

Following the Current:

A Bioregional History of the Fox River from the
Pleistocene to the Present

Book By:
Dr. Jackie G. VanZahms

**Following the Current: A Bioregional
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Pleistocene to the Present**

By Dr. Jackie G. VanZahms

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Authors

Dr. Jackie G. VanZahms is the pen name for the Illinois Mathematics and Science Academy's Fall 2022 Mod 8 History of the Environment class. This is their first book.

D David Love

R. Rylie-Nicole Bozarth

J Jackson Halstead, Janelle Thomas, Jackie Zhang, Jeff Duan

A Atharva Gawde

C Christian Cline

K Keira Feliciano

I Irene Park

E Evan Kuzukas

G. Grace Daum

V Val Castellanos

A Avery Hedican

N Nooriyah Doriwala

Z Zander Tamez

A Alan Hernandez

H Halimat Sanusi

M Maame Poku, Mia Benitez

S Shanan Riley, Shawn Bailey, Simon Hoffman, Sofia Zasiiebida

David Love

David Love is a current senior at IMSA. He wrote about American Rivers classifying the Fox River as endangered.

Rylie-Nicole Bozarth

Rylie-Nicole is a senior at IMSA. Her interests are the environment and bioremediation.

Jackson Halstead

Jackson really likes space, the outdoors, and the environment. He is usually busy doing some sort of work or project but enjoys playing video games and reading in his free time. Writing for this book has been a great experience and he hopes you enjoy it!

Janelle Thomas

Janelle Thomas is a senior. She likes to skateboard and read.

Jackie Zhang

Jackie is an eighteen-year-old Chinese girl who loves enjoying K-pop, reading Chinese books, and consuming other East Asian media. She plays the violin and dances, and she is majoring in chemistry/pharmacy since her passion is in organic/medicinal chemistry.

Jeff Duan

In Jeff's free time, he enjoys going to Fox Valley Mall (they have a new Korean cheese dog restaurant!) but he has never actually seen the Fox River.

Atharva Gawde

Atharva wrote a little bit about the Colonial French presence in the Fox River Valley. But outside of environmental history, he enjoys photography, literature, playing tennis, and learning German.

Christian Cline

Christian's section in this book consists of river otters' relationships to the Fox River, and all their history surrounding the Fox River overall. He chose this because first off, otters are amazing, but also because after doing a bit of beginner's research, Christian discovered that the history of river otters not just in the Fox River, but also the entirety of the state of Illinois is actually quite unique, so he hopes you'll enjoy his section.

Keira Feliciano

Keira Feliciano lives in Aurora, Illinois. She is a senior at the Illinois Math and Science Academy. Outside of school, Keira enjoys skiing, dancing, and spending time with family and friends.

Irene Park

Irene is a current senior at IMSA. She enjoys eating cheese. A fun fact is that she can sleep for nineteen hours at a time.

Evan Kuzukas

Evan was born in Chicago and has lived in the Chicagoland area all his life. He has been interested in the Radium girls since 7th grade and what they have done for worker's rights has inspired him. In his free time, he can be found reading about planes or cars, gaming, or working in the Makerlab

Grace Daum

Grace Daum is an IMSA senior from South Elgin, Illinois. She enjoys chemistry and biology and hopes to one day be a cardiothoracic surgeon. In her free time, Grace runs for IMSA's cross-country team, is an avid fantasy and science fiction reader, and goes fishing on the Fox River with her dad.

Val Castellanos

Valeria (Val) Castellanos (she/her) has lived most of her life in Illinois and is currently completing her high school education at a residential accelerated STEM institution in Aurora, the Illinois Mathematics and Science Academy (IMSA).

Avery Hedican

Avery Hedican lives in Gridley, Illinois. She is a senior at the Illinois Math and Science Academy. When she's not busy with school, Avery spends time with my friends and family or plays hockey.

Nooriyah Doriwala

Nooriyah Doriwala is a senior at IMSA who loves swimming, traveling, and watching foreign films. She enjoyed the process of writing this book and may consider being a radical environmentalist in the near future.

Zander Tamez

Zander is a senior at IMSA who also happens to be one of the authors for this book. He loves to skateboard/dance around and experience new things.

Alan Hernandez

Alan Hernandez is the author of History of Elgin's Growth along the Fox River. He's a senior at IMSA and he wants to major in CS. Some of his hobbies include listening to music and playing Volleyball.

Halimat Sanusi

Halimat is a current senior at the Illinois Mathematics and Science Academy. She is an avid dancer who also enjoys cooking and baking.

Mia Benitez

Mia enjoys drawing using charcoal and watching comedy or horror movies. When she is not busy, she usually spends her free time learning about astronomy.

Maame Poku

Maame is a senior at Illinois Math and Science Academy. She really enjoys being outside in nature, especially when she wants to watch the sunset.

Shanan Riley

Shanan is a senior at IMSA and thinks that History of the Environment is a pretty fun class. Although she's not sure that she has ever even seen the Fox River, she once memorized every invasive species in North America so her section can probably be trusted.

Shawn Bailey

Shawn Bailey has a PhD in environmental history from the University of Montana, where he researched and fished the headwaters of the Columbia River. He teaches history at the Illinois Mathematics and Science Academy and lives in Chicago with his wife and son.

Simon Hoffman

Simon Hoffman is the author of a section of this book. He's currently a senior at IMSA and plans on studying physics in college. His interests are playing games and cooking. He hopes that you enjoy reading his essay!

Sofia Zasiębida

Sofia is a senior at IMSA. She thinks that History of the Environment is a pretty cool class. She is also a fan of restored rivers.

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Figure 1 Fox River Watershed Map, Source: Friends of the Fox River

Foreword

Each day I drive about twenty-five miles to go to the Illinois Mathematics and Science Academy (IMSA). It's where we spend time nurturing and igniting interest for high school aged students around the state interested in science, technology, engineering and math (STEM). While those disciplines are an attractor, the academic environment stimulates curiosity and a sense of investigation in all subject areas. It's not the type of school most people experience. Sure, we have classes, but the nature of learning is not about knowing the same knowledge, but rather an approach to thinking, exploration and creation so that students can lead their learning of different things. Students do projects within and outside of classes, and the school schedule is structured to support both pathways.

IMSA is not just a school, but also a second home to almost all of us. The students reside there which is quite unusual for a public school. We offer an experience uniquely different from high schools throughout the state, providing an invaluable resource to communities that can't create specialized curriculum for uniquely capable and motivated students in STEM. The students stay overnight, and their residential life experience engages them in socio-emotional and leadership development, not to mention learning how to do some essentials like laundry, shopping, and service in the community.

When I am on my drive to IMSA, and when students go on trips off campus, we cross a bridge over the Fox River. I've crossed that bridge countless times. In fact, if I take a different route to school, I cross another bridge over that same river. You can drive five miles to downtown Aurora and cross even a larger bridge, along with a lot of businesses and community activity along the perimeter. You begin to realize the Fox River is important to our community, and then when you

look at a map you realize the Fox River is not just important to Aurora but quite a few towns over a 200-mile stretch in two different states.

As a STEM school, you might think we are curious about the ecology of the river and how that has changed over time due to climate change and the influence of neighboring industries. That's true, however there's so much more to the study of a river – the history of the people who migrated around it, the culture that developed, and the challenges and innovations that were developed as a result of their circumstances. What a great opportunity for a course uniquely equipped for IMSA, the History of the Environment, to investigate further the many facets of the life of a river and its surroundings. It signals that the study of science is influenced by history, and society can influence the future of science. It also helps us understand that each day, when we cross bridges in our hometown, there are important stories behind the rivers that have shaped the community in which we live. I'm grateful our students have investigated and shared some of these stories as part of their learning discoveries, and hope the next edition involves additional perspectives and towns along that 200-mile stretch of the Fox River.

Dr. Evan Glazer
President & CEO of Illinois Mathematics and Science Academy



Figure 2 Illinois Mathematics and Science Academy is located in the Fox River Watershed, two miles due west of the river itself. Source: Google Maps

“It’s Our Fox River” History—An Introduction

Shawn Bailey

On September 8, 2022, ecologist, educator, and river enthusiast Jenni Schiavone slid an aluminum canoe into mild waters in south central Wisconsin, beginning a more than 200-mile float that she later described as “the best trip of my life.” She hoped to paddle the entire length of the Fox River and, in doing so, bring attention to the “It’s Our Fox River Day” conservation events scheduled for September 17 throughout the valley. At its true headwaters, near the Wisconsin town of Colgate, the Fox is little more than a swampy depression full of cattails, basking turtles, and boot-sucking mud. By Brookfield, enough water flows to allow a canoe or kayak under normal conditions, through a narrow channel a spry child could hurdle across. Near Waukesha, eighteen miles west of Milwaukee, a goutier river emerges and flows south into the state of Illinois. During her journey, Schiavone crossed over this man-made border, paddled through multiple ecosystems and across private property lines, bisected golf courses and skirted a small airport, portaged around more than a dozen low-head dams and navigated through crowded towns like Aurora, Illinois, the second largest city in the state. Along the way, Schiavone witnessed the intersection of human beings and other animals within the Fox watershed, juxtaposing the healthy fauna “constantly soaring or splashing” around her on a daily basis with disconcerting sights such as a dead goose hanging in a snarl of discarded monofilament line. Less than two weeks after she started, Schiavone ended her adventure in Ottawa, Illinois, at the confluence of the Fox and the Illinois Rivers. When asked about her goal for undertaking such a trip, Schiavone later remarked: “I wanted to know this river.”¹

¹ Aaron Dorman, “An Algonquin conservationist finds turtles and trash along Fox River as she canoes the 200-mile length,” *Northwest Herald*, September 20, 2022; and Dale Bowman, “Paddling the Fox River, source to confluence: History and fun,” *Chicago Sun-Times*, September 18, 2018.



Figure 3 Jenni Schiavone during her float trip down the Fox River (2022). Source: Shaw Local.

The following book is a collective effort to know the Fox River as well. While Schiavone physically paddled the entire river to improve her ecological knowledge, this collection is an attempt to understand the long history of the Fox River, from its geologic origins at the end of the Pleistocene Epoch to modern issues such as pollution or personhood rights for the river. Within this *longue durée* approach to the history of the Fox, each contributor designed a research project based on their own personality, background, and interests. We make no claims to completeness in our history of the Fox. Consider the following an incomplete, pointillist portrait of a river. Each of the following twenty-two essays is one set of well-paced brush strokes towards a full picture of the history of the Fox, which future scholars will hopefully help complete. This academic journey examines the history of the Fox River through a few lenses, beginning with the concepts of place and bioregional history.

In his book *Space and Place: The Perspective of Experience*, human geographer Yi-Fu Tuan defined the terms space and place with simple calculus. Ideology and cultural values, when added to blank spaces throughout the world, equal distinct humanized places. As Tuan wrote, “place is security,

space is freedom: we are attached to one and long for the other.” People live their lives in places, going to school, working, flirting, committing crimes, having children, creating art, and consuming goods all the while. Places are tangible and definable entities on a map. Spaces, however, are nonconcrete by nature and much more challenging to describe. For Tuan, “open space has no trodden paths and signposts. It has no fixed pattern of established human meaning; it is like a blank sheet on which meaning may be imposed.” When humans impress their own needs, wants, and desires on a space—such as a river—they create a uniquely human landscape.²

According to historian Dan Flores, the term “bioregion” is “a precise and highly useful term of art for environmental historians.” Bioregional history is deceptively easy to imagine. A bioregion is delineated by environmental and topographical borders and not political lines on a map. The Fox River is a definable bioregion—a watershed that covers 202 miles from boggy headwaters to concluding confluence, draining 2,658 square miles in the process. The fact that this bioregion cuts through two states, eight counties, and numerous towns and cities is of secondary importance to the definition of this particular place. Flores’ builds off Tuan’s equation and posits that the “narrative line of bioregional history is essentially imagining the stories of different but sequential cultures occupying the same space and creating their own succession of ‘places’ on the same piece of ground.”³ Applying this maxim to the Fox River allows historians to visualize the distinct places created by human beings in the valley over the course of 10,000 years or more. The river traversed by Black Hawk and thousands of indigenous peoples prior to and during the early nineteenth century was not the same waterway dammed by industrialists in the early twentieth century nor the

² Yi-Fu Tuan, *Space and Place: The Perspective of Experience*, (Minneapolis: University of Minnesota Press, 1977): 3, 6, 12, 18, 54; and Tim Cresswell, *Place: A Short Introduction*, (Malden, MA: Blackwell Publishing, 2004): 12.

³ United States Geological Survey, “Fox River,” Feature ID 408636, January 15, 1980, <https://edits.nationalmap.gov/apps/gaz-domestic/public/summary/408636>; and Dan L. Flores, “Place: Thinking About Bioregional History,” *The Natural West: Environmental History in the Great Plains and Rocky Mountains*, (Norman, OK: University of Oklahoma Press, 2001): 102-103.

stream beloved by Schiavone and the Friends of the Fox River in the twenty-first, because the application of human culture allowed these different people and disparate groups to create distinct and dynamic places in the same geographic space. Untangling these unique perspectives is a core goal of this book.

