged Practice fellowship, and is a 2024-2026 Bush Fellow.

Anastasia Bamford is a non-binary poet and photographer from Duluth, Minnesota. They have recently published a book of poems and photographs titled *Morphology* with a grant from the Arrowhead Regional Arts Council, and they have two earlier chapbooks, *Rejoice* (1984) and *Dogwood Girl* (2000). Anastasia's work has been published in the anthologies *Earth Beneath, Sky Beyond* and *A Kiss Is Still A Kiss*, both by Outrider Press, and in the *Duluth Superior Pride Zine 2023* and *2024*. Their work has also been included in the *Freshwater Feral* zine published by the Duluth Poetry Chapter of the League of MN Poets, the anthology *Murder Your Darlings* published by the Duluth Failed Poets Society, and in the 2024 edition of *Agates*, published by the League of MN Poets.

Nan Montgomery has been published in Under Construction, Chanter, Buffalo Bones, The Thunderbird Review, Murder Your Darlings, The Nemadji Review, and the collection Sonder: Through My Eyes. According to Montgomery, "Art is a small word for big magic. Painting in oils and watercolor challenges my training each time I pick up my brushes. One-of-a-kind quilts cover the beds of family and friends. Art is any discipline that demands heart, skill, and patience. Writing and the arts are a home for me and the northland gave me my voice." Nan's first collection of poetry, Seen in Passing, has been published, thanks to a grant from the Arrowhead Regional Arts Council.

Sheila Packa is a poet, writer, and teacher with Minnesota and Finnish roots. She has five books of poetry: Mother Tongue, Echo & Lightning, Cloud Birds, Night Train Red Dust: Poems of the Iron Range, and Surface Displacements. She has an MFA in Creative Writing from Goddard College and has taught creative writing and composition at Lake Superior College. She leads poetry and writing workshops in community settings and often performs her work in music and media installations with her creative partner Kathy McTavish. This piece is reprinted from its original appearances in the On An Inland Sea: Writing the Great Lakes anthology, edited by Michael Welch, and the original book of poetry, Surface Displacements (Wildwood River Press).

Jennifer Brady is Interim Dean of the College of Arts, Humanities, and Social Sciences at the University of Minnesota Duluth. She is also an Associate Professor of Spanish. Brady's research focuses on representations of subjectivity and the self in contemporary literary and cinematographic works, as well as on innovative models of placemaking public cultural spaces in Spain. Another area of professional interest is the ethical development and dissemination of scholarship in Luso-Hispanic Cultural Studies in English, Portuguese, and Spanish. Having served since 2007 on the editorial staff of Hispania, the flagship scholarly journal of the American Association of Teachers of Spanish and Portuguese (AATSP) founded in 1917, Brady has managed the production of 32+ volumes, and contributed to the creative development of the journal. Currently, she serves as an Associate Editor at Hispania.

FEATURE

RIGHTS OF NATURE AND THE LAKE ERIE BILL OF RIGHTS

By Sheryl Cunningham

On February 26, 2019, citizens of Toledo, Ohio, passed legislation called the Lake Erie Bill of Rights (LEBOR), which created legal standing for nature in the state of Ohio by giving individual citizens the right to sue on behalf of the Lake Erie ecosystem. The initial motivation for organizing for the LEBOR came from residents who experienced the Toledo Water Crisis, a three-day period in August 2014 when residents could not drink their tap water due to a harmful algal bloom (HAB) that developed near a water intake station in the Maumee River. Microcystin, a toxin that can affect the liver and nervous system, was detected in the water. The main complaint of Toledoans for Safe Water (TFSW), the community group behind the LEBOR, was that little had been done to improve or protect Lake Erie water quality in the years since the crisis in 2014.

Sunset on Lake Erie at Pebble Beach, Kelleys Island. The island is about 30 nautical miles from the city of Toledo, Ohio and is one of several islands in Lake Erie that have had their surrounding waters affected by algal blooms. Image courtesy of Sheryl Cunningham.

There are different types of pollution mentioned in the LEBOR, but the Ohio Environmental Protection Agency has identified farm runoff as the main source of HAB-creating nutrient pollution—extra phosphorus and nitrogen—in this area of Ohio.[1] HAB development in the watershed is linked to agricultural fertilizer practices and can be further exacerbated by weather conditions, like extreme rain events.[2] While there are many different types of farms in Ohio, the LEBOR specifically mentions large-scale agricultural operations, including "factory hog and chicken farms."[3] In 2017, for example, there were sixty-four concentrated animal feeding facilities in the Western Lake Erie watershed, with thirty-eight facilities holding chickens and swine.[4] Despite its focus on pollution from industrial livestock agriculture, the passage of the ballot measure concerned many Ohio farmers. Advocates for farmers, such as the Ohio Farm Bureau (OFB), considered the LEBOR a threat because of its potential to open up all farms, regardless of size or type, to lawsuits targeting nutrient pollution.

John Kasich (R) was governor of Ohio during the Toledo Water Crisis and throughout his second term directed some of his attention toward the problem of HABs in the Lake Erie watershed. Like the TFSW, he was frustrated by inaction on the issue. In July of 2018, he signed a controversial executive order that would have

In 2015, the year following the Toledo Water Crisis, Lake Erie had one of its worst years on record for algal blooms. On July 28, 2015, the Operational Land Imager (OLI) on Landsat 8 captured this image. The large bloom spread beyond the largest Lake Erie island, Pelee Island, which is part of the province of Ontario, Canada. Via NASA Earth Observatory. Image by Joshua Stevens, using Landsat data from the U.S. Geological Survey.

added seven local ecosystems to the state's list of distressed watersheds. He felt that legislators and farmers had had ample time to address the nutrient pollution, yet the problem had persisted and steadily worsened since 2014.[5] Farming practices are largely unregulated in Ohio, with state legislators showing a preference for voluntary compliance with best practices for farm runoff. However, once a watershed is officially declared "distressed," regulations can be put into place. The watersheds that Kasich declared distressed in his 2018 executive order all fed into the Maumee River and eventually into Lake Erie. The executive order was opposed by several different entities and ultimately did not go into effect because of disagreements about the criteria that would place a watershed into the "distressed" category.

When Gov. Kasich's order failed to create meaningful change, the Toledoans for Safe Water placed the Lake Erie Bill of Rights on the local ballot and gained citizen support through the city's election process. Toledo voters passed the legislation on February 26, 2019; however, it was challenged in court the very next day by an Ohio farmer named Mark Drewes. Given that the lawsuit would take time to resolve, lawmakers who opposed the LEBOR also blocked the legislation at the state level by adding extra language to an upcoming state budget bill. The amended budget stated: "Nature or any ecosystem does not have standing to participate in or bring an action in any court of common pleas," making the law unenforceable while the lawsuit made its way through the courts. [6] Although the LEBOR was a local charter amendment, passed in the city of Toledo, Drewes challenged the law in a federal court because he thought the law violated the U.S. Constitution.