Another objective is to use the Fox River—despite its humble size and relative obscurity—as a lens for understanding broader United States history. The Fox is just one of more than 250,000 rivers in the United States. The roughly 200-miles of river that flows through Wisconsin and Illinois is less than 0.0067% of the more than 3-million miles of rivers that course throughout the country. Scholars have written hundreds of books about major rivers throughout the United States, with particular focus on the Mississippi, Missouri, Colorado, and Columbia. While historian Gregory Summers published *Consuming Nature: Environmentalism in the Fox River Valley, 1850-1950*, concerning a separate yet identically named waterway in northern Wisconsin, the following is the first academic history of this particular river.⁴

This collective chronicle of the Fox River borrows from the still emerging field microhistory and highlights some key ideologies, moments, and eras in American history. Historian Jill Lepore, focusing on the difference between biography and microhistory, contends that “microhistory is founded upon...[this] assumption: however singular a person's life may be, the value of examining it lies not in its uniqueness, but in its exemplariness, in how that individual's life serves as an allegory for broader issues affecting the culture as a whole.” Our book is essentially a microhistory focused on the Fox River. To paraphrase Charles Joyner’s conception of microhistory, this book seeks

⁴ Martin Doyle, *The Source: How Rivers Made America and America Remade Its Rivers*, (New York: W.W. Norton & Company, 2018): 10-11; and Gregory Summers, *Consuming Nature: Environmentalism in the Fox River Valley, 1850-1950*, (Lawrence, KS: University of Kansas Press, 2006).

answers to important historical questions along the banks of a small Midwestern river.⁵ The following essays trace a long scope of history, from the First Americans' arrival at the end of the Pleistocene to the rise of indigenous empires along Midwestern waterways; from the dispossession of Native Americans as a result of Puritanical ideals and Manifest Destiny to the entrenchment of the Industrial Revolution as the dominant economic force in the region; from the commodification of Fox River species to the rise of modern environmentalism; and from continuing anthropocentric issues such as industrial pollution and littering to the possibility of partial ecological restoration and personhood for the Fox River.

This book is broken into four sections. Part One “Origins” is an examination of the creation and first cultures of the Fox River bioregion. Mia Benitez, in her essay “A Bioregion Transformed,” explains the Pleistocene origins of the Fox River and the geological impact of the region on successive human cultures. Zander Tamez, in his essay “Fox River: Its Long-Forgotten Inhabitants,” explores the history of the First Americans who call the Fox River home. Atharva Gawde focuses on a momentous event in North American history—the Fox Wars—in his essay “Colonial French Presence on the Fox River.” In doing so, Gawde revises traditional scholarship on the area Richard White envisions as “the middle ground.” Keira Feliciano, in her essay “The Effects of Land Cover Change on the Fox River Area,” analyzes human impacts on the Fox River watershed’s landscapes, with a particular focus on the Potawatomi people of Illinois. In “Why the Fox River?” Maame Afua Poku asks the question: what’s in a name? Through an analysis of the origin of the name Fox, this essay connects the history of the river with conceptions of dispossession and colonial place-naming.

⁵ Jill Lepore, “Historians Who Love Too Much: Reflections on Microhistory and Biography,” *The Journal of American History*, Vol. 88, No. 1, (June 2001): 133; and Charles Joyner, *Shared Traditions: Southern History and Folk Culture*, (Urbana, IL: University of Illinois Press, 1999): 1.

Part Two focuses on the biota of the Fox River, especially the interrelationships between the dominant species in the bioregion—*homo sapiens*—with other fauna in and along the river. Jackson Halstead and Grace Daum examine the importance of two traditional interactions in the region: hunting and fishing. In both, titled “Hunting in the Fox River Bioregion” and “Fishing on the Fox” respectively, Halstead and Daum use these sports afield to examine the historical and ecological healthiness of the river and its valley. Jackie Zhang, in “Freshwater Mussels’ Essential Filtration of the Fox River,” highlights the transformation of native bivalves from economic resource and fashion accessory to environmental necessity. In their essays, “How River Otters Will Save Our Rivers” and “Invasive Species in the Fox River,” Christian Cline and Shanan Riley look at more recent arrivals into the Fox River bioregion. Cline argues that the “history of the river otter in Illinois is a telltale sign that ecological river improvement is possible in Illinois, and...they can also help us understand how to better protect, maintain, and observe the Fox River itself.” Conversely, Riley examines the history of invasive species throughout the Fox River ecosystem and how human intervention repeatedly reengineers modern ecosystems.

Part Three focuses on the development and continued impact of industry on the Fox River. The first two essays concentrate on the industrial development of the Fox River, into a version of what Richard White famously called an “organic machine.” Simon Hoffman, in his “Paper Mills on the Fox River,” explores the dominant nineteenth and early twentieth century along the river while Halimat Sanusi’s “The History of Dams on the Fox River” provides the historical context for the energy necessary to power these industrial mills and other factories on the Fox. This industrialization, in turn, impacted species throughout the region. Likewise, Janelle Thomas uses the history of Fox River dams to make predictions for the environmental future of the region in “Fox River’s Bioregional History – Low-Head Dams.” In her essay “Safety of the Recreational Use of the Fox River near Hydraulic Dams,” Avery Hedican surveys the sometimes-morbid intersection of

recreational swimming and the more than a dozen dams built on the Fox River. Rylie-Nicole Bozarth juxtaposes two centuries of development on the Fox with recent, but incomplete restorative ecological efforts, in her essay “Obsolete Technologies and Restoration on the Fox River.” In “Glowing in Ottawa,” Evan Kuzukas examines the intersection of radium girls, the riparian ecosystem, and the history of occupational health in the United States. Kuzukas concludes that this “battle against corporate interest, short-sighted thinking, and environmental apathy continues to cause harm to the Fox River and the residents of Ottawa.”

Finally, Part Four focuses on the modern history of the Fox River. David Love, in “Fox River’s Endangerment Status,” puts historical context the American Rivers’ decision to name the Fox the seventh most endangered river in the United States more than two decades ago, while Sofia Zasiabida’s “The History of Restoration Projects on the Fox River” adds the impact of suburban sprawl to the growing litany of polluters of the Fox River. Irene Park, in her essay “Policies and Regulations on the Fox,” examines the key role of the State of Illinois in protecting the Fox and argues that “though the state government extended its powers by proposing laws that both preserved the ecology of the river and helped human corporations, the laws have primarily been intended to help the Fox River ecosystems, rather than prioritizing human advancements.” Jeff Duan examines the intersection of casino boat gambling and environmentalism, in his essay “Behind the Glitz and the Glamor.” In “The Growth of Elgin and the History of the Fox River,” Alan Hernandez scrutinizes the river’s role in the rise of Illinois’ seventh largest city. The concluding essay of our book, Nooriyah Doriwala’s “Personhood of Natural Entities,” argues that a legal designation of personhood for the Fox River, while unlikely, “would be an important step to shifting our ideologies from nature's conservation for human recreation to nature's inherent right to exist.”

Jenni Schiavone’s canoe trip was one part of a larger effort to raise interest and environmental awareness with regards to the Fox River, in both Wisconsin and Illinois. Sponsored by the environmental group Friends of the Fox River, “It’s Our Fox River Day” is an annual event that combines conservation efforts along the complete course of the river with a celebration of the centrality of the river for life in the region. In 2022, more than 2,000 people participated in fifty-one events along the Fox. Abbreviated IOFRD and pronounced “I Offered,” this day “originated as a 200-mile cleanup to symbolize the need for a unified approach to protect and restore a watershed,” but has grown into something more— “an opportunity for residents to be able to say, ‘I offered’ thanks to my Fox River.”⁶ The following collection is the historical equivalent of IOFRD, providing historical context for ten millennia or more of human history at the same time promoting an appreciation for the entire watershed. This book is the collaboration of twenty-two talented and diverse scholars, who use rigorous scholarship of the past to explain the present while offering hope for the future—it’s our Fox River history.

⁶ Friends of the Fox River, “Thank You for making It’s Our Fox River Day a great success!,” <https://friendsofthefoxriver.org/its-our-fox-river-day-2/>, accessed November 11, 2022.

Part One—Origins

I stand by the river, and I know that it has been here yesterday and will be here tomorrow and that therefore, since I am part of its pattern today, I also belong to all its yesterdays and will be a part of all its tomorrows. This is a kind of earthly immortality, a kinship with rivers and hills and rocks, with all things and all creatures that have ever lived or ever will live or have their being on the earth. It is my assurance of an orderly continuity in the great design of the universe.

—Virginia Eifert, *River World*

A Bioregion Transformed

Mia Benitez

The Pleistocene Epoch, which dated from 2.6 million to 11,000 years ago, transformed the ecological aspects of the Fox River bioregion. This period consists of a glacial stage known as the Wisconsin Glaciation, this stage started 75,000 years ago, which is the last stage of the Pleistocene Epoch. Although the Wisconsin Glaciation is only a stage of this epoch, it transformed this bioregion differently than prior stages. The Pleistocene Epoch prompted both positive and negative effects on the Fox River, which established the bioregion that is present to this day. The dispute on whether this transformation had a valuable or damaging influence is indeterminable because of the way this land has supplied society located nearby the Fox River. Although most researchers have argued that the Pleistocene Epoch and Wisconsin Glaciation had a negative impact because of environmental and animal population loss, this glaciation period set the stage for successive human development through improving the ecosystem, supplying an abundance of natural resources, and a balancing the climate.

Even though the Pleistocene Epoch transformed the ecosystem through a destructive natural process, it established land that would cultivate a new ecosystem. Illinois's northern region, which includes the Fox River, was covered by glaciers during the Pleistocene Epoch. During the Wisconsin Glaciation, abrupt climate changes occurred due to a shift in the Earth's orbit and magnetic field, resulting in an increase in temperatures and volcanic activity. These changes caused glaciers to continuously melt, resulting in long-term flooding to destroy prior biomes and life surrounding the glacier. Animal populations like the stag moose and giant beavers went extinct due to the sudden loss of habitat.

Yet, the loss in habitat and population would be regained through the opportunity of new land. Since the glaciers brought material from the north down to Illinois, once the glaciers melted, new materials like soil, sediment, and minerals can be sourced there. This brings the opportunity for new plants and animals to cultivate here. Land that was once frozen, would now become grasslands and forests that inhabit new plants and animals that specifically reside in that type of habitat. New animal species like white-tail deer, cottontail rabbit, and raccoon, live in this bioregion.¹ The Pleistocene brought opportunities for Illinois to improve the ecosystem and the environment. This improvement includes the minerals that are sourced from the Fox River.

The Wisconsin Glaciation improved the natural resources located in the Fox River bioregion during the Pleistocene Epoch. The north region of Illinois was covered with glaciers while the rest of the state was a tundra because of the extremely low temperatures and lack of glaciers. This type of land yielded no resources because the topsoil was completely frozen. As the glaciers shifted south, they brought soil, glacial deposits, and raw material towards Illinois. It was not until the temperatures increased during the end of the Wisconsin Glaciation; global temperatures increased 6 degrees Celsius annually.² Thus, causing healthier land and melting glaciers to distribute the resources throughout the land. The majority of the silt, gravel, and sand were distributed to the lower levels of land, which outlined bodies of water.³ Coal, zinc, clay, oil, and gas, were found under the soil.⁷ The land prior to glaciation held no value because of the frozen land restricting the obtention of resources. Similar to animal and plant populations during the Wisconsin Glaciation, the

¹ Illinois State. *Geology of Illinois*. Illinois State Geological Survey, (2022) [https://www2.illinois.gov/dnr/education/Documents/OnlineIntroIllinoisNatRes\(5-6\).pdf#:~:text=GLACIATION%20IN%20ILLINOIS%20About%2085%20percent%20of%20what,are%20known%20as%20the%20pre-Illinoian%2C%20Illinoian%20and%20Wisconsinian](https://www2.illinois.gov/dnr/education/Documents/OnlineIntroIllinoisNatRes(5-6).pdf#:~:text=GLACIATION%20IN%20ILLINOIS%20About%2085%20percent%20of%20what,are%20known%20as%20the%20pre-Illinoian%2C%20Illinoian%20and%20Wisconsinian)

² Stauffer, B., H. Hofer, H. Oeschger, J. Schwander, and U. Siegenthaler. "Atmospheric CO2 Concentration During the Last Glaciation." *Annals of Glaciology* 5 (1984): 160–64. doi:10.3189/1984AoS5-1-160-164

³ Illinois State. *Glaciers Smooth the Surface*. Illinois State Geological Survey, (2022.) pp 1-10. <https://isgs.illinois.edu/outreach/geology-resources/glaciers-smooth-surface>

environment loss during this period was gained through the increase of earth materials from melting glaciers. The gravel sourced from the gravel fields below the layers of topsoil, is mined in the Fox Valley in the present.⁴ The Wisconsin Glaciation has benefited local populations with its immense supply of gravel. The success brought from this has been improving the use of the land compared to its state before the glaciation, frozen flatland. The melting glaciers improved Illinois's landscape and supplied the materials that shape the present Fox River.

The recovery of Illinois's tundra resulted in the Fox River bioregion becoming further inhabitable. The Woodfordian period, dated 15000 years ago, is a stage of the late Wisconsin Glaciation. During this time, the land had an extremely thin surface layer of soil. The soil was coarse, brittle, lacked minerals, and contained little to no fossils, with yellow and brown pigment. While the soil after the Pleistocene Epoch was recorded with large moraines, a variety of minerals, fossils such as snail shells, silt, and dark-brown pigment, with soft soil.⁵ It was conclusive that around the Fox River, there was a similar drift in sand and clay within the soil. McHenry and Kane counties share the same composition of moraines in the ground.⁶ With this similarity, the improvement of the soil was done by the glaciers because of the way the water traveled as it formed the Fox River. The increasing variety of natural resources contained in the top layer of soil is a sign of the soil recovering from its tundra state, where the soil was frozen and contained no richness that would improve its quality and capability in the agricultural industry of society. Healthier soil possesses the ability to absorb and filter rainfall without risking erosion. With richer soil, the Fox River bioregion

⁴ Mechanic, Gary. *Our Waters, Our Fox. Friends of the Fox River.* (Dean Tripp, 2017)
<https://friendsofthefoxriver.org/2017/05/14/our-waters-our-fox/>

⁵ Frye, John C, H B Willman, Meyer Ruben, and Robert Black. *Definition of Wisconsinan Stage - USGS.* (U.S. Geological Survey. U.S. Department of the Interior, 1894). pp E9-E10. <https://pubs.usgs.gov/bul/1274e/report.pdf>

¹⁰ Mechanic, Gary. *Our Waters, Our Fox.*

⁶ Kempton, John P. *Subsurface Stratigraphy of the Pleistocene Deposits of Central Northern Illinois,* (Urbana, IL: Illinois State Geological Survey, 1963), pp 19-20.

became more inhabitable because of its increase in the variety of earth deposits from the aftermath of the Pleistocene Epoch, and the melting of the topsoil in Illinois.