In this article, I first discuss the Rights of Nature legal framework, which served as the basis for the Lake Erie Bill of Rights. Next, I explain the concept of an ecocentric interruption and position the LEBOR as an ecocentric interruption by examining the dominant discourses on farming in Ohio. Finally, I analyze the rhetorical implications of the online communications of two key organizations: the Ohio Farm Bureau, who opposed the LEBOR, and the Toledoans for Safe Water, who spearheaded the legislation. While the LEBOR ultimately failed in the court system, I argue that the ecocentric rhetoric of the ballot measure successfully equipped the general public to think about farms as parts of ecosystems that include human and more-than-human concerns.

The Rights of Nature

Many within the United States can (and do) balk at the idea that a river or ecosystem has recognizable rights. The Rights of Nature movement draws attention to fundamental questions about how humans relate to nonhuman entities, whether corporate or natural. In discussions about the Rights of Nature in law, most scholars point to Christopher Stone's 1972 law review article "Do Trees Have Standing? Toward Legal Rights for Natural Objects."[7] In his article, Stone described the concept of legal personhood and who or what has been characterized as such in the United States over time. He acknowledged that the idea of advocating for the rights of natural objects while strange to many in the late twentieth century, was possible through the concept of corporate personhood. On this framework, Stone noted, "We have become so accustomed to the idea of a corporation having 'its' own rights, and being a 'person' and 'citizen' for so many statutory and constitutional purposes, that we forget how jarring the notion was to early jurists."[8] To reframe the initial strangeness of the Rights of Nature, advocates today often utilize a version of Stone's question in public dialogue:

"*If corporations can be recognized as rights-bearing, why can't ecosystems?"* This question helps make the environment more intelligible and offers one possible route to rethinking human-nature relationships.

The Community Environmental Legal Defense Fund (CELDF), who worked with TFSW to help draft the language of the LEBOR, argues that corporate personhood has created a power imbalance in the United States that endangers healthy ecosystems. For this reason, the CELDF has been involved with the advancement of the Rights of Nature in legal contexts, both in the United States and beyond.[9] With assistance from the CELDF, in 2006 Tamaqua Borough in neighboring Pennsylvania became the first place in the world to legally recognize the Rights of Nature when the municipality banned sewage sludge dumping.[10] The CELDF also advised environmental protection advocates in Ecuador, where recognition of the Rights of Nature has been championed at the national level.[11] In 2008, Ecuador amended its national constitution to recognize the rights of *Pachamama*, the Quechua term for Mother Earth. Bolivia has also amended its constitution to recognize some aspects of the Rights of Nature.[12] Some countries, such as New Zealand, have established guardianship agreements between government entities and Indigenous groups to protect specific natural resources and water systems.[13] Even those who question whether a rights-based approach is the best way to enact environmental protections agree that the language of rights is widely recognizable across the world.[14]

Unlike Bolivia, Ecuador, and New Zealand, there is no formal recognition of the Rights of Nature at the national level in the United States. Without national recognition of the legal framework, it is not surprising that the Lake Erie Bill of Rights faced intense legal challenges. In 2020, a federal judge declared the ballot initiative unconstitutional. In the ruling, the court noted that because the Lake Erie watershed affected more than just the citizens of Toledo, the ballot initiative overstepped its bounds by impacting people who lived outside of the city. Nonetheless, it is significant that citizens of a major city passed the LEBOR. The fact that elected officials in Toledo were willing to defend it in court suggests that the Rights of Nature language was an ecocentric interruption of business as usual.

Ecocentric Interruptions of Dominant Discourses

Legal arguments about the Rights of Nature have productive meaning outside of legal contexts if we consider how the language can disrupt the status quo. Ecocentric rhetoric, an expansive term that has "earthly coexistence" as its goal, asks people to consider how humans can continue to inhabit the planet without destroying it or its other inhabitants.[15] Joshua Trey Barnett argues that ecocentric rhetoric offers the possibility of extending human democratic thinking to the nonhuman:

> Rethinking democracy entails listening to, and respecting, the requirements, the desires, and the demands of what exceeds the human. Because plants, animals, habitats, ecosystems, and earth systems do not "speak" in languages that are necessarily intelligible from the perspective of humans, though, more-than-human signals require translation. In conversation with naturalists, ecologists, and earth system scientists, rhetoricians can identify, describe, and translate (that is, render intelligible and meaningful) those signals that arrive in something other than a human voice. By doing so, we will help to bring a more ecocentric rhetoric—and democracy—into existence.[16]

Discourses of rights have thus far been contentious and fundamental to the ongoing experiment of democracy in the United States. The expansion of rights to ecosystems is an act of translation that could help what is more-than-human not only survive but thrive.

Ecocentric rhetoric can have a variety of impacts, but I am most interested in how Rights of Nature language can lead to a "critical interruption" of a dominant discourse. [17] In *Environmental Communication and the Public Sphere*, Robert Cox and Phaedra Pezzullo argue that a discourse is dominant when it "gains a broad or taken for granted status in a culture or when its meanings help to legitimize certain practices." They explain that these "discourses are [often] invisible in the sense that they express naturalized or taken-for-granted assumptions and values about how the world is or should be organized."[18] In the case of the LEBOR, I begin by analyzing the 2020 version of the Ohio Right to Farm Law because the legislation illustrates what can be considered the dominant discourse as it literally defines the legal meaning of agriculture within the state. The initial bill was passed in 1982 and Ohio lawmakers revised the civil statute in 2020. [19] The most recent version of the law indicates two distinct yet related strands of ideas about agricultural land and land-use practices. First, farms and farmers are in need of protection. Second, farmland is property untethered from nature or the environment.

The sense that farms must be protected is also evident in the Right to Farm law's establishment of "agricultural districts." According to the law, a farm can be enrolled as an agricultural district if it has been used for agricultural production for at least the prior three years, is at least 10 acres, and the average yearly gross income during the previous three-year period was at least twenty-five hundred dollars. Once agricultural land is designated an agricultural district by the state, it is protected from nuisance lawsuits, and some eminent domain claims. Farmers can also defer certain types of taxes as long as the land is kept in agricultural use. Perhaps the most important provision is that farmers whose land is registered as agricultural districts have a "complete defense" against civil action.[20] The basic idea of the law is that farmers should not be sued for doing farm activities. For example, a farmer whose land is registered as an agricultural district would be protected against a lawsuit from a neighbor who sues about the smell of livestock. These protections have developed, in part, because farming is a huge economic driver that contributes more than $53 billion to Ohio's economy, as well as twelve percent of all jobs in the state.[21]

Beyond nuisance lawsuits, the eminent domain language in the law reflects concerns that farms are also under threat from development. According to the Ohio Farmland Preservation Office, Ohio lost nearly one-third of its agricultural land between 1950 and 2000, mostly due to residential and commercial development. [22] Joshua Trey Barnett encourages rhetorical analysis that critically considers "content" in order to grapple with both the moments when rhetors explicitly engage ecological concerns as well as the instances when they fail to do so.[23] In the case of Western Lake Erie, there are rhetorical absences that are worth considering given that much of Ohio was once forested. The Western Lake Erie watershed was once part of the massive Great Black Swamp, a swampland "30 to 40 miles wide, [that extended] for 120 miles from the Sandusky River in the east, nearly to Fort Wayne, Indiana, in the west."[24] Due to the harsh wilderness conditions in and near the swamp, it was also one of the last places in Ohio where indigenous tribes lived in the late 1700s and into the early 1800s. In the nineteenth century, the Great Black Swamp was drained to enable agricultural development and the colonization of the land.[25] However, the Ohio Right to Farm Law does not acknowledge that the state's farmland has not always been farmland, nor the history of settler colonialism and the native tribes that co-existed with the swamp

for centuries. This is not to say that the Ohio General Assembly or the Farmland Preservation Office should recount the history of the Great Black Swamp, but the erasure of the history of the ecosystem seems to matter. Although there is concern about the threat of development in the Ohio Right to Farm Law, agriculture was also a form of development that drastically transformed the landscape into agricultural property for white newcomers.