The Pleistocene deposits of Northern Illinois increased its abundance of laminated clay after accumulating resources from the melting glaciers. This type of clay consists of a combination of organic material, minerals, and fossils. Pleistocene deposits such as laminated clay also share the ability to filter water. This earth material contains sufficient oxygen, which increases the atmospheric oxidation in the area. It helps mandate healthier soil due to the balanced amount of oxygen that is filtered and flows through the soil. Since Northern Illinois has achieved laminated clay in its land, it is evident that the glaciers have produced successful moraines that help with the recession of glaciers and that there has been a succession with the improvement of soil conditions in Northern Illinois, specifically with the soil surrounding the Fox River.⁷

The geographical advancements from the melting glaciers of the Pleistocene Epoch and the Wisconsin Glaciation have improved the climate. Melting glaciers can change the chemistry and temperature of the atmosphere because of its warming and cooling circulation. When the glacier melts, it can release greenhouse gases such as methane and carbon, which are produced by the build-up of gas from organic matter that had been buried within the glacier. Since global warming has impacted glaciers around the world, an immense amount of greenhouse gases has been released into the atmosphere, causing an alteration in its balance. This drastic change can cause climatic storms and temperature fluctuations to occur. Especially with the atmosphere being thin during the Pleistocene Epoch, greenhouse gases would have reacted more severely and rerouted a general circulation of cool air to match with Earth, thus creating a balanced climate. Along with the amount

⁷ Winchell, Newton Horace. In *The American Ecologist*. 17. (Minneapolis, MN: The Geological Publishing Company, 1896) pp 289–293.

of carbon released into the Earth's atmosphere, the fluctuating cycle found a balance after the glaciers stopped melting.⁸ Although the Earth's atmosphere had endured fluctuation in its climate from the melting glaciers, this time period resulted in an improvement of climate compared to what it was before.

The Pleistocene Epoch and Wisconsin Glaciation provided inhabitable land with a new ecosystem, an abundance of natural resources, and an improved climate. The melting glaciers caused abrupt changes to the environment, however, the loss in habitat and population would be recovered with the nurturing of the once frozen land. This brings the opportunity for new plants and animals to thrive here. Along with the increasing temperatures, the melting glaciers would distribute the resources throughout the land because of the natural resources buried within the glaciers. Materials such as silt, gravel, and sand were distributed to form the base of the Earth's topsoil. With coal, zinc, and other minerals found throughout the sediment. Followed with the recovery of soil being beneficial for habitation and its reduced risk against erosion. These geological changes have improved the climate through the melting of glaciers. The levels of greenhouse gases, like carbon, which have been released into the atmosphere have caused fluctuating changes to the climate until the rising temperature had found a balanced with the amount of carbon being released. Thus, creating the atmosphere that is present today. The changes the Pleistocene Epochs endured involved severe risks in order to achieve what is present now. It is arguable that this epoch only caused destruction because of the amount of habitual and animal loss. Yet, with loss, there had been a gain in improvement for both the health of the land, and for the opportunity for new plants and animals to thrive in this bioregion.

⁸ Pyne, Lydia V., and Stephen J. Pyne. In *The Last Lost World: Ice Ages, Human Origins, and the Invention of the Pleistocene*, (New York, NY: Penguin Books, 2013) pp 19-21.

Fox River: Its Long-Forgotten Inhabitants

Zander Tamez

There are a few different tribes that resided alongside the Fox River, namely the Mound Builders who were responsible for various effigies and mounds scattered around Illinois, the Sac and Fox who have a deep intertwined culture with one another, and the Potawatomi nation which held the most power. The mounds left by the Mound Builders are a unique representation of where they used to reside and were made as a result of the waterway that they settled nearby. The Sac and Fox tribes were one of the closest tribes residing to the Fox River and had a distinct culture surrounding the two of them. This culture is a fine example of the type of “place” that Dan Flores spoke of, as the traditions and customs cultivated by the people who live there are the foundation of who they are. The Fox people were also involved in something called the Fox Wars, which was caused by the Fox people holding up trade across the river. The Potawatomi people were similar to the Sac and Fox people in how they interacted with their waterways, however they were on opposing sides of conflict. These diverse tribes with their own ideals and thoughts have all had a relationship with the Fox River that shaped how they approach their daily life and the world around them.

Although the Mound builders resided on the Fox River at an earlier time than the rest, this did not change the fact that they were heavily influenced by the river. The early mound builders did not have any animals or livestock to use for transportation, so they turned to the river for help. Their main mode of transportation was a long canoe that went up and down the Fox River, which was carved out of a single log to have room for a decent amount of people and supplies. Because of this travel method, the settlements that these people built were largely against the riverbank where it was easiest to access the river when they were in any need of transportation. As the name entails, the

Mound builders were a prehistoric group of people that made these markings called “effigies” in the shapes of various animals. These animal effigies were usually seen in groups that represented similar shapes, The effigies that were made by these mound builders were commonly made near the riverbanks, as most were discovered along the river such as the “lizard effigy mound”¹. The lizard mound is an effigy that was created by the mound builders sometime between 650-1300 AD. After its discovery, a park was made for it in an attempt to preserve the works of the Mound Builders called “Lizard Mound Park” which contains the lizard mound along with several others found within the area. There were more markings of the mound builders found along the Mississippi river as well. Another effigy found in Galena Illinois’s Casper Bluff Land & Water Preserve (also made sometime between 650-1300 AD) is called the “Thunderbird Effigy Mound”² which has a wingspan of 112 feet and is the last of its kind, as the rest of the thunderbird effigies have worn off and disappeared from the ground. Furthermore, another effigy located in Galena created by the mound builders is the bear effigy mound. This mound is located at Keough Effigy Mounds which is close to the Mississippi River and is the only known bear effigy in Illinois. The Sac and Fox tribes were affected by the Fox River in a different way.¹

The Sac and Fox tribes are two distinct tribes of people, however they have been closely linked since the events of the Fox Wars and the relocation of the Fox Tribe. The Fox people named themselves, “The People of the Red Earth,” which is due to their cultural icon, Wisaka, who supposedly formed the first humans out of red clay. The Fox tribe originally resided along the Saint Lawrence River, living off of the waterway as a source of food and general wellbeing. However, the Fox people were involved in various conflicts that were detrimental to them and their

¹ J.F. Snyer, “Prehistoric Illinois: Certain Indian Mounds Technically Considered : Snyer, J. F. : Free Download, Borrow, and Streaming.” Internet Archive (Journal of the Illinois State Historical Society (1908-1984), January 1, 1909), <https://archive.org/details/jstor-40193991>; Jim Johannsen, “Thunderbird Effigy Mound, Galena, Illinois,” Trail Run Project, 2017, <https://www.trailrunproject.com/gem/537/thunderbird-effigy-mound>; New World Encyclopedia Editors, “Fox (Tribe),” Visit the main page, 2017, [https://www.newworldencyclopedia.org/entry/Fox_\(tribe\)#History](https://www.newworldencyclopedia.org/entry/Fox_(tribe)#History).

homeland. Which led them to migrate to the southern part of the Great Lakes region in the United States. The region that they migrated to consisted of states that we know today as Illinois, Indiana, Michigan, and Ohio. This is when they began to colonize on various different waterways including the Fox River, which they used as a substitute for their previous source of life, the Saint Lawrence River. However, the Fox people were then involved in another conflict involving the Fox and Mississippi Rivers when the French wanted access to use them as trade routes. After refusing, this meant war. The conflicts that they were a part of were named the Fox Wars and involved the French and other tribes during the early 1700s. The wars ended in the Fox Tribe's defeat and their land was taken from them yet again, and they had to migrate away from their newfound sources of life. This is when they found the Sac tribe who was also driven out, and they chose to conjoin their nations to preserve their numbers during their forced relocation to Kansas in 1843. The Sac and Fox nation's relationship with the Fox River was beneficial for the tribes, however this led to conflicts with other powers that also wanted a relationship with the water source.²

The Potawatomi people had also lived along the Fox River, and lived off the waterway while holding ideals that split from the Sac and Fox. The Potawatomi tribe had lived in the Great Lakes region since as early as the 1600s and have had similar encounters as the Fox tribe. The Potawatomi people were involved in the Fox Wars as well, however instead of helping out their indigenous brother, the Fox, they decided to side with the French and help drive out the enemy tribe.

To conclude, these tribes with vastly different approaches to life all have and are influenced by the riverbanks they reside on (namely the Fox River). The Mound builders would use the river for travel and a place of refuge, making settlements along the river to then make effigies to mark

² J.F. Snyer, "Prehistoric Illinois: Certain Indian Mounds Technically Considered : Snyer, J. F. : Free Download, Borrow, and Streaming." Internet Archive (Journal of the Illinois State Historical Society (1908-1984), January 1, 1909), <https://archive.org/details/jstor-40193991>; Jim Johannsen, "Thunderbird Effigy Mound, Galena, Illinois," Trail Run Project, 2017, <https://www.trailrunproject.com/gem/537/thunderbird-effigy-mound>; New World Encyclopedia Editors, "Fox (Tribe)," Visit the main page, 2017, [https://www.newworldencyclopedia.org/entry/Fox_\(tribe\)#History](https://www.newworldencyclopedia.org/entry/Fox_(tribe)#History).

how far they've come. There were effigies made all throughout Illinois, and a group of effigy mounds were made along the Fox River, made to look like a group of lizards and other various animals. The Mound builders' markings were made because of the river that they were next to, as the majority of the effigies found were along a riverbank. The Sac and Fox people had a positive relationship with waterways as the fish and drinking water source gave them life. However, they were challenged and forcefully relocated various times because of their relationship with their waterways (these being the Saint Lawrence, Mississippi, and Fox River). The Potawatomi people were similar to those in the Sac and Fox nation in terms of their relationship with the Fox River, except for the fact that they were on opposite sides of conflict during the Fox Wars. These tribes with unique cultures and backgrounds have all had a form of a favorable relationship with the Fox River that has shaped their ideals and attitude towards the world they lived in.

Colonial French Presence on the Fox River: Motivations of the Fox Wars

Atharva Gawde

The Fox Wars, a series of military encounters between the French and Fox (Meskwaki) Indians in the Midwest, fought mostly between 1712 and 1730, are a significant installment in the historiography of French colonialism in the Great Lakes Region. At a surface level, the French's desire to use the Fox-controlled Fox River system to gain trade access to Mississippi and the West defines the conflict. However, since Louise Phelps Kellogg wrote the first comprehensive account of the Fox Wars in the 1920s, the war has been a heavily challenged topic in virtually all histories of French-Indian relations in the Upper Country.¹ *The Middle Ground: Indians, Empires and Republics, 1650-1815*, Richard White's seminal study of the region, highlights the wars' importance in influencing French-Indian relationships throughout the first half of the eighteenth century. White regarded the violence noteworthy for its effect on historical figures and historians trying to comprehend and document the structure and purpose of French-Indian ties. "The Fox wars," according to White, "provided the basic primer for alliance politics," shaping all future interactions between the French and their native allies. Both French and Indians came to understand how to function within the "complicated and precarious" partnership that kept them together until the French ceded the territory to Britain in 1763.² Yet, despite its historic significance, historians of the 20th century and their contemporaries have grossly misrepresented and exalted French-Indian diplomacy as cordial and cooperative when, in fact, it was a masquerade motivated by the profitable

¹ Louise Phelps Kellogg. 2007. *The French Régime in Wisconsin and the Northwest*. Westminster, Md.: Heritage Books.

² White, Richard. 2011. *The Middle Ground : Indians, Empires, and Republics in the Great Lakes Region, 1650-1815*. New York: Cambridge University Press.

fur trade. Under conditions that did not immediately advance their bourgeois goals, true French intentions were more obvious and unmasked in French native policy and operation.

Focusing especially on the prejudiced policies against the Fox/Meskwaki native tribes demonstrated during the Fox Wars reveals the malevolent French attitude and portrayal of Natives. White's *The Middle Ground* is one of many modern histories of New France that promotes a French Indian policy that was controlled by the fur trade and evidenced by the start of the Fox Wars in 1712. The vast and powerful fur trade, however, did not always determine New France's approach to its Indian population.