Once drained, the former swampland was bought and sold, and farms eventually became spaces understood as protected property. In the Ohio Right to Farm Law, farmland is bounded and categorized as "land" and "property" and is recognized as property when organized in "tracts," "parcels," "lots," or "acres." This language limits thinking about connectedness and systems—there are no ecosystems in the Ohio Right to Farm Law. It is understandable that agricultural land is described in this manner; farms are property and some farms do need protection against certain kinds of development and nuisance lawsuits. However, the complex history of the Western Lake Erie watershed underscores the colonizing relationship with land for the humans who once lived there, those who currently live there, and the more-than-human ecosystem.

Opposing and Supporting the LEBOR

The Opposition of the Ohio Farm Bureau (OFB)

The Ohio Farm Bureau is a 100-year-old nonprofit organization founded in 1919 to advocate for Ohio farmers and farming communities.[26] Today, the OFB is still a powerful lobbying organization for farmers in the state of Ohio. The OFB communicates with members in various ways, but in this article, I look at public communications of the OFB via the blog on its website. In its efforts to defeat the LEBOR, the OFB blog made three distinct arguments: (1) the LEBOR is silly and absurd; (2) the LEBOR violated the Ohio Right to Farm Law and its protections for farms against nuisance lawsuits; and (3) the LEBOR is unconstitutional.

The OFB seized on the idea that farmers could be "sued by Lake Erie" early on in blog posts about the LEBOR. Before the ballot initiative passed, one blog post described the situation this way: "Toledo voters will soon decide whether farmers can be sued by Lake Erie."[27] Another post explained, "You could be sued by Lake Erie, or more precisely, by any resident of Toledo who wants to speak for the lake and finds fault with the way you're farming or doing business.

The massive Great Black Swamp spanned most of Northwestern Ohio and into Indiana. By Drdpw, CC BY-SA 2.5, via Wikimedia Commons.

It sounds incredible, but the threat is real enough that [the] Farm Bureau is engaged in the legal maneuvering."[28] In this blog excerpt, the Farm Bureau presented itself as a reluctant participant, highlighting the tension between the absurdity of a lake being able to sue a person, but simultaneously being a viable threat. This tension is reminiscent of other arguments in which environmental positions are described as ridiculous and trivialized while still being seen as threatening to a specific way of life.[29]

The term nuisance appears repeatedly in OFB discourse and is typically described as farmers getting sued over things like smells or traffic. One post about the LEBOR described the financial penalties farmers endured in other states: "Juries have awarded millions of dollars to rural residents who complained about the smell, flies and increased truck traffic around the farms."[30] In Ohio, enrollment as an agricultural district is one way that farmers typically protect themselves from nuisance lawsuits. However, the 2019 budget bill that blocked the LEBOR also expanded protections to farmers who did *not* register their farm as an agricultural district. The Farm Bureau blog post claimed that although the budget bill loophole was meant to protect farmers from the LEBOR, it might not be enough for complete protection: "[W]e don't know for sure that those lawsuits would be considered nuisance and whether this defense would be the slam dunk. But as I always say as a lawyer, I want every farmer to have every tool in the toolbox that they can and so if there's any chance it would work, we want farmers to be able to use this and have this at their disposal as needed."[31] Using the budget bill as a way to invalidate the LEBOR indicates concern among farmers and lobbyists about whether nutrient pollution to an ecosystem could be considered a legal nuisance.

OFB blog posts do not explicitly acknowledge the direct harm farmers cause to Lake Erie and its larger ecosystem. The words "nutrient pollution," for example, never appear, nor does the word "algae." However, the OFB did implicitly acknowledge that the LEBOR was about water quality in its commentary about the ballot initiative's Rights of Nature language: "The rights this measure would grant the lake include, 'an ability to exist, flourish, be free from pollution' and other broadly described entitlements."[32] The LEBOR does not actually use the phrase "free from pollution" in its text, though it does use the words "exist and flourish." Whether this was a misunderstanding of the LEBOR, or an intentional rhetorical widening of its potential implications is unclear. More importantly, the type of pollution—nutrient pollution—and what it causes—algae blooms—do not appear in these blog posts. Yet in a post from January 29, 2019, the Farm Bureau encouraged members to: "Make sure you're talking about all the good things you are doing for water quality… and the challenges that we face and how we are taking the bull by the horns and doing our part."[33] As an advocacy organization for Ohio farmers, it makes sense that the blog posts did not focus on what farmers were doing wrong, but their omission of any discussion of nutrient pollution is an instructive discursive silence.

The reticence to directly discuss nutrient pollution was apparent in an Ohio Farm Bureau blog post about Mark Drewes, the farmer who filed the lawsuit against the LEBOR. The writer described Drewes in February 2019 as "employing a variety of conservation practices, water monitoring systems, water control structures and… [using] variable rate enabled equipment and yet he's vulnerable to frivolous lawsuits. We are proud that our member has stood up against this overreach, and his efforts will benefit all Farm Bureau members, farmers, and protect jobs in Ohio."[34] The author positioned Drewes as a responsible steward of conservation and the LEBOR as a case of frivolous overreach, repeating the earlier trivializing language of OFB blog posts, without acknowledging the real problem—nutrient pollution in Ohio waterways from farm runoff.

This rhetoric echoes the dominant discourse of the Ohio Right to Farm Law in its sentiment that farmers and farms need protection from those who would do them harm rather than citizens or ecosystems needing protection from hazardous agricultural practices.

In the same blog post, Mark Drewes's lawyer, Thomas Fusonie, argued that their lawsuit sought to "protect" the Drewes family's fifth-generation farm from an "unconstitutional assault."[35] LEBOR opponents frequently used the term "family farm" and in the case of the Drewes family, it was an accurate description. However, the term also evokes a romanticized version of farming that does not strongly align with the reality of large-scale industrial farming and animal feeding facilities that have expanded over the past two decades.[36] The legal argument about the LEBOR's unconstitutionality was that municipalities, like Toledo, could not pass such an amendment because the State of Ohio holds constitutional authority over public interests concerning the lake. According to Fusonie, the LEBOR would have given "Toledoans authority over nearly 5 million Ohioans, thousands of farms, more than 400,000 businesses and every level of government in 35 northern Ohio counties plus parts of Michigan, Indiana, Pennsylvania, New York and Canada."[37] The argument that Toledo lacked the authority to enforce its amendment was the same reasoning the federal judge used to declare the LEBOR unconstitutional in 2020. LEBOR opponents' commentary about constitutionality, however, elides the very argument that many Rights of Nature advocates attempted to make: why is the continuous pollution of an ecosystem considered constitutional? In rural areas with extensive farmland and many types of farms, such as those in the Western Lake Erie watershed, nutrient pollution persists—even when farmers adopt conservation practices like building buffer zones and using precise nutrient management plans.

The Support of Toledoans for Safe Water (TSFW)

On its website, Toledoans for Safe Water describes itself as a "grassroots organization in the Toledo area working to establish a Bill of Rights to protect Lake Erie and the communities that rely on its health and viability."[38] This group began with the specific purpose of organizing around a new legal framework to better support community rights and the Rights of Nature. In both the language of the LEBOR and its public organizing, the TFSW advanced four distinct yet interrelated arguments to advocate for the Lake Erie ecosystem: (1) because government inaction allows pollution to persist legally, communities need more tools to resist this hazardous status quo; (2) responsibility must be assigned for the current condition of the Lake Erie ecosystem; (3) a rhetoric of dependence defines the relationship between humans and the ecosystem; and (4) the Rights of Nature involves more than personhood, distinguishing TFSW from other environmental advocates.[39]

The home page of the TFSW website places the story of the 2014 Toledo Water Crisis front and center, recounting the water advisory city officials issued following the detection of toxic algae in the Maumee River. The group explains that the LEBOR is a means to legalize "sustainability, community rights, and environmental protections."[40] This language draws attention to the idea that causing harm to ecosystems is often legally sanctioned, while attempting to stop harm is not:

> Taxpayers have endured unsafe drinking waters and toxic shorelines for an unreasonable amount of time. Throughout it all, industrial farming practices remain not only steadfast but are encouraged and

> prioritized above the health and rights of the people and environment. This needs to change. Now, in a time that calls for urgent and drastic environmental protections, our charter amendment initiative demands a new political framework built on Rights of Nature and local self-governance.[41]

Local self-governance is permitted under the Ohio Constitution through a concept called home rule. Yet in the case of decades of pollution in Lake Erie and other environmental protection issues, like fracking, home rule has not been effective in helping local municipalities protect themselves from known or potential environmental hazards.[42] On its official website, the TFSW asserts that its organizing involves more than highlighting a person's right to a healthy environment, and argues that community and natural rights are distinct yet mutually supportive.

In the LEBOR, the TFSW utilized a rhetoric of "emergency" to describe the state of the lake and its ecosystem, and to express care and concern for both human and more-than-human beings:

> We the people of the City of Toledo declare that Lake Erie and the Lake Erie watershed comprise an ecosystem upon which millions of people and countless species depend for health, drinking water and survival. We further declare that this ecosystem, which has suffered for more than a century under continuous assault and ruin due to industrialization, is in imminent danger of irreversible devastation due to continued abuse by people and corporations enabled by reckless government policies, permitting and licensing of activities that unremittingly create cumulative harm, and lack of protective intervention. Continued abuse consisting of direct dumping of industrial wastes, runoff of noxious substances from large scale agricultural practices, including factory hog and chicken farms, combined with the effects of global climate change, constitute an immediate emergency.[43]

People, countless species, and the ecosystem itself have been harmed. The TFSW is clear about how this harm has occurred, as they identify the entities responsible for the current condition of the ecosystem as a whole: industrial waste, farm runoff, and government policies that allow for abuse. The litany of harms is coupled with a rhetoric of urgency: for TFSW, the state of the lake is one of imminent and potentially irreversible danger.

In the dominant legal discourse about agriculture in Ohio, farmers are understood to own discrete parcels of productive land, each bounded and largely disconnected from the others. Property lines are what matter in terms of how people are supposed to relate to land. In the LEBOR, however, there is no farmland or industrial land—there are ecosystems and watersheds that not only exist, but possess rights: "Lake Erie, and the Lake Erie watershed, possess the right to exist, flourish, and naturally evolve. The Lake Erie Ecosystem shall include all natural water features, communities of organisms, soil as well as terrestrial and aquatic sub ecosystems that are part of Lake Erie and its watershed."[44] This rhetoric prioritizes natural systems rather than parcels of property. The LEBOR does not attempt to get rid of the concept of property, but encourages thinking about the environmental consequences of humans conceptualizing land *only* as property. The TFSW articulates a different relationship with land for humans: "We the people of the City of Toledo find that laws ostensibly enacted to protect us, and to foster our health, prosperity, and fundamental rights do neither; and that the very air, land, and water – on which our lives and happiness depend – are threatened."[45] There is recognition of dependence rather than ownership, where humans and the more-than-human depend upon ecosystems for survival.[46]

In many articulations of the Rights of Nature, the language emphasizes the concept of personhood.[47] The TFSW, however, note that their vision of Rights of Nature is more complex than the idea of personhood, mirroring the praxis of the CELDF, which helped the group draft the legislation. According to CELDF, "One common misconception—including within elements of the Rights of Nature movement—is that organizers are advancing legal personhood for ecosystems. The truth is more complex."[48] In an opinion piece in *The Guardian* by two members of TFSW, Markie Miller and Crystal Jankowski, explained, "In fact, we were careful to distinguish between human rights ('personhood') and ecosystem rights. For humans, the LEBOR recognises rights 'to a clean and healthy environment' and to a system of government that protects 'human, civil, and collective rights.' But for the lake, it recognises different rights: to 'exist, flourish and naturally evolve'—it does not establish 'personhood.'"[49] There are, of course, different ways that nature can be framed in legal discourses, including: (1) normative reflection of human rights, (2) common heritage of humanity, (3) constitutional objective to protect the environment, (4) human right to a favorable environment and (5) nature as a legal subject and person.[50] The LEBOR organizers are attempting to do both four and five, but they would likely argue that nature should be a subject with legal standing, but *not* articulated as a person.

Miller and Jankowski's concerns about personhood focus on how corporations utilize the concept: "Personhood protections for ecosystems can quickly be co-opted. We must not advance a movement where ecosystem rights come in conflict with the human rights of poor people. Instead, the LEBOR treats city residents and the natural world as allies in a fight against corporate greed by elevating both human and ecosystem rights above the property privileges of corporations."[51] The members of TFSW recognize these limitations in their arguments about personhood and instead pursue a more ecocentric framing of an ecosystem's rights to "exist, flourish, and naturally evolve."

Can a legal failure be a rhetorical success?

It is difficult to disrupt, let alone reverse, ecologically damaging practices that have become the status quo over time. The LEBOR is an ecocentric interruption because it challenges the dominant discourse about who and what needs protection, and why. The dominant discourse, written into law, prioritizes the need to protect agricultural property from development and nuisance lawsuits, while the LEBOR positions farms, especially large-scale industrial livestock farming, as sources of ecological damage. The LEBOR recognizes property rights but questions why the rights of corporations are privileged above the rights of humans and ecosystems. As a result, it disrupts the narrative of property—not to get rid of it, but to remind the public that farmland is connected to waterways and ecosystems. When humans conceptualize land solely as property, it sets ecosystems and the species that depend on them on a perilous path.