Unsurprisingly, French sources of the time attempted to explain the conflict by demonizing their Fox adversaries as a "Cruel people," typified by the cunning treachery of the animal whose name they carried.³ For much of the 20th century, historians merely mirrored the tone of these French sources, attributing the war to the Fox's "habitual warlike resolve."⁴ One scholar claimed that because of their "chronic belligerence," the Fox became "the problem tribe of the Great Lakes country" and had a "fierce barbaric impulse" toward the French.⁵

A more nuanced, though still faulty, analysis of the Fox wars is provided by more recent scholarship, which refutes the ideas that either the French leadership and commercial interests were driving forces behind the violence or that it was entirely the result of intrinsic Fox hostility. Instead, it is claimed that disagreements over the boundaries of the developing French-Indian alliance led to the Fox Wars. Whereas French imperial officials sought to broaden their sphere of influence in the west by establishing connections with commercial and military allies, natives who were already partners of France wanted to curtail this growth by preventing their enemies from receiving French

³ Antoine, Michel. 1968. "Les Arrêts Du Conseil Rendus Au XVIIIe Siècle Pour Le Département de La Marine (1723-1791)." *Revue Française d'Histoire d'Outre-Mer* 55 (200): 316–34. <https://doi.org/10.3406/outre.1968.1466>.

⁴ Lachance, André. 1990. "Dale MIQUELON, New France, 1701-1744: A Supplement to Europe." *Recherches Sociographiques* 31 (3): 420. <https://doi.org/10.7202/056551ar>.

⁵ Louise Phelps Kellogg. 2007. *The French Régime in Wisconsin and the Northwest*. Westminster, Md.: Heritage Books.

supplies and assistance.⁶ However, this conclusion only creates an unreliable depiction of amiability and intended cooperation from the French towards the Natives. To establish the boundaries of their alliance, the allied Indians fiercely asserted their rights when the French befriended the Fox to get access to the Fox River. They demanded that the French honor their relationship by rejecting their former adversaries.

The French did not oppress Indians with the same fury as the colonizing English and conquering Spanish only because of the nature of their early mission in the New World: the fur trade. The French were obliged by the fur trade to actively work toward establishing peace with and receiving help from the Indians they encountered.⁷ When the Native Americans put up their demands in the eighteenth century, however, France engaged in the two Fox wars, which ultimately led to the near-extirpation of several Indian tribes and the complete annihilation of at least one.

To summarize the French's approach of deception, French policy in the early eighteenth century in the New World was to try to make peace with any Indian tribes who were not already affiliated with a European rival. King Louis XIV outlined this strategy in a letter to Sieur de Mury, the fourth governor of Louisiana, explaining that peace with Indians was required "in order to get control of their commerce and to prevent the English from coming to trade among them," blatantly revealing the French's sole interest in commerce.⁸ Unsurprisingly, despite being in contact for almost 30 years, the French and the Fox never truly achieved peace.

The Fox's concerns regarding enemy tribes were not misguided, and the French's betrayal of them, providing and receiving to and from other Native tribes, only furthered their demise. The

⁶ Lachance, Paul, and Patricia Dillon Woods. 1981. "French-Indian Relations on the Southern Frontier, 1699-1762." *The Journal of American History* 68 (1): 106. <https://doi.org/10.2307/1890918>.

⁷ Rushforth, Brett. 2006a. "Slavery, the Fox Wars, and the Limits of Alliance." *William and Mary Quarterly* 63 (1): 53. <https://doi.org/10.2307/3491725>.

⁸ Fritz, Henry E. 1995. "The Fox Wars: The Mesquakie Challenge to New France." *The Historian* 57 (4): 790-92. <https://go.gale.com/ps/i.do?id=GALE%7CA17404109&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=00182370&p=AONE&sw=w&userGroupName=anon%7E4bb78cd8>.

most effective strategy used by the native allies of New France against the Fox was the Indian slave trade. By attacking Fox settlements in search of victims, then giving or selling these captives to the French as slaves, French allies created a significant and ultimately fatal rift between the French and their once-allies the Fox. While it may seem that this was an inevitability given the Fox's adversaries, the French were not innocent. The desire for Fox slaves from French colonists encouraged this approach, which ultimately guaranteed its success by driving the Fox away from French interests and ultimately pushing them to war, completely in contrast to the official French policy of embracing the Fox, which has tainted the historical narrative. The prior Fox-French alliances only served to benefit the French.

However, literature on the colonization of North America from the twentieth century mistook the Foxes' desire to defend their home for violence and was unable to see past the Machiavellian front of New France. In *The French and Indian War*, Donald Barr Chidsey noted that French settlers "were fascinated by the Indians," "learned the languages, they respected the customs and adopted the habits... the French plunged into the wilderness fearlessly, making astonishing trips of exploration," in contrast to English settlers who "took no interest in the moral well-being of the redskin."⁹ F.E. Whitton concurred with Chidsey in *Wolfe and North America*, a book that also focuses on the French and Indian War, regarding a natural attraction between the French and Indians. According to Whitton, "Indian communities sprang up, cherished by the Government and favoured by the easy-tempered people."¹⁰ Both accounts exemplify the issue that the French narrative created, depicted themselves as well-intentioned victims to the violence of the Fox, rather than the opposite.

⁹ Donald Barr Chidsey. 2019. *The World of Samuel Adams*.

¹⁰ Ernest, Frederick. 2021. *Wolfe and North America*. Hassell Street Press.

The naive acceptance and failure to critically analyze primary French sources has cascaded into an unreliable, misleading historical narrative of a cooperative New France against the “barbaric” Fox tribes, which has seeped into the contemporary literature focused on the French presence in the Great Lakes region. It is however clear that the opposite is absurdly more accurate in describing the dynamics of the French and Fox relations. The French’s perceptions of the Fox, as seen through French correspondence, disregard for the enslaved Fox, and power dynamics signify a predatory, imperialist France against the Fox, who themselves sought cooperation. In essence, the Fox-French alliance only served the French and their trade interests, while leaving the Fox defenseless in times of desperation.

The Effects of Land Cover Change on the Fox River Area

Keira Feliciano

Before the 1820s, the Fox River was a mosaic of prairies, forests, woodlands, marshes, ponds, lakes, and meadows. However, when met by the hands of man, land cover and land use altered the biodiversity of the region. The interaction of a multitude of factors, all controlled by humans, has changed the distribution of the land cover in the Fox River Area. Consequences of the intensive habitat conversion are the absence of wildfires and habitat fragmentation, which lead to diversity loss. Where humans have influence on the environment, they are a fruitful source of corruption. Even though consumption of natural resources can be sustainable, humans continue to change the landscape which threatens the integrity of living systems from which we all depend.

“Land cover, being the expression of human activities, changes with modifications in these activities.”¹¹ Originally covering 58.98% of the land in Illinois, the amount of high-quality prairie that makes up the land cover of Illinois today stands at less than 0.01%, about 2,300 acres.¹² From 1920 to 1989, about three million acres of prairie were either supplanted by forest, converted to urban areas, or converted to agriculture. Within the Fox River Area, 35.1 acres of high-quality prairie is left of 1,892,400 acres, which represents 0.01% of the original population.¹³ The same fate driven by humans was brought upon the forest, savanna, wetland, and vascular plant ecosystems of Illinois. Starting at 13,828,840 acres of coverage, some 544,730 acres of forest were absorbed by urban development and 9,902,710 acres were converted to agriculture, leaving a mere 11,600 acres of high-

¹¹ Fao.org. “The Conceptual Basis.” <https://www.fao.org/3/X0596E/x0596e01f.htm>.

¹² Illinois Department of Natural Resources. *Fox River Area Assessment*. Office of Scientific Research and Analysis, 1998. <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/fox-3-Living-Resources.pdf>.

¹³ Ibid.

quality forest in Illinois and 250 acres in the Fox River Area.¹⁴ Similarly, presettlement vegetation maps of the Fox River Area show savannas were a common feature of the Fox River Area, but are no longer. Of the 1,299.2 acres of savanna in Illinois, one high-quality savanna occurs in the Fox River Area today.¹⁵ About 53,401 acres of wetland occur in the Fox River Area and a total of 1,655 acres are undegraded and high-quality.¹⁶ The status of the different natural communities in Illinois and the Fox River Area was the same — prevalent in 1820 but seldom occurring today. From the pattern of population change seen across the Fox River Area natural communities, it is clear that land cover changes, which moved in tangent with human activities, rendered the decline in health of the Fox River Area.

By virtue of the widespread land conversions since 1820, habitat fragmentation occurred in the Fox River Area. A few distinguishable characteristics of fragmented habitats make them more prone to environmental conditions and risk factors. Due to reduced area, the habitat can only support species at lower population levels, which are more susceptible to extirpation.¹⁷ Increased isolation decreases the frequency of migration among fragments, thus reducing recolonization after degradation.¹⁸ The creation of edges results in soil moisture conditions and levels of solar radiation.¹⁹ In the long term, fragmentation can reduce species richness and abundance, and decrease the restoration potential of an environment. The effects of industrial pollution on grasslands in the Fox River Area demonstrate how perturbations impact the adaptation capacity of a fragmented habitat compared to an unfragmented habitat. In 1970, the spillage of oil in grasslands caused a small

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Haddad, Nick. "Habitat Fragmentation and its Lasting Impact on Earth's Ecosystems." *Science Advances*, March 20, 2015. <https://www.science.org/doi/10.1126/sciadv.1500052>; Illinois Department of Natural Resources. *Fox River Area Assessment*. Office of Scientific Research and Analysis, 1998. <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/fox-3-Living-Resources.pdf>.

¹⁹ Ibid.

population to break off from the larger population. The size of the fragment population affected succession rate, “such that increased light penetration and altered seed pools in smaller fragments impeded the rate of ecological succession relative to that of larger fragments.”²⁰ The effects of fragmentation on the Fox River Area, caused by conversion of lands, is habitat degradation and biodiversity loss.

Climate change and land cover have circular influences on each other. Changes in land cover can influence the climate. The intensive conversion of the land can result in loss of undegradable land, which can result in localized changes in temperature and weather patterns.²¹ Likewise, human-induced climate changes can create changes in land cover. The formation of the specialized group of trees, tallgrass prairie, was driven by climate change dynamics that occurred over the course of 18,000 years ago.²² In the middle of the Ice Age, glaciers were the primary land cover of Northeastern Illinois. As the climate became warmer, the glaciers were transposed with tundra-type vegetation and that with a hardwood forest. About 8,300 years ago, the climate became even warmer, making conditions favorable to prairie. The rise in temperatures caused the glaciers to melt at unprecedented rates, shifting the distribution of the land and the species inside those biomes. As the major drivers of climate change, humans were at the core of this phenomenon.

Although humans have always played a direct role in the health of the environment, they have not always proved to be harmful. The Potawatomi tribe were the first humans to settle in the Fox River Area.²³ They settled villages at future sites of Aurora and Oswego and subsisted by

²⁰ Haddad, Nick. “Habitat Fragmentation and its Lasting Impact on Earth’s Ecosystems.” *Science Advances*, March 20, 2015. <https://www.science.org/doi/10.1126/sciadv.1500052>; Illinois Department of Natural Resources.

²¹ Illinois Department of Natural Resources. *Fox River Area Assessment*. Office of Scientific Research and Analysis, 1998. <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/fox-3-Living-Resources.pdf>.

²² Ibid.

²³ National Interagency Fire Center: Humans and National Interagency Fire Center. “Wildfires.” Purdue, https://mrcc.purdue.edu/living_wx/wildfires/index.html; Historyonthefox. “The Era When the Fox River Valley’s Native People and Settlers Lived Alongside Each Other.” History on the Fox, Nov 1, 2022. <https://historyonthefox.wordpress.com/category/fox-river/>; Indians.org. “Potawatomi Indians.” Indians.org,

reliance on the waterway and cultivation of the soil.²⁴ The Potawatomi tribe is a prime example of a mutually beneficial relationship between humanity and the environment. The tribe dwelled in woodlands and groves in the Fox River Area, which provided them necessary provisions of shelter from wind, a permanent source of water, and coverage for shade.²⁵ In exchange, the Potawatomi helped maintain the natural landscape of the area by developing an important process utilizing fire. Through slash and burn agriculture, they deliberately started fires to “reduce unwanted, harmful vegetation and animals, while promoting the health of vegetation and animals that are naturally part of the community.”²⁶ Employed originally as a cultivation method, fire became a natural conservation method. As such, the physiognomy and vegetation structure of many native plant communities depends on fire, and fire absence can change the composition of the land. For example, “vegetational changes common throughout Illinois, such as from prairie to shrub thicket or forest or oak-dominated woodland to maple-dominated forest, are attributable to reduced fire frequency and fire absence.”²⁷ The Potawatomi tribe introduced what was for them a form of sustainable agriculture that has now become a natural component of the earth system, using the Earth’s resources while preserving it.

In the same way that the Potawatomi used a natural conservation method, we too must practice sustainable management and, even further, help restore the land to its original state.

Restoration efforts are an optimal management strategy that can mitigate climate change and halt, if

<http://indians.org/articles/potawatomi-indians.html>; Nationalgeographic.org. “The Ecological Benefits of Fire.” National Geographic, <https://education.nationalgeographic.org/resource/ecological-benefits-fire>.

²⁴ Illinois Department of Natural Resources. *Fox River Area Assessment*. Office of Scientific Research and Analysis, 1998. <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/fox-3-Living-Resources.pdf>.

²⁵ Mpm.edu. “Potawatomi History.” Milwaukee Public Museum, <https://www.mpm.edu/content/wirp/ICW-152>.

²⁶ Illinois Department of Natural Resources. *Fox River Area Assessment*. Office of Scientific Research and Analysis, 1998. <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/fox-3-Living-Resources.pdf>.

²⁷ Ibid.

not reverse, biodiversity loss. Markedly important to the success of management strategies is the termination of land conversion for urbanization, agricultural activities, and deforestation.