Where does this disruption lead? The ecocentric interruption of the Lake Erie Bill of Rights has led to a more systems-level approach to thinking about farms as parts of ecosystems at the state level. The LEBOR advocates galvanized new initiatives where citizens and politicians had failed in the past. In 2019, while the LEBOR was being contested in court, the administration of Ohio Governor Mike DeWine created a new program, H2Ohio, to address water quality problems like nutrient pollution in Ohio. The program includes partnerships with three state agencies—the Ohio Environmental Protection

Agency, the Ohio Department of Agriculture, and the Ohio Department of Natural Resources—as well as with nonprofit organizations like the Ohio Farm Bureau and The Nature Conservancy. The initiative focuses on various water quality issues, such as septic infrastructure, lead contamination, algal blooms, and nutrient pollution. The latter two are of particular interest because they represent a new approach to addressing nutrient pollution, its effect on algal blooms, and the health of Lake Erie and other Ohio waterways.

The H2Ohio website directly connects algal blooms to farm runoff. The water quality initiative states that it is "working to strategically address serious water issues that have been building in Ohio for decades. Such problems include harmful algal blooms on Lake Erie caused by phosphorus runoff from farm fertilizer."[52] The explicit identification of the cause of algal blooms departs from the rhetoric of the Ohio Farm Bureau, which omitted such connections. The H2Ohio site also includes both the human and the more-than-human within its aegis, explaining, "Algal blooms in Ohio's lakes, rivers, and streams can threaten drinking water and impact the health of people and animals."[53] The admission that the state's approach to water quality was flawed and had been so for quite some time, gently echoes the discourse of the TFSW. In some regards, the rhetoric of this new initiative is less forceful than that of the LEBOR; it does not claim that nature should have rights. Nonetheless, H2Ohio openly identifies the problem and is working toward two environmental goals: reducing the amount of phosphorus that infiltrates waterways and cultivating wetlands on agricultural land. The growth of wetlands will naturally filter agricultural runoff and return parts of the Western Lake Erie watershed's ecosystem closer to its environmental state prior to intensive agricultural development.[54] The rhetoric of the website also repeatedly stresses that these

Sunrise over Lake Erie from Kelleys Island State Park. Image courtesy of Sheryl Cunningham.

approaches will not create change quickly: "Ohio's water quality issues took time to develop, and it will take time to reverse course," which suggests that the state government is acknowledging the need for ongoing, comprehensive action to protect Ohio ecosystems and all who depend on them.[55]

Organizing around the Lake Erie Bill of Rights in Toledo is not solely responsible for the creation of the H2Ohio program. Nonetheless, it is difficult to ignore how Ohio policymakers' urgency about addressing nutrient pollution increased in the legal aftermath of the failed Toledo ballot measure. Additionally, there are some rhetorical parallels between the LEBOR and the H2Ohio initiative in how they identify the lake's importance for humans and the more-than-human and acknowledge the perennially inadequate protection of water resources. These outcomes suggest that ecocentric interruptions, like legal arguments for the Rights of Nature, can be generative outside of the legal system for which they are created. Using Rights of Nature language helps reframe humans' relationship with nature and the environment, and allows people to ask simple yet compelling questions about rights and the way they are applied. The Rights of Nature language has the capacity to be particularly productive in agricultural contexts because it aligns with what many farmers already know—dependence on the land. This shared condition of dependence and connection is true for humans, animals, plants, and the land itself. Regular use of more ecocentric language will not change environmental conditions on the ground or in the water overnight, but it is a start. Normalizing an ecological understanding of connectedness and thinking about ecosystems in a country like the United States—where property and property rights are prioritized—is essential for reframing approaches to complex problems such as nutrient pollution.

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GEOGRAPHIES

MISI-ZAAGA'IGANING (MILLE LACS LAKE)

By Travis Zimmerman

Minnesota is largely defined by its cultural and geographic relationships to its lakes, large and small. Lake Superior, on Minnesota's north shore, is part of the chain of North American Great Lakes that are well known and internationally iconic. Yet, Mille Lacs Lake, the second-largest lake in Minnesota, is no less impressive and culturally relevant.

In "Misi-zaaga'iganing (Mille Lacs Lake)," Travis Zimmerman uses the Mille Lacs Indian Trading Post historical site to explore the social and political history of the region. Today, the site serves a very different function than when the trading post first opened in the 1920s. In an area packed with mega lakes, historic sites (such as the Mille Lacs Trading Post) offer avenues to explore how a body of water connects to residents' sense of place and identity.

– Mikala Stokes, Editorial Assistant

A sunset on Mille Lacs Lake as seen from Father Hennepin State Park near Isle, Minnesota. Image courtesy of Tom Webster (CC-BY-2.0).

Mille Lacs Lake is the second largest lake in Minnesota and archaeological evidence suggests that it was one of the first areas that humans settled in the region. Many different groups of people have called the area around the lake home. A number of Native American tribes have lived around the lake throughout time. When some of the first Europeans came through the area in the 1600s they were met by the Cheyenne. During the next century, as the Cheyenne migrated westward, the Dakota moved into the area and called the lake Bdé Wakán or Mystic Lake. When the Ojibwe arrived in the mid-eighteenth century, they called the lake Misi-zaaga'iganing, the lake that spreads all over. The first Europeans to travel through the area were French explorers, followed by French and British traders, and eventually Americans that set up towns and settlements around the lake. Following a series of treaties that resulted in the establishment of the state of Minnesota, loggers flooded into the area for the timber that was found throughout the forest surrounding the lake. By the early 1900s, trading posts and stores could be found around the lake and along rivers in the region. One of these trading posts was run by Harry and Jeannette Ayers, who moved to the area from St. Paul, Minnesota and were granted a trading license by the United States Indian Service in 1918. They were forced to relocate from their original location in 1925 and by the next decade their new trading post was open for business on the southwest shores of Mille Lacs Lake. In the beginning the trading post served as a general store for the local community, but as more tourists came through the area, they started to buy and sell American Indian arts and crafts. Eventually their enterprise would expand to include cottage rentals, a boat building and repair business, and fishing guide services.

The Mille Lacs Indian Trading Post in 1950. Image courtesy of Minnesota Historical Society.

The lake provided area inhabitants with everything they needed to sustain life. Besides the obvious resources a lake the size of Mille Lacs provides—like walleye, northern, and bass—the lake also provided ducks, geese, turtles, and muskrats just to name a few of the birds and other animals that frequented her shores. Plants like cattails and nettles provided a versatile food source as well as material that could be woven into bags, mats, and fiber that was used for cordage. Along the shores and surrounding wetlands, dozens of plants were used for food, medicine, and dye. The adjacent coniferous forest provided plenty of game that also provided furs and hides for clothing. Local rivers and lakes also were important sources of wild rice, the food growing on the water that led the Ojibwe to migrate into the area from the east coast. Today the Ojibwe, more specifically the Mille Lacs Band of Ojibwe, still rely on the resources provided by the lake and the surrounding area. Although the great coniferous forest is gone, fish and wild game are plentiful, wild rice can still be found in some lakes around the area, and maple trees are abundant for collecting sap and boiling down to syrup and sugar.