Humans play a direct role in the distribution of the land. Since 1820, they have directly converted the land for agricultural uses and urbanization. Concurrently, they have had indirect effects on land coverage by controlling wildfires inducing and climate change. In turn, changes in land have led to fragmentation and increased climate change even more, which decreases biodiversity. As a result, there is an ever pressing need to restore the Earth to its original condition through management strategies. Both directly and indirectly, humans are the drivers of land cover change, which exacerbates environmental issues. As such, they need to be the agents of change and implement management strategies to restore the Fox River Area to its original state.

Why the Fox River?

Maame Afua Poku

Names. They are things that are given to people, places, items, and other things once they are created. Names are given with significance. For example, in Ghanaian culture, parents name their children after the day they are born. Names are given to us to make sure that people are connected back to their culture or their origins. When it comes to the naming of places, such as Mt. Denali, Tacoma, and Doso Dayabi, colonizers have felt the need to change the names of these places to make it easier for people to remember. However, they do not know that this makes people forget the history that is connected back to the origins of the land. This almost happened to the Fox River, however; this plan never went through. Name-changing harms the history of places because people never understand the central importance and reasoning behind the creation of the land.

Now, everyone must be wondering, why is the Fox River called the Fox River. To understand this, let us look at the history of the inhabitants of the Fox River. Before 1634, the Meskwaki people were the inhabitants of the Fox River.¹ The primary use of the Fox River during their time was to trade things to other places, such as Mexico.² They are also known as the Sac and Fox tribe. Originally, this tribe is located in the St. Lawrence River Valley, which is along the Canadian border.³ They ended up migrating and being located in Michigan, Wisconsin, Illinois, Missouri, and Iowa. The reason why the Meskwaki Tribe migrated to Michigan, Wisconsin, Illinois, Missouri, and Iowa is that, during the 1700s, they were a part of the Fox Wars. During this Fox War,

¹ Ward Duren J H., *Meskwakia and the Meskwaki People (Tama County, Iowa)* (Iowa City, IA: State historical Society of Iowa, 1906).

² "History: Meskwaki: Sac & Fox Tribe of the Mississippi," Meskwaki Nation (Meskwaki Nation), <https://www.meskwaki.org/history/>.

³ "History: Meskwaki: Sac & Fox Tribe of the Mississippi," Meskwaki Nation (Meskwaki Nation), <https://www.meskwaki.org/history/>.

the Meskwaki and Sauk tribe fought off the French to ensure they could preserve the lands. Native Americans tended to be the residents of lands in these states.⁴ Because the Meskwaki tribe lived around the Fox River, they named the river the Fox River, which is named after the tribe. Now you might be wondering, it is named after them. Yes, it is! The French gave the Meskwaki Tribe the name of Renards, which translates to the Fox in French.⁵ Because the Meskwaki people were locals around the Fox River, the origins ended up being tied to the river.

Because locals felt like the river did not have a connection to their living, they felt the need to change the name of the river. In 1922, residents that were not living around the river decided that the Fox River needed a new name.⁶ Jim Lino, the publicity man for Mooseheart believed that the river should be called the Mooseheart River.⁷ The reasoning behind this is that Mooseheart was the 1st town in Kane County and important people who helped change the history of Chicago were living there. This group called the Loyal People of Moose were supporting this movement. People believed that Lino was joking about this, especially people who were living by the banks of the river because there was no reason for the name change. According to a resident living on the banks, the reason why they could change the name of the river was “The fact that Wisconsin has two Fox Rivers.”⁸ This reason would have been plausible, however; there were no other reasons. Eugene Clifford, an attorney, talked about some reasons why the name of rivers can be changed, some

⁴ “History: Meskwaki: Sac & Fox Tribe of the Mississippi,” Meskwaki Nation (Meskwaki Nation), <https://www.meskwaki.org/history/>.

⁵ Ward Duren J H., *Meskwakia and the Meskwaki People* (Tama County, Iowa) (Iowa City, IA: State historical Society of Iowa, 1906).

⁶ “Illinois Digital Newspaper Collections,” *True Republican* 11 January 1922 - Illinois Digital Newspaper Collections, <https://idnc.library.illinois.edu/?a=d&d=STR19220111.2.23&srpos=2&e=-----en-20--1--img-txIN-%22fox%2Briver%22%2Bname%2Bchange----->.

⁷ “Illinois Digital Newspaper Collections,” *The DeKalb Daily Chronicle* 9 January 1922 - Illinois Digital Newspaper Collections, <https://idnc.library.illinois.edu/?a=d&d=DKD19220109.1.6&srpos=3&e=-----en-20--1--img-txIN-%22fox%2Briver%22%2Bname%2Bchange%2Bmooseheart----->.

⁸ “Illinois Digital Newspaper Collections,” *True Republican* 14 January 1922 - Illinois Digital Newspaper Collections, <https://idnc.library.illinois.edu/?a=d&d=STR19220114.2.55&srpos=1&e=-----en-20--1--img-txIN-%22fox%2Briver%22%2Bname%2Bchange%2Bmooseheart----->.

instances including if a river is confined to one state, and/or if the stream is considered a navigable stream, then a War Department can consider changing the name.⁹ This plan of changing the name of the river did not go through, thankfully. Residents realized that it was a dumb idea to change the name of the river. It seemed as if Lino strip away the history of the Native Americans and place emphasis and importance on colonizers of the land.

Funny thing is, Lino is not the only person who believed that Native Americans and their tribes did not have importance on famous landmarks all across the world. There are so many modern examples of name changes. One example of a name change is Mount Denali. This mountain is the tallest peak in North America, which is located in south-central Alaska.¹⁰ Denali is an Athabascan word, which means “the high one.”¹¹ The Athabascans were the locals around this mountain, they usually lived around Interior Alaska. They were the residents around the mountain for centuries and centuries.¹²



Figure 4 Denali, "the High One." Source: National Park Service

⁹ “Illinois Digital Newspaper Collections,” *True Republican* 14 January 1922 - Illinois Digital Newspaper Collections, <https://idnc.library.illinois.edu/?a=d&d=STR19220114.2.55&srpos=1&e=-----en-20--1--img-txIN-%22fox%2Briver%22%2Bname%2Bchange%2Bmooseheart----->.

¹⁰ Catton, Theodore R. *The Public Historian* 15, no. 2 (1993): 137–39. <https://doi.org/10.2307/3377974>.

¹¹ “Home,” Geriatrics, https://geriatrics.stanford.edu/ethnomed/alaskan/introduction/native_cultures/athabascan.html.

¹² “Denali or Mount McKinley?,” National Parks Service (U.S. Department of the Interior), <https://www.nps.gov/dena/learn/historyculture/denali-origins.htm>.

However, there were many instances of changing the name of this mountain. The main name that people of the United States wanted to change the mountain name to was Mount McKinley. The effort to change it to this name started in 1897 by William Dickey, a gold prospector.¹³ Dickey was a McKinley admirer and he started using the name in a *New York Sun* article after the president was elected. This name started sticking to the mountain after the assassination of President McKinley. The funny thing about this is that there was no correlation between this and the mountain. In 1916, Thomas Riggs believed that “It is not descriptive. Everybody in the United States knows of Mt. McKinley and the various efforts made to climb it. In consequence, both Mr. Yard and I think that the name McKinley should stick.”¹⁴ The name of this mountain did end up changing in 1917. However, this did not last forever. In 2015, Obama decided that the name of the mountain had to change back to its original name. This was impacted by the politicians in Alaska and Congress continued these efforts. According to the 1947 law that Secretary of the Interior Sally Jewell cited, they are able to use authority when the USBGN “does not act within a reasonable time” as a justification to make the change.¹⁵ With Obama changing the name back to its original, people were able to continue to remember the tribe that was surrounding that area. If it was not for Obama’s efforts, the tribes surrounding the mountain would not have been preserved.

Another example of a name change is Mount Rainier. This is a stratovolcano located in Washington State.¹⁶ Many do not know that this was once known as Mount Tacoma. This was home

¹³ “Denali or Mount McKinley?,” National Parks Service (U.S. Department of the Interior), <https://www.nps.gov/dena/learn/historyculture/denali-origins.htm>.

¹⁴ “Denali or Mount McKinley?,” National Parks Service (U.S. Department of the Interior), <https://www.nps.gov/dena/learn/historyculture/denali-origins.htm>.

¹⁵ Mufson, Steven. Obama will rename the highest U.S. peak, dropping McKinley for Denali (posted 2015-08-30 20:58:43): Mount Denali is the name used by generations of Alaska natives that means "the great one." In WP Company LLC d/b/a *The Washington Post* [database online]. Washington, D.C., United States Washington, D.C., 2015.

¹⁶ “11 Fun Facts about Mount Rainier National Park,” U.S. Department of the Interior, February 28, 2020, <https://www.doi.gov/blog/11-fun-facts-about-mount-rainier-national-park>.

to Cowlitz, Muckleshoot, Nisqually, Puyallup, Squaxin Island, Yakama, and Coast Salish people.¹⁷ They used to use to be strong caretakers of their land. They would always make sure to collect resources for their land so that they would be able to thrive. Well, this was all before the British came in and took over their land. In 1792, George Vancouver, a British explorer, renamed Mount Tacoma. He was the first known European to explore what we now call Puget Sound.¹⁸ He decided that it would be a smart decision to name this mountain after his best friend, Peter Rainier. He was a captain and eventually, an admiral in the Royal Navy.¹⁹ He believed that since he did a lot of work for the British Empire, he deserved to have something named after him. Sadly, this name stuck to the mountain. Vancouver did this multiple times with other landmarks, such as Mount Baker, Mount St. Helens, and Puget Sound.²⁰ There were multiple fights about this name change but nothing ever changed. With this name being there by colonizers, the history and origins of this mountain were lost.

The history of these landmarks mentioned in this chapter has been lost thanks to the colonizers. They believe that changing the name to fit something connected to their culture makes so much more sense. However, this is incorrect. As mentioned at the beginning of this chapter, name placing is so important to items, especially landmarks. For example, the Fox River, name connects it back to the history of the inhabitants of the land. With this name, people are able to remember that, at one point in time, the Meskwaki tribe were the residents of this land. People need to understand that stripping away names removes the old life or history of something and starts a

¹⁷ “Mount Rainier History,” National Parks Service (U.S. Department of the Interior), <https://www.nps.gov/mora/learn/historyculture/mount-rainier-history.htm>.

¹⁸ 2019 Video by Stephen Hegg Knute Berger, “Why Mount Rainier Was Once Called Mount Tacoma,” Crosscut, November 11, 2022, <https://crosscut.com/2019/04/why-mount-rainier-was-once-called-mount-tacoma>


¹⁹ 2019 Video by Stephen Hegg Knute Berger, “Why Mount Rainier Was Once Called Mount Tacoma,” Crosscut, November 11, 2022, <https://crosscut.com/2019/04/why-mount-rainier-was-once-called-mount-tacoma>

²⁰ 2019 Video by Stephen Hegg Knute Berger, “Why Mount Rainier Was Once Called Mount Tacoma,” Crosscut, November 11, 2022, <https://crosscut.com/2019/04/why-mount-rainier-was-once-called-mount-tacoma>

new history. This is not entirely true with landmarks like these because it makes people believe that the colonizers were the first residents of these landmarks.


Quaternary Deposits


HUDSON EPISODE


 Cahokia Fm; river sand, gravel, and silt

WISCONSIN EPISODE

Mason Group

 Thickness of Peoria and Roxanna Silts; silt deposited as loess (5-ft contour interval)

 Equality Fm; silt and clay deposited in lakes

 Henry Fm; sand and gravel deposited in glacial rivers, outwash fans, beaches, and dunes


Wecron Group


(Tiskilwa, Lemont, and Wadsworth Fms) and Trafalgar Fm; diamicton deposited as till and ice-marginal sediment

 End moraine

 Till plain

ILLINOIS EPISODE

 Teneriffe Silt; silt and clay deposited in lakes

 Pearl Fm; sand and gravel deposited in glacial rivers and outwash fans, and Hagarstown Mbr; ice-contact sand and gravel deposited in ridges

Winnebago Fm; diamicton deposited as till and ice-marginal sediment


 Till plain

Glasford Fm; diamicton deposited as till and ice-marginal sediment

 End moraine

 Till plain

PRE-ILLINOIS EPISODE

 Wolf Creek Fm; predominantly diamicton deposited as till and ice-marginal sediment