When the Ayers moved their business to the southwest shore of Mille Lacs, they did so to be closer to the community of the Ojibwe that were scattered throughout the area. They relied on the members from the Mille Lacs Band of Ojibwe to assist with their operations and worked closely with the Band, often advocating on their behalf in dealings with the Bureau of Indian Affairs. Harry Ayers was also an avid collector of American Indian items and by the 1950s he had accumulated over 1,000 pieces of Ojibwe material culture.

Mille Lacs Indian Museum today. Image courtesy of Minnesota Historical Society.

Mille Lacs Indian Museum, 2012.
Image courtesy of Brady Willette and Minnesota Historical Society.

Birch bark basket workshop.
Image courtesy of Charlie Vaughn and Minnesota Historical Society.

In 1959, the Ayers donated these items along with the trading post and other buildings on site as well as the land to the Minnesota Historical Society. The Mille Lacs Indian Museum and Trading Post opened as a historic site in 1960. The first museum was a building used to store Harry's collection that was attached to the trading post. The site was a unique collaboration between the Mille Lacs Band of Ojibwe and the Minnesota Historical Society. This museum stayed in operation until 1992, when it was torn down to break ground for a new museum. When the planning for this new museum began in the early 1990s, an advisory council made up of elders from the Band and other community members made sure that the relationship to the water was reflected in the architectural design of the building. As a result, the entire east side of the museum is all windows that face the lake and mimic the shoreline of Lake Mille Lacs. The current museum, which opened in 1996, brings the history, culture, and art of the Ojibwe alive through tours of the Four Seasons Room where visitors can learn about seasonal activities that have been practiced for hundreds of years. The Four Seasons Room and the other exhibits highlight the significance of the lake to the Ojibwe way of life, and the importance of the lake throughout their history as they struggled for survival and eventually retained their hunting and fishing rights when those rights were upheld by the United States Supreme Court in 1999. The site also includes programs, workshops, and the trading post that continues to sell authentic Native American arts and crafts made by members from the local community and Native artisans from throughout the United States.

Mille Lacs Indian Trading Post today.

The partnership between the Mille Lacs Band of Ojibwe and the Minnesota Historical Society, and the stories that are told at the site have created both challenges and opportunities. Since the site is located on a reservation, many people assume that it is a tribally run museum, owned and operated by the Mille Lacs Band. Since it is a partnership, that creates some confusion. Another challenge, which is common amongst a lot of museums, especially museums that tell the story of any community, is keeping the exhibits and stories fresh and updated. The current museum has been around for more than 20 years, and besides a few minor additions, it has not changed much in the last couple of decades.

As the old adage goes, with every challenge comes opportunity, and the site has had the opportunity to bring in traveling exhibits throughout the past several years to get people to keep coming back to the museum. In the fall of 2019, the museum was the host site for another traveling exhibit entitled We Are Water MN. This exhibit highlights the importance of water in people's lives by exploring how we relate to water, how we use water, how water unites communities, and how water affects every element of our lives. This exhibit also examines how we care for and protect water for future generations. This exhibit travels around the state and focuses on the stories particular to the areas that are hosting it. At the Mille Lacs Indian Museum, the exhibit includes stories of Mille Lacs Band members and other local community members and their relationship to Mille Lacs Lake and other watersheds in the area. We Are Water MN is led by the Minnesota Humanities Center in partnership with the Minnesota Pollution Control Agency, the Minnesota Historical Society, and the Minnesota Departments of Agriculture, Health, and Natural Resources.

Hear Gary Benjamin' s We Are Water MN story, "Water is medicine." (transcript)
See more stories in the online map.

In addition to the traveling exhibit, the museum has further, future opportunities to continue to connect the stories of the Mille Lacs Band of Ojibwe with Mille Lacs Lake. Positioned on the shores of the lake, future programming ideas include a walking trail that visitors will be able to explore that will take them out to the lake and around the site. This trail will have interpretive signs of aquatic plants and animals that were used by the Ojibwe. These signs would be bilingual, including the common English name as well as the Ojibwe name. This trail could be used when the museum building is not open and hopefully birdwatchers and other nature lovers could utilize the trail. Potential partners for this project could be the Mille Lacs Band of Ojibwe, the Minnesota Department of Natural Resources, and the Lake Mille Lacs Scenic Byway Committee.

As museum professionals, we often talk about interpreting history where it happened and the power of place. The Mille Lacs Indian Museum and Trading Post is located in an area that is rich in history, has an incredible amount of biodiversity, and resides along the shores of one of the largest lakes in Minnesota. Located centrally in the middle of the state, the site is only a couple of hours from most major cities in Minnesota, so can be visited as a day trip. We invite you to come visit and experience for yourself the history, culture, and art of the Ojibwe, as well as to explore the beautiful area around Lake Mille Lacs.

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PERSPECTIVES

LOOKING FOR A US 'CLIMATE HAVEN' AWAY FROM DISASTER RISKS?

By Julie Arbit, Brad Bottoms, and Earl Lewis

Southeast Michigan seemed like the perfect "climate haven."

"My family has owned my home since the '60s. … Even when my dad was a kid and lived there, no floods, no floods, no floods, no floods. Until [2021]," one southeast Michigan resident told us. That June, a storm dumped more than 6 inches of rain on the region, overloading stormwater systems and flooding homes.

Burlington, Vermont, is often named as a 'climate haven,' but surrounding areas flooded during extreme storms in July 2023.
Image by Beyond My Ken, CC BY-SA 4.0, via Wikimedia Commons.

That sense of living through unexpected and unprecedented disasters resonates with more Americans each year, we have found in our research into the past, present and future of risk and resilience.

An analysis of federal disaster declarations for weather-related events puts more data behind the fears – the average number of disaster declarations has skyrocketed since 2000 to nearly twice that of the preceding 20-year period.

As people question how livable the world will be in a warming future, a narrative around climate migration and "climate havens" has emerged.

These "climate havens" are areas touted by researchers, public officials and city planners as natural refuges from extreme climate conditions. Some climate havens are already welcoming people escaping the effects of climate change elsewhere. Many have affordable housing and legacy infrastructure from their larger populations before the mid-20th century, when people began to leave as industries disappeared.

But they aren't disaster-proof – or necessarily ready for the changing climate.

Flooding on main street in Montpelier, Vermont, July 11, 2023. The Vermont National Guard was activated to assist in flood disaster relief and search and rescue operations. Image by Sgt. Denis Nunez, U.S. Army National Guard. CC BY 2.0, via Wikimedia Commons.

Six Climate Havens

Some of the most cited "havens" in research by national organizations and in news media are older cities in the Great Lakes region, upper Midwest and Northeast. They include Ann Arbor, Michigan; Duluth, Minnesota; Minneapolis; Buffalo, New York; Burlington, Vermont; and Madison, Wisconsin.

Yet each of these cities will likely have to contend with some of the greatest temperature increases in the country in the coming years. Warmer air also has a higher capacity to hold water vapor, causing more frequent, intense and longer duration storms.

These cities are already feeling the impacts of climate change. In 2023 alone, "haven" regions in Wisconsin, Vermont and Michigan suffered significant damage from powerful storms and flooding.