 Unglaciati

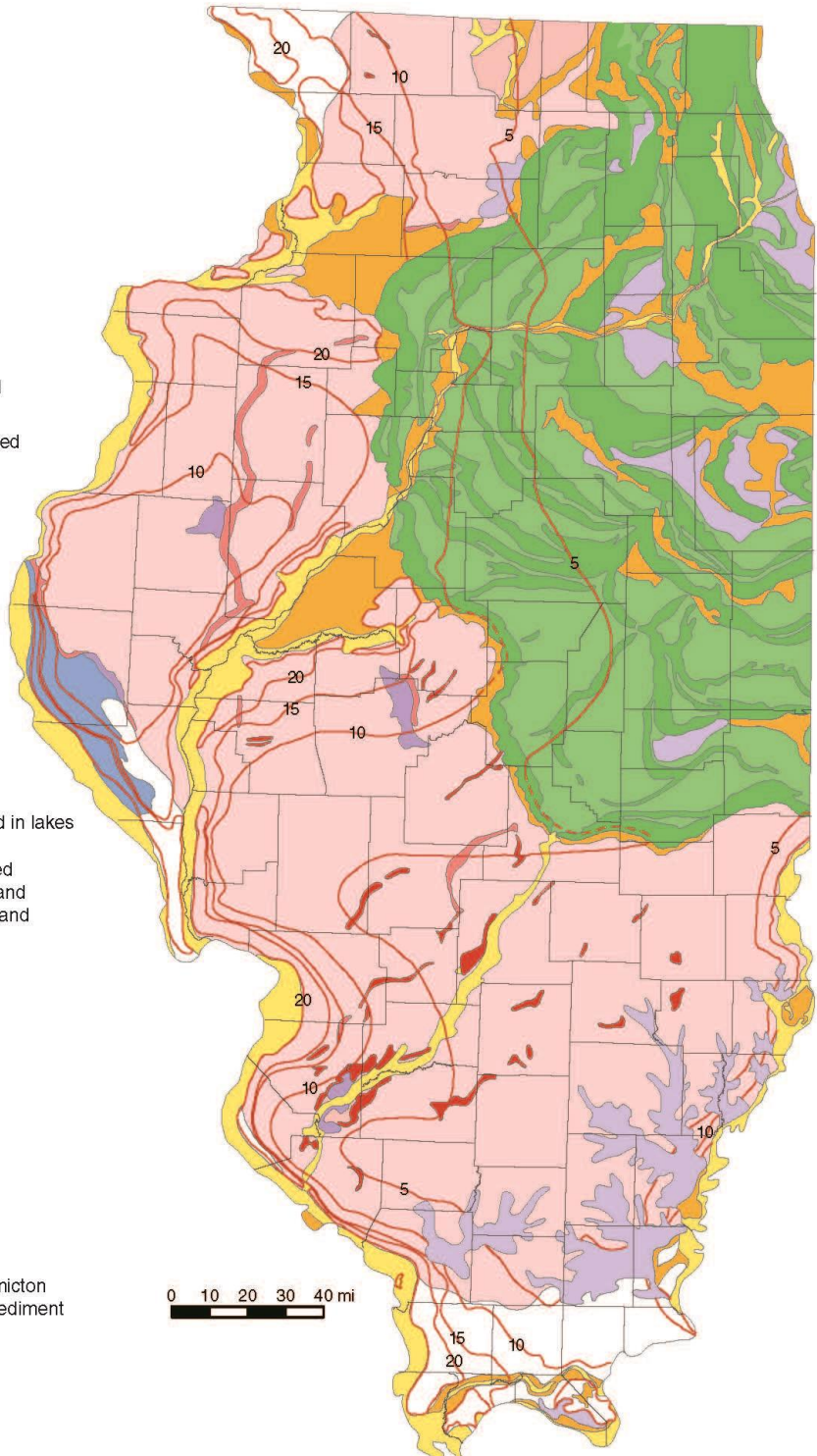


Figure 5 Quaternary Glaciation in Illinois, Source: Illinois State Geological Society



Figure 6 Evidence of Wisconsin Glaciation in Illinois. Source: Illinois State Geological Survey



Figure 7 Remnant of Thunderbird Effigy made by early Mound Builders. Source: Trail Run Project



Figure 8 George Catlin, *Discovery Dance, Sac and Fox* (1835-1837). Source: Smithsonian American Art Museum

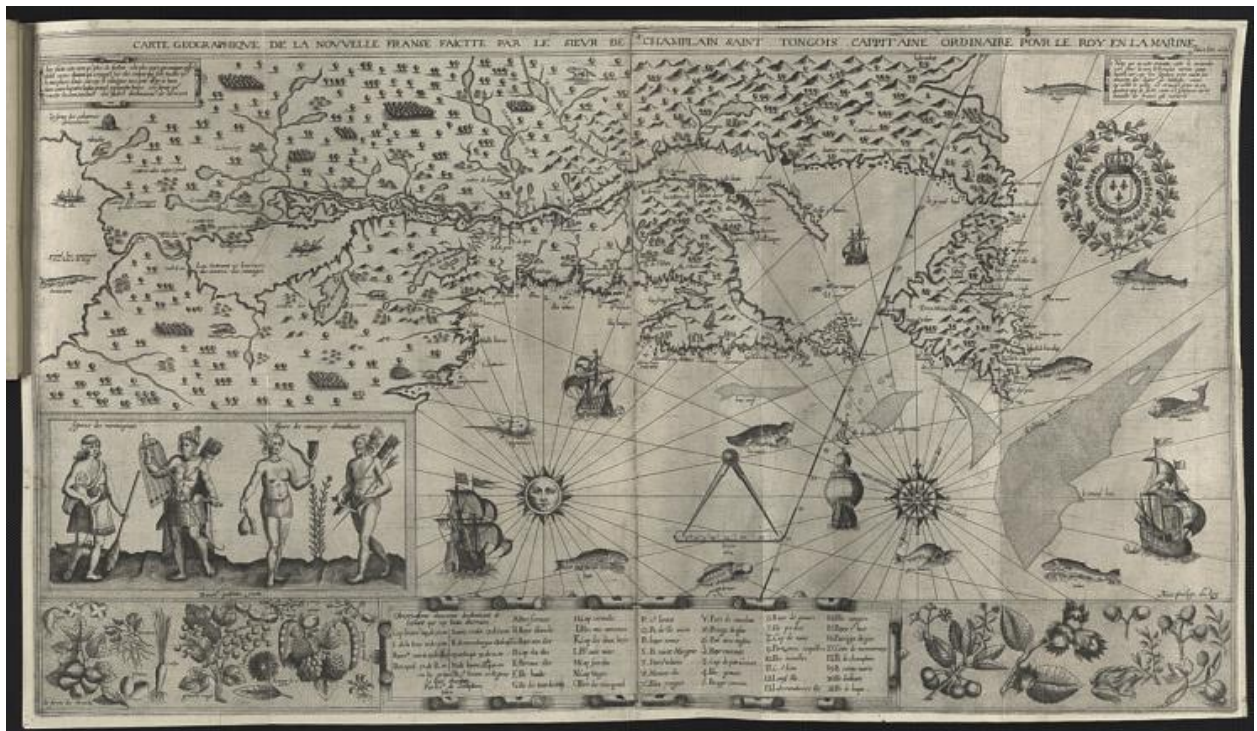


Figure 9 *Carte Geographique de La Nouvelle Franse* (1612). Source: Smithsonian Museum of American History



Figure 10 Combat between the Ojibwas and the Sacs and Foxes on Lake Superior. Source: Newberry Library Archives



Figure 11 Fox River in the early 1900s. Source: History on the Fox

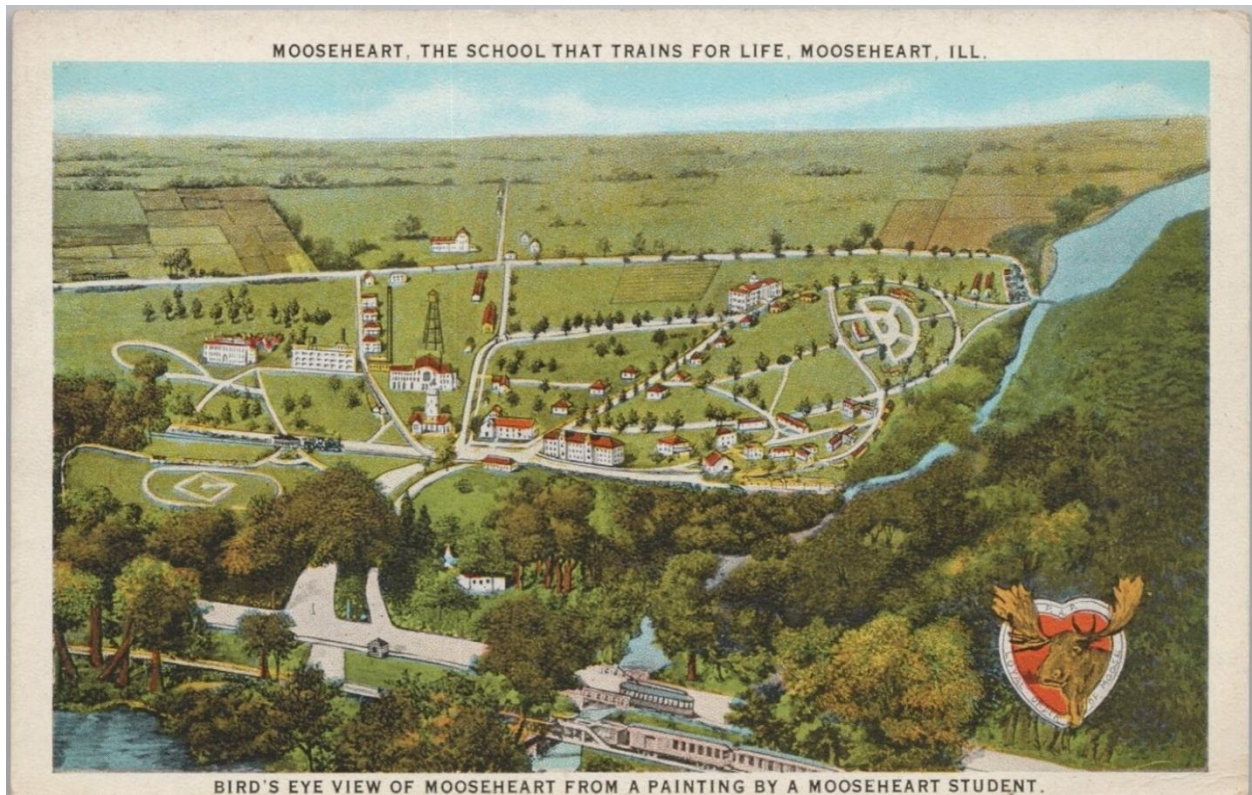


Figure 12 Mooseheart, The School that Trains for Life, Mooseheart, Ill. Postcard (no date)



Figure 13 Party poses with hunting and fishing equipment, Frank LeGros boathouse, Fox River Grove, IL, circa 1895. Source: Chicago Tribune



Figure 14 Joanna Garner fishes the Fox River near St. Charles, years after Emancipation. Source: St. Charles History Museum Archives



Figure 15 Two recreational fishermen enjoying a day on the Fox River catching largemouth bass (2022). Source: Troy Daum



Figure 16 Freshwater mussel in the Fox River. Source: INHS Mollusk Collection

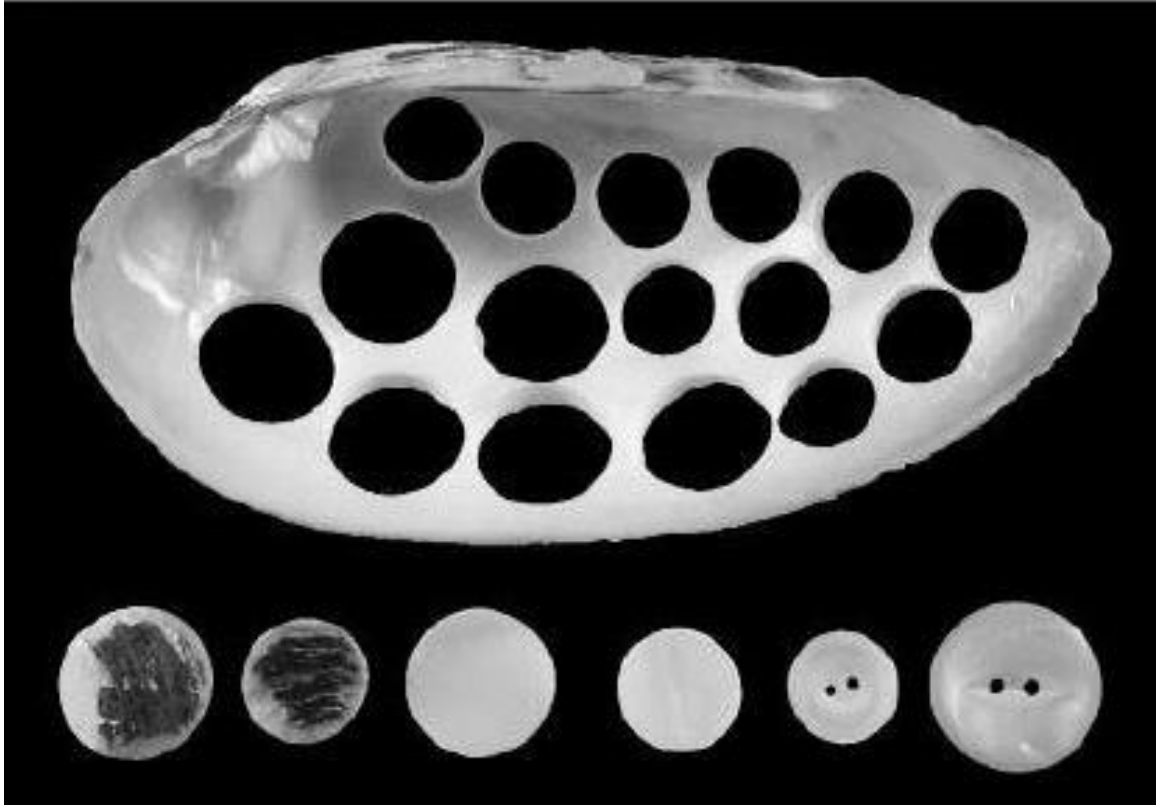


Figure 17 Freshwater mussel used to make pearl buttons. Source: Illinois Department of Natural Resources



Figure 18 River otter in Lake County, IL. Source: Lake County Forest Preserves



Bushnell

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Figure 19 River otter photo confirmation at a latrine site along Fox River (2017). Source: Lake County Forest Preserves



Figure 20 Invasive rusty crayfish. Source: Illinois Department of Natural Resources



Figure 21 Invasive zebra mussels. Source: University of Minnesota



Figure 22 U.S. Fish and Wildlife (USFWS) personnel are surrounded by jumping silver carp on the Fox River in Illinois. Source: Ryan Haggerty, USFWS

Part Two—Animals

...animal history asks us to consider the degree to which being “human” means being the supreme species on the planet. Some worry that to give equal historical standing to animals that were hunted, exterminated, exploited, or forced to endure suffering for our comfort...is to question our uniqueness and right to do as we wish on earth. At its most unsettling, animal history is really about what it has meant to be human through our interaction with other species and perhaps make a change in the future

—Susan Nance, “Animal History: The Final Frontier?”

Hunting in the Fox River Bioregion

Jackson Halstead

The Fox River's bioregion is an extensive and diverse ecosystem, and home to many different species. Hundreds of different species call the Fox River Valley home. The area is mostly deciduous forest with a cool climate. The many different oak and ash trees cover hundreds of miles. Forests and preserves are found everywhere, full of trails for people to walk. Animals can be found all over. White-tailed deer, eastern cotton tailed rabbits, skunks, and so many more can be seen, foraging and surviving the many threats they face. Many of the species found here are the same as found in any other part of the American Midwest. Every once in a while, if you're lucky, a bald eagle can be found flying high, with its bright white head shining. Hunting in the Fox River bioregion has created incredible change within the last 400 years, starting when European settlers first arrived.

While you might be lucky if you see a bald eagle, they are just one of the many species affected by humans today. Before the 1950's they were very common, soaring the skies with little in their way.¹ Not just them though, others too. Those white-tailed deer you see sometimes, they used to number in the tens of thousands in just this region. Those thousands of Canada geese you see migrating every year? Imagine that, but double, maybe even triple the amount. Before European settlers in the late 1600's, the environment was affected very little by humans. No hundreds of miles of asphalt laid bare across flat roads or sprawling cities that can be seen clearly from space. The environment was not polluted or changed in many unnatural ways. It had so many species living freely, not being brought to near extinction or turned into nothing by cars on those many asphalt

¹ Mayor, Dana. "Bald Eagle Population by State." AZ Animals, November 14, 2022. <https://a-z-animals.com/blog/bald-eagle-population-by-state/>.

roads. They lived free from interaction with many humans. One of the many reasons today that many of these species still face extinction is due to hunting. Some species have been brought very close to extinction due to it, like the white-tailed deer, and many others have been brought to extinction sadly.² Hunting has had a tremendous effect on the wildlife of the Fox River bioregion.

Hunting. Today it's kind of a gray area on its purpose in society, and if it should even still be allowed. Many hunt just for the killing, while others hunt for the food that they can gain. Many argue that we do not need to hunt anymore due to our lack of food scarcity. Let's start with the beginning of hunting in the Fox River. The hunting of animals first started when Native Americans arrived in the area over 10,000 years ago. With the Fox River sitting in between the Mississippi River and Great Lakes, it was a great place to settle.³ The first Native Americans to arrive had access to a lot of food, water, decent climate, and diverse animals. It also had access to lots of rivers in which to travel freely. It was a sensible and clear place to live within.

Hunting of course was plentiful in the area. Hundreds of deer and many other species that were perfectly suited for so many uses lived in the Fox River. They could be found year-round, had enough meat to feed people, and would be utilized for many different components.⁴ Hunting was the main source of food for the indigenous tribes of the area. Every part was used as well, with little waste being the standard. There was very little effect on the animal populations due to hunting.⁵ Not being nearly as efficient as it is today, preservation was not as common of an option unlike today. Instead, they hunted for what they needed to survive.

² Webb, Kent. "Estimated U.S. Deer Population, 1450 to 2016 Year 2000 to 2016 ..." Accessed November 14, 2022.

³ Low, John N., and John N. Low. "Video: The Power of Place: The Indigenous Peoples of Northeastern Illinois & the Fox River Valley" Lecture."

⁴ "Traditional Animal Foods of Indigenous Peoples of Northern North America." Deer | Traditional Animal Foods of Indigenous Peoples of Northern North America - Animals - Mammals - Hoofed Mammals. Accessed December 14, 2022. <http://traditionalanimalfoods.org/mammals/hoofed/page.aspx?id=6133>.

⁵ Low, John N., and John N. Low. "Video: The Power of Place: The Indigenous Peoples of Northeastern Illinois & the Fox River Valley" Lecture."

It remained this way for many thousands of years. This “balance” did amazingly well until another variable was introduced. In 1492, a certain someone sailed that ocean blue. And what did that special person do? Forever change history, especially that of the environment. That certain someone being Christopher Columbus of course. When he discovered the Americas, he caused most European nations to grab and grasp whatever bit they could. Quickly, hundreds of people with disconcerting perceptions of the wilderness, new invasive species ready to dominate said wilderness, and many diseases to destroy that wilderness arrived in what is now the United States.⁶ And that's just what they did. They drastically began to affect the environment. With overhunting being one of the very first major effects.

The French colonists were first to start settling in the Fox River areas in the early 1700's. They much liked the easily accessible rivers that allowed them to easily navigate the land and the access to the Great Lakes.⁷ They also quickly took a liking to the many different furs available. Beaver, bison, and many other species quickly started disappearing due to being hunted in increasing numbers. Beavers especially were hunted en masse for their very water repellent furs. They could be used for many different purposes and were a luxury back in Europe that sold extremely well. So valuable that it was the driving cause for western expansion, and even caused a few wars, most notably the Beaver Wars.⁸ Native Americans quickly took advantage of this demand as well and began to hunt for furs specifically as well. As more and more settlers arrived and expanded, more and more animals were hunted for their furs. They hunted with little consideration about whether the animal would go extinct, they just wanted the furs. Beavers nearly became extinct in the late

⁶ “1492: An Ongoing Voyage Europe Claims America: The Atlantic Joined.” Library of Congress, August 13, 1992. <https://www.loc.gov/exhibits/1492/eurocla.html>.

⁷ “1492: An Ongoing Voyage Europe Claims America: The Atlantic Joined.” Library of Congress, August 13, 1992. <https://www.loc.gov/exhibits/1492/eurocla.html>.

⁸ Rust, Randal. “Beaver Wars, Summary, Facts, Significance, Timeline, Colonial America.”

1800's due to the mass hunting dropping down to only 1200 individuals.⁹ Today they are still recovering. They can be found rarely in the Fox River Bioregion, which is disheartening especially due to their environmental importance.

Sadly, it did not just stop with the French hunting in the 1700's. It continued to only get worse. Eventually due to many other conflicts, and the French and Indian war, England gained control over the Fox River and surrounding areas, and quickly took over in fur trades.¹⁰ Then more people began to move west. By the 1800's, American "pioneers" were manifesting destiny across the American continent. The 1850's saw permanent settlements grow larger and larger. In 1860, Chicago was developing into the metropolis it is today. Towns like Burlington and Aurora began to form due to this growth as well. Most importantly, farmers began to remove forest for fields. The state of Illinois quickly became more field than forest.

Mass urbanization and agriculture, while decreasing the need for hunting only removed more from the environment. People no longer needed to hunt for food, farms and cattle took the place of those needs. They also took the place of lands that they hunted. Entire ecosystems were being removed for fields in which to farm and raise livestock. This further limited the animal populations. Deer had to cross large fields rather than dense forests. Bobcats, Mountain Lions, and so many other species were driven away due to human activity.¹¹ All balances in the bioregion were completely destroyed. But even through all of this, humans didn't stop hunting.

Humans continued to hunt for not even just food anymore. Starting in the late 1800's, past the industrial revolution, hunting began to be more of a pastime, or sport. It was a patriotic, American, manly thing to do. It was romanticized to an extreme. White-tailed deer took the brunt

⁹ Rust, Randal. "Beaver Wars, Summary, Facts, Significance, Timeline, Colonial America."

¹⁰ "History of the Fur Trade - Furbearer Education." History of the fur trade. furbearer education.

¹¹ "About Mountain Lions." Mountain Lion Foundation, July 6, 2021. <https://mountainlion.org/about-mountain-lions/>.

of the beating. They were the ideal animal. Idolized as the prime animal to hunt in the forests of

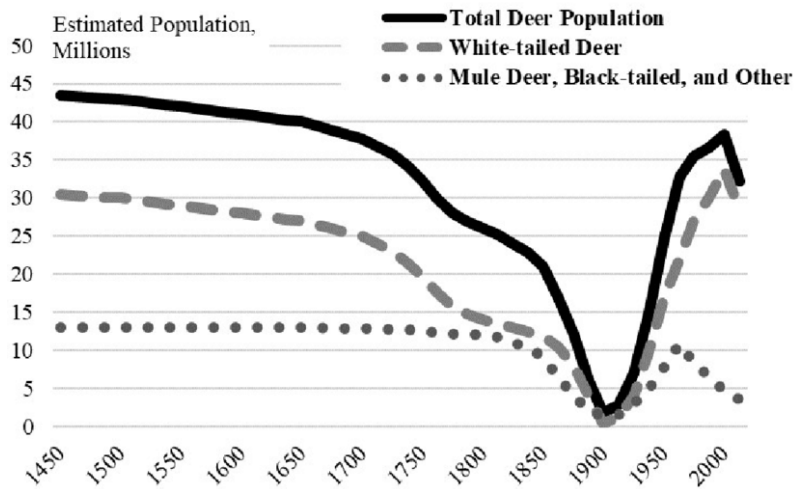


Figure 23 Deer Population in North America (1450-2000)

Illinois. It too was romanticized. It's the Illinois state mammal. People mounted the heads over their mantles as trophies. Bucks with the greatest number of points on their antlers were prized specifically. The hunting of

deer got to extreme levels. Take this picture for example.

A trend can be seen starting from when the European colonists began to spread west in the mid 1700's. From then on it took a drastic hit that nearly drove the deer into extinction. By the early 1900's, deer species across all of the United States, not just the Fox River, nearly went extinct, and America almost lost a symbol of freedom.¹²

But America didn't lose that symbol, that idol of freedom. People noticed. They realized that they no longer were seeing deer in their yards. They were nowhere to be found on any land, and it was a rare find to actually see one.¹³ So people began to protect the deer. The government developed rules for hunting games and put them into place. Agencies formed to protect the different species that were hunted, and by 1900, most states had hunting agencies.¹⁴ Illinois got its first "Game Wardens" in 1885, and from there conservation became vital to save them from an

¹² Coffey, R. Kelley. "White-Tailed Deer." Appalachian Voices. *The Appalachian Voice*, September 1, 2004. <https://appvoices.org/2004/09/01/2724/>.

¹³ George, Emily. "The White-Tailed Deer: From Near-Extinction to Flourishment in the Southeast." Realtree Camo, September 19, 2018.

¹⁴ "History of the Conservation Police." State of Illinois Main Site.

impending extinction. It came close, but it stabilized and began to rise.¹⁵ They even began to restock deer into forests during the 1940's and 1950's. With that "Buck Only" laws were established, only allowing the hunting of bucks to save female deer. Today, they are back to even greater than their original numbers.¹⁶ The comeback is nothing short of amazing.

In fact, it was so successful that hunting actually is helpful for the environment. Deer have become so plentiful that hunting now keeps their numbers as a much more sustainable number for the environment. There are many wildlife preserves and forests around the Fox River open for hunting during certain seasons.¹⁷ In fact, you can easily see deer in much of the bioregion.

They opened the door to conservation. We are still feeling the effects of overhunting and the removal of habitat, but with the help of conservation, many species are making comebacks to the region. Otters, also facing extinction just like beavers, are making a comeback, and are prosperous in the rest of Illinois. Beavers too are making a historic comeback. Hunting has come from being a severely harmful and destructive practice, to more of an actually beneficial practice. It has had tremendous effects on the Fox River bioregion, but it is still improving. The bioregion has experienced much turmoil from hunting, but is beginning to stabilize and come back to a balance. We may never see it as it once was, but I like to take comfort in knowing that things are at least improving.

¹⁵ George, Emily. "The White-Tailed Deer: From Near-Extinction to Flourishment in the Southeast." Realtree Camo, September 19, 2018. <https://www.realtree.com/deer-hunting/galleries/the-white-tailed-deer-from-near-extinction-to-flourishment-in-the-southeast>.

¹⁶ Webb, Kent. "Estimated U.S. Deer Population, 1450 to 2016 Year 2000 to 2016 ..."

¹⁷ "Fox River National Wildlife Refuge." FWS.gov. Accessed December 14, 2022. <https://www.fws.gov/refuge/fox-river>.

Fishing on the Fox

Grace Daum

An ecosystem is a very fragile thing, with its stability heavily dependent on the well-being of its inhabitants. Therefore, the impact on the fish and other species that reside in a river should be an important factor in discussions about things such as dams or invasive species. However, politicians and other decision-makers often don't consider these factors, and this reflects important things about the prevalent values in the societies surrounding the river, such as a disregard for the health of the environment in favor of enhancing the economy and commerce. Examining the species of fish native (such as smallmouth and largemouth bass, channel catfish, muskies, and bluegill) to the Fox River (including how and why their populations have changed) scrutinizes the outcome of previous decisions concerning the river and indicates how fishing is connected to the environment to ultimately explain why the impact on the river's inhabitants should be a significant factor in decisions concerning the river.