The previous winter was also catastrophic: Lake-effect snow fueled by moisture from the still-open water of Lake Erie dumped over 4 feet of snow on Buffalo, leaving nearly 50 people dead and thousands of households without power or heat. Duluth reached near-record snowfall and faced significant flooding as unseasonably high temperatures caused rapid snowmelt in April.

Heavy rainfall and extreme winter storms can cause widespread damage to the energy grid and significant flooding, and heighten the risk of waterborne disease outbreaks. These effects are particularly notable in legacy Great Lakes cities with aging energy and water infrastructure.

A lake-effect snowstorm in November 2014 buried Buffalo, New York, under more than 5 feet of snow and caused hundreds of roofs to collapse. A similar storm occurred in December 2022. Image by Anthony Quintano, CC BY 2.0, via Wikimedia Commons.

Older Infrastructure Wasn't Built For This

Older cities tend to have older infrastructure that likely wasn't built to withstand more extreme weather events. They are now scrambling to shore up their systems.

Many cities are investing in infrastructure upgrades, but these upgrades tend to be fragmented, are not permanent fixes and often lack long-term funding. Typically, they also are not broad enough to protect entire cities from the effects of climate change and can exacerbate existing vulnerabilities.

Electricity grids are extremely vulnerable to the mounting effects of severe thunderstorms and winter storms on power lines. Vermont and Michigan are ranked 45th and 46th among the states, respectively, in electricity reliability, which incorporates the frequency of outages and the time it takes utilities to restore power.

Stormwater systems in the Great Lakes region also regularly fail to keep pace with the heavy rainfall and rapid snowmelt caused by climate change. Stormwater systems are routinely designed in accordance with precipitation analyses from the National Oceanic and Atmospheric Administration called Atlas 14, which don't account for climate change. A new version won't be available until 2026 at the earliest.

Madison, Wisconsin, has seen warmer summers and more precipitation in the past decade. Image by Jeff Miller, University of Wisconsin-Madison, CC BY 2.0, via Wikimedia Commons.

At the confluence of these infrastructure challenges is more frequent and extensive urban flooding in and around haven cities. An analysis by the First Street Foundation, which incorporates future climate projections into precipitation modeling, reveals that five of these six haven cities face moderate or major flood risk.

Disaster declaration data shows that the counties housing these six cities have experienced an average of six declarations for severe storms and flooding since 2000, about one every 3.9 years, and these are on the rise.

Intensified precipitation can further stress stormwater infrastructure, resulting in basement flooding, contamination of drinking water sources in cities with legacy sewage systems, and hazardous road and highway flooding. Transportation systems are also contending with hotter temperatures and pavement not designed for extreme heat.

As these trends ramp up, cities everywhere will also have to pay attention to systemic inequalities in vulnerability that often fall along lines of race, wealth and mobility. Urban heat island effects, energy insecurity and heightened flood risk are just a few of the issues intensified by climate change that tend to hit poor residents harder.

What can cities do to prepare?

So, what is a haven city to do in the face of pressing climate changes and population influx?

Decision-makers can hope for the best, but must plan for the worst. That means working to reduce greenhouse gas emissions that are driving climate change, but also assessing the community's physical infrastructure and social safety nets for vulnerabilities that become more likely in a warming climate.

Collaborating across sectors is also essential. For example, a community may rely on the same water resources for energy, drinking water and recreation. Climate change can affect all three. Working across sectors and including community input in planning for climate change can help highlight concerns early.

There are a number of innovative ways that cities can fund infrastructure projects, such as public-private partnerships and green banks that help support sustainability projects. DC Green Bank in Washington, D.C., for example, works with private companies to mobilize funding for natural stormwater management projects and energy efficiency.

Cities will have to remain vigilant about reducing emissions that contribute to climate change, and at the same time prepare for the climate risks creeping toward even the "climate havens" of the globe.

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PRIMARY SOURCES

CLIMATE CHANGE THREATENS DRINKING WATER QUALITY ACROSS THE GREAT LAKES

By Gabriel Filippelli, and Joseph D. Ortiz

This story is part of the Pulitzer Center's nationwide Connected Coastlines reporting initiative. For more information, go to https://pulitzercenter.org/journalism/initiatives/connected-coastlines.

"Do Not Drink/Do Not Boil" is not what anyone wants to hear about their city's tap water. But the combined effects of climate change and degraded water quality could make such warnings more frequent across the Great Lakes region.

Harmful algae bloom. Pelee Island, Ohio. Lake Erie. Image by T. Archer, NOAA Great Lakes Environmental Research Laboratory/Flickr.

A preview occurred on July 31, 2014, when a nasty green slime – properly known as a harmful algal bloom, or HAB – developed in the western basin of Lake Erie. Before long it had overwhelmed the Toledo Water Intake Crib, which provides drinking water to nearly 500,000 people in and around the city.

Tests revealed that the algae was producing microcystin, a sometimes deadly liver toxin and suspected carcinogen. Unlike some other toxins, microcystin can't be rendered harmless by boiling. So the city issued a "Do Not Drink/Do Not Boil" order that set off a three-day crisis.

Local stores soon ran out of bottled water. Ohio's governor declared a state of emergency, and the National Guard was called in to provide safe drinking water until the system could be flushed and treatment facilities brought back on line.

The culprit was a combination of high nutrient pollution – nitrogen and phosphorus, which stimulate the growth of algae – from sewage, agriculture and suburban runoff, and high water temperatures linked to climate change. This event showed that even in regions with resources as vast as the Great Lakes, water supplies are vulnerable to these kinds of man-made threats.

As Midwesterners working in the fields of urban environmental health and climate and environmental science, we believe more crises like Toledo's could lie ahead if the region doesn't address looming threats to drinking water quality.

True color photo images of Lake Erie's harmful algal blooms on August 14, 2017. Image by Zachary Haslick, Aerial Associates Photography, NOAA Great Lakes Environmental Research Laboratory/Flickr.

Vast and Abused

The Great Lakes together hold 20% of the world's surface freshwater – more than enough to provide drinking water to over 48 million people from Duluth to Chicago, Detroit, Cleveland and Toronto. But human impacts have severely harmed this precious and vital resource.

In 1970, after a century of urbanization and industrialization around the Great Lakes, water quality was severely degraded. Factories were allowed to dump waste into waterways rather than treating it. Inadequate sewer systems often sent raw sewage into rivers and lakes, fouling the water and causing algal blooms.

Problems like these helped spur two major steps in 1972: passage of the U.S. Clean Water Act, and adoption of the Great Lakes Water Quality Agreement between the United States and Canada. Since then, many industries have been cleaned up or shut down. Sewer systems are being redesigned, albeit slowly and at great cost.

The resulting cuts in nutrient and wastewater pollution have brought a quick decline in HABs – especially in Lake Erie, the Great Lake with the most densely populated shoreline. But new problems have emerged, due partly to shortcomings in those laws and agreements, combined with the growing effects of climate change.

Drinking water from the Great Lakes is in high demand. See video "Tapping the Great Lakes."

Warmer and Wetter

Climate change is profoundly altering many factors that affect life in the Great Lakes region. The most immediate impacts of recent climate change have been on precipitation, lake levels and water temperatures.

Annual precipitation in the region has increased by about 5 inches over the past century. Changes in the past five years alone – the hottest five years in recorded history – have been particularly dramatic, with a series of extreme rainfall events bringing extremely high and rapidly varying water levels to the Great Lakes.

Record high precipitation in 2019 caused flooding, property damage and beachfront losses in a number of coastal communities. Precipitation in 2020 is projected to be equally high, if not higher. Some of this is due to natural variability, but certainly some is due to climate change.

Another clear impact of climate change is a general warming of all five Great Lakes, particularly in the springtime. The temperature increase is modest and varies from year to year and place to place, but is consistent overall with records of warming throughout the region.

More Polluted Runoff

Some of these climate-related changes have converged with more direct human impacts to influence water quality in the Great Lakes.

Cleanup measures adopted back in the 1970s imposed stringent limits on large point sources of nutrient pollution, like wastewater and factories. But smaller "nonpoint" sources, such as fertilizer and other nutrients washing off farm fields and

suburban lawns, were addressed through weaker, voluntary controls. These have since become major pollution sources.

Since the mid-1990s, climate-driven increases in precipitation have carried growing quantities of nutrient runoff into Lake Erie. This rising load has triggered increasingly severe algal blooms, comparable in some ways to the events of the 1970s. Toledo's 2014 crisis was not an anomaly.

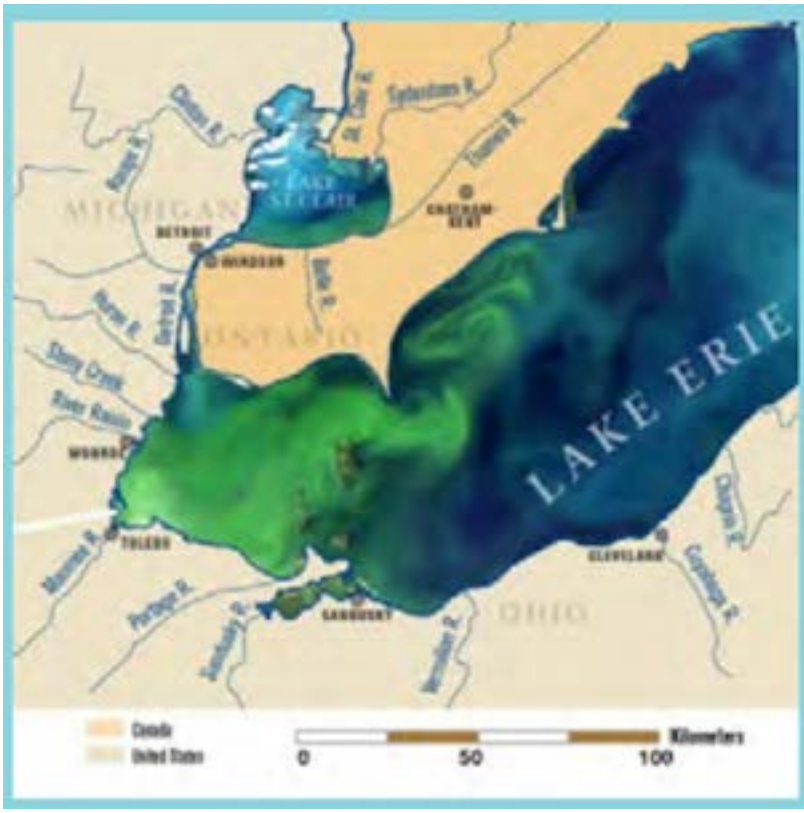
These blooms can make lake water smell and taste bad, and sometimes make it dangerous to drink. They also have long-term impacts on the lakes' ecosystems. They deplete oxygen, killing fish and spurring chemical processes that prime the waters of Lake Erie for larger future blooms. Low-oxygen water is more corrosive and can damage water pipes, causing poor taste or foul odors, and helps release trace metals that may also cause health problems.

So despite a half-century of advances, in many ways Great Lakes water quality is back to where it was in 1970, but with the added influence of a rapidly changing climate.

Filtering Runoff

How can the region change course and build resilience into Great Lakes coastal communities?

Thanks to a number of recent studies, including an intensive modeling analysis of future climate



TRIBUTARY	TP LOAD
LOADS TO LAKE ST. CLAIR:	
St. Clair River	399
Thames River	235
LOADS TO LAKE ERIE:	
Maumee River	3812
Detroit River	1987
Sandusky River	1101
Cuyahoga River	452
Grand River	447
Portage River	369
River Raisin	262
Huron River	205

Figure showing total phosphorus (TP) tributary loading to Lake St. Clair and the western Lake Erie in 2018 in metric tons per annum (MTA). Runoff from agricultural areas is the major source of nutrient loadings with about 70 percent from commercial fertilizer application and 30 percent from animal manure. Diagram and map by Michigan Sea Grant, M. Maccoux, Contractor ECCC, S. Wortman, USEPA, D. Obenour, NCSU, M. Evans, USGS/IJC.

change in Indiana, which serves as a proxy for most of the region, we have a pretty good picture of what the future could look like.

As one might guess, warming will continue. Summertime water temperatures are projected to rise by about another 5 degrees Fahrenheit by midcentury, even if nations significantly reduce their greenhouse gas emissions. This will cause further declines in water quality and negatively impact coastal ecosystems.

The analysis also projects an increase in extreme precipitation and runoff, particularly in the winter and spring. These shifts will likely bring still more nutrient runoff, sediment contaminants and sewage overflows into coastal zones, even if surrounding states hold the actual quantities of these nutrients steady. More contaminants, coupled with higher temperatures, can trigger algal blooms that threaten water supplies.

But recent success stories point to strategies for tackling these problems, at least at the local and regional levels.

A number of large infrastructure projects are currently underway to improve stormwater management and municipal sewer systems, so that they can capture and process sewage and associated nutrients before they are transported to the Great Lakes. These initiatives will help control flooding and increase the supply of "gray water," or used water from bathroom sinks, washing machines, tubs and showers, for uses such as landscaping.

Cities are coupling this "gray infrastructure" with green infrastructure projects, such as green roofs, infiltration gardens and reclaimed wetlands. These systems can filter water to help remove excess nutrients. They also will slow runoff during extreme precipitation events, thus recharging natural reservoirs.

Municipal water managers are also using smart technologies and improved remote sensing methods to create near-real-time warning systems for HABs that might help avert crises. Groups like the Cleveland Water Alliance, an association of industry, government and academic partners, are working to implement smart lake technologies in Lake Erie and other freshwater environments around the globe. Finally, states including Ohio and Indiana are moving to cut total nutrient inputs into the Great Lakes from all sources, and using advanced modeling to pinpoint those sources.

Together these developments could help reduce the size of HABs, and perhaps even reach the roughly 50% reduction in nutrient runoff that government studies suggest is needed to bring them back to their minimum extent in the mid-1990s.

Short of curbing global greenhouse gas emissions, keeping communities that rely so heavily on the Great Lakes livable will require all of these actions and more.

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