By the 21st century, not much remaining wilderness in the United States is untouched by humans. These alterations are often ecologically based. Historically, the purposeful addition of species to bodies of water similar to the Fox River has resulted in a mix of beneficial and detrimental impacts, which demonstrates the importance of an examination of the potential repercussions of an effort prior to its implementation. For example, stocking fish is the practice of raising fish in a hatchery and releasing them into a large body of water to either supplement existing populations or introduce new populations where there were none. This is done for a range of reasons, including to restore endangered species and to provide commercial or recreational fishing opportunities.¹ In

¹ "Fish Stocking." U.S. Fish & Wildlife Service. Accessed November 12, 2022. <https://www.fws.gov/service/fish-stocking-0>.

many cases, this practice is important to the health of the river and the balance of the ecosystem. In the mid to late 1990s, Illinoisan biologists observed that despite the relative hardiness of the northern strain of largemouth bass in the Chain O' Lakes, their numbers were dropping as the smaller yellow bass, another native species which reproduces in much larger numbers, outcompeted them for resources.² They started to revitalize the population by stocking 65,000 fingerling bass, all branded with a black spot. The next year, they would net some of the fish and record what percentage of the population came from stocked fish to see how well the bass were spawning naturally, with the hope that one day they would be able to stop stocking. Though the problem has not been resolved yet, this effort has improved the situation drastically, with only 25,000 northern largemouth bass being stocked in 2021 and 17,000 in 2022.³

There are many situations, however, where stocking fish can be highly detrimental to the ecology of the body of water. Many of the high altitude or backcountry lakes chosen for recreational trout stocking in the western part of the United States (including the Klamath mountains of northern California) in the late 1800s had no fish in them at all prior to the introduction of the trout. Instead, these lakes had large populations of invertebrates and frogs, populations devastated by the sudden introduction of a predator they had no protection against.⁴ Though there have been no species devastation events similar to this in the Fox River as of now, there catastrophic effects could very easily be replicated if the wrong population of fish is suddenly elevated due to stocking.

Finally, there are the most complicated cases, where species were introduced to solve an important ecological problem (not just for recreational purposes) yet ended up creating a whole new

² Stanek, Steve. "Stocking Fish Is Going Swimmngly: By Branding and Stocking Bass on the Chain o' Lakes, Outdoor Enthusiasts and Biologists Are Improving Fishing and the Environment." *Chicago Tribune*, September 11, 1997. <https://www.proquest.com/docview/2278441343>.

³ "FOX CHAIN O LAKES." Illinois Department of Natural Resources. Accessed November 12, 2022. <https://www.ifishillinois.org/profiles/waterbody.php?waternum=00080>.

⁴ MacDonald, James. "The Dark Side of Fish Stocking," *JSTOR Daily*, March 12, 2018. <https://daily.jstor.org/fish-stocking-the-dark-underbelly-of-resource-management/>.

problem. For instance, the Asian carp was imported in the southern part of the U.S. in the 1970s by the U.S. Fish Commission to clear algal blooms from wastewater treatment plants and aquaculture ponds.⁵ Unfortunately, due to flooding that allowed the carp to escape into the Mississippi River basin, this troublesome species has made its way to northern rivers, wrecking ecosystems. Asian carp can reach up to 100 pounds, they have insatiable appetites, and they breed very quickly in large numbers. Therefore, the invasive fish can easily outcompete other species, resulting in significant damage to both the recreational and commercial fishing industries. In places such as the Illinois River, Asian carp now make up 70 percent of the entire biomass of fish.⁶ The Fox River does not currently have Asian carp (though there is the German carp, which was introduced in the 1880s but coexists with native species), but efforts have been necessary to keep it free from the Asian carp, such as rebuilding dams or creating barriers.⁷ ⁸ Because of the introduction of this invasive species back in the 70s as a means to clear waste, Congress now needs to approve a \$778-million plan to keep Asian carp out of the Great Lakes in order to protect the \$7-billion-a-year fishing industry there.⁹ From the stocking of largemouth bass to restore their population, to the accidental decimation of native populations of frogs by introducing trout species, to the widespread infestation of Asian carp and the continued efforts to curb their expansion, the intentional addition of species to a body of water can prompt a variety of outcomes, which all have long lasting consequences and exemplify why all decisions concerning the Fox River need to be examined from the point of view of its inhabitants.

⁵ Burton, Adrian. "The Great Lakes Carp Lockout." *Frontiers in Ecology and the Environment* 8, no. 1 (2010): 6–6. <http://www.jstor.org/stable/20696395>.

⁶ Bentley, Chris. "If You Can't Beat 'Em, Eat 'Em: Illinois Fisheries Rebrand the Invasive Asian Carp." Here & Now. WBUR, July 1, 2022. <https://www.wbur.org/hereandnow/2022/07/01/asian-carp-copi-rebrand-food>.

⁷ "Carping about the Fox River..." *historyonthefox*, June 23, 2015. <https://historyonthefox.wordpress.com/2015/06/23/carping-about-the-fox-river/#:~:text=German%20carp%20thrived%20after%20being,Commission%20in%20the%2019th%20Century>.

⁸ YoungDyke, Drew. "Stopping Carp Ripple Effects." National Wildlife Federation, August 1, 2019. <https://www.nwf.org/Magazines/National-Wildlife/2019/Aug-Sept/Conservation/Asian-Carp>.

⁹ YoungDyke

Recreational and commercial are the main forms of fishing on the Fox River, each of which is intrinsically connected to the health of bodies of water such as the Fox River and raises important points concerning the influence humans have on the living occupants of said river. One in ten people in industrialized nations are recreational fishermen, which means that recreational fishing has the capacity to dramatically impact fish populations. While the main reason anglers are invested in the healthiness of aquatic environments is to protect the fish they seek, a number of fishermen have also developed a deep respect for the natural world and their catch. Historical sportsmen and fishermen alike have consciously engaged in conservation efforts. In the *American Sportsmen and the Origins of Conservation*, John Reiger details how sportsmen were at the forefront of many conservation movements. Through the 1870s, they formed hundreds of organizations that maintained game habitats, organized national parks, and lobbied for laws surrounding the protection of game species.¹⁰ This is useful since sportsmen are often the first to notice when something is wrong. One famous case is when, in September 2010, a fly fisherman in Britain noticed the presence of an invasive and highly ecologically damaging species known as the ‘killer shrimp’ (*Dikerogammarus villosus*) in Grafham Water reservoir. He reported it immediately, allowing the scientific community to take steps to contain the problem before it spread around the country.¹¹ Anglers also monitor pollution levels. Many invertebrates (such as *Baetis rhodani*) can only thrive in very well oxygenated, unpolluted water, so when their populations drop, anglers will note this as an indicator of degrading water quality and will report it, as it signals that a pollution incident has likely occurred.¹² There are

¹⁰ Clumpner, R. A. (1976). Reviewed Work: *American Sportsmen and The Origins of Conservation* by John F. Reiger. *Journal of Sport History*, 3(3), 326–328. Retrieved from <https://www.jstor.org/stable/43609672>.

¹¹ Madgwick, Genevieve, and David C Aldridge. “Killer Shrimps in Britain: Hype or Horror?” *British Wildlife*, August 2011. https://www.researchgate.net/publication/289661862_Killer_shrimps_in_Britain_Hype_or_horror_The_facts_about_our_latest_invasive_animal.

¹² MacDougall-Davis, Robert. “Fishing and the Environment: Why the Two Are Inextricably Linked.” *The Ecologist*, October 15, 2015. <https://theecologist.org/2010/oct/15/fishing-and-environment-why-two-are-inextricably-linked#:~:text=Angling%20and%20fisheries%20conservation,environmental%20issues%20that%20need%20addressing>.

also some detriments to recreational fishing, like how it primarily preys upon a certain age of maturation of fish, how it can lead to overfishing, or how it can cause habitat destruction. However, this just indicates the necessity of regulations to curtail these potential consequences. Therefore, recreational fishing and the well-being of aquatic environments are connected in all bodies of water that are fished, including the Fox River. Through their respect for the environment, anglers are aware of the impact they have on the waters they fish and the necessity of balance, which prompts them towards conservation efforts that are essential in preserving the species of the rivers. Given the popularity of recreational fishing in the Fox River, this concept can be exploited to help protect and improve the river.

Commercial fishing is a necessary industry, worth billions of dollars and providing countries their supply of fish, and while it is not without its merits, there also lie significant issues within the industry that are damaging to aquatic ecosystems. Firstly, there are benefits to the large-scale aspect of commercial fishing. For the last decade, the more than 1,200 licensed commercial anglers on the Illinois River have done their part to manage the Asian carp epidemic, spending their workdays catching boatloads of the species (6.3 million pounds to date), though they are only worth pennies to the pound.¹³ The fishermen claim they do it more as a public service, as it is a rough day to make the day's earnings yet when pounds of the invasive species are removed from the river, there are automatically more resources available for the native species of fish.¹⁴ There are also consequential ramifications of commercial fishing, like its penchant to result in overfishing. Although inland waters, such as rivers, experience a variety of stressors, including pollution and the introduction of new species, overfishing is a significant concern. Commercial fishing can call forth the "fishing

¹³ "Asian Carp Business Process Analysis." Fishing in Illinois. Accessed November 12, 2022. https://www.ifishillinois.org/programs/CARPREport_news.html.

¹⁴ McFarland, Joe. "Roughing It." *Outdoor Illinois*, March 2005. <https://www2.illinois.gov/dnr/oi/documents/march05commercialfishing.pdf>.

down” effect, where the largest fish in an ecosystem are removed and either the species is eliminated and replaced by smaller species or the population of that species are still prevalent in the ecosystem but are a smaller size at maturation.¹⁵ This initiates a cascade of events, including the eradication of species with short life cycles, reductions in the mean size of fish in a body of water, and changes to the reproduction rates. The potential consequences, good and bad, of recreational and commercial fishing demonstrate the value of fishing in the conservation of all aquatic ecosystems. They also show the necessity of regulating the fishermen on the Fox River to ensure a balance in said ecosystem for the well-being of the inhabitants.

There are a number of situations in the Fox River itself that provide important insights into future decisions, examples of plans with unprecedented outcomes. In May 1936, the flow from upriver dams was shut off and diverted to provide power to other areas. By the time the president of the Fox Valley federation submitted a complaint of low water conditions, large numbers of fish that had been trapped below the St. Charles Dam had died.¹⁶ This situation illustrated the importance of balance between using water for power and maintaining a healthy water level and educated future regulations. It also demonstrates why some argue for removal of dams from the Fox River. Around 1959 in Wisconsin, anglers had observed that the population of northern pike had been struggling for the past couple of years and had been pushing for regulation.¹⁷ Since the fishermen often understand individual aquatic environments the best, this concern indicates that a size limit is probably a good idea and important to support the different species of fish. Around the 1960s, it was discovered that among the 4,000 fish caught from the Fox River, four percent had tumors and

¹⁵ Allan, J. David, Robin Abell, Zeb Hogan, Carmen Revenga, Brad W. Taylor, Robin L. Welcomme, and Kirk Winemiller. “Overfishing of Inland Waters.” *BioScience* 55, no. 12 (December 2005): 1041–51. [https://doi.org/10.1641/0006-3568\(2005\)055\[1041:ooiw\]2.0.co;2](https://doi.org/10.1641/0006-3568(2005)055[1041:ooiw]2.0.co;2).

¹⁶ “FOX RIVER DOWN, FISH DYING; USE OF DAMS BLAMED.” *Chicago Daily Tribune*, May 24, 1936. <https://www.proquest.com/hnpchicagotribune/docview/181789693/76D10610E5F24CF0PQ/10>.

¹⁷ McNally, Tom. “Illinois to Start Stocking Trout Streams: Most Regulations for Fishing Are Unchanged.” *Chicago Daily Tribune*, March 29, 1959. <https://www.proquest.com/hnpchicagotribune/docview/182262328/28E57DD580774529PQ/11>.

seventy percent of the tumors were cancerous. This terrible human hazard was due entirely to the water pollution from industries, as the tumor rate in the Fox fish was found to be four times higher than that of identical fish in less-polluted Canadian waters.¹⁸ This signified that the fines for dumping toxic waste into waterways needed to be raised to the point that the industries needed to construct facilities for neutralizing the poisons instead. In fact, in 2017, Chicago Mayor Rahm Emanuel introduced a measure that proposed the increase of fines for illegally dumping large quantities of toxic waste from \$3,500 to \$30,000, strongly discouraging companies from trying to evade the proper disposal of waste.¹⁹ All of these examples directly impacting the Fox River provide consequential lessons as to how decisions can go awry, how to mitigate problems that arise, and how to make more informed decisions in the future.

The Fox River has changed as humans evolved, as their interests changed, as they made mistakes and attempted to fix them. From examining the repercussions and advantages of past decisions concerning similar rivers, lessons can be learned and applied when similar conversations emerge concerning the Fox River. Situations involving the intentional addition of species, either to supplement existing populations or to introduce new ones, can be convoluted and difficult to predict, which is when it is essential to look towards the past. Furthermore, there are many fishermen around the Fox River, and they can be of significant assistance in the conservation efforts, so long as they are properly regulated. Overall, the most crucial part of this process is to be thorough in the examination of the predicted outcomes and their impact on the river, to ensure the well-being of all inhabitants of the Fox River.

¹⁸ Stone, Brenda. "Peril of Cancer from Fox River Fish Revealed." *Chicago Tribune*, March 30, 1974. <https://www.proquest.com/hnpchicagotribune/docview/171112256/76D10610E5F24CF0PQ/5>.

¹⁹ Musulin, K., & Boteler, C. (2017, October 4). *Update: Chicago officials move forward on illegal dumping measure*. Waste Dive. Retrieved November 28, 2022, from <https://www.wastedive.com/news/update-chicago-officials-move-forward-on-illegal-dumping-measure/505734/>

Freshwater Mussels' Essential Filtration of the Fox River

Jackie Zhang

For over several decades, the freshwater mussel population living in the Fox River has been declining due to overharvest, uncontrolled water pollution, disrupted breeding cycles, and habitat destruction.¹ The Illinois Endangered Species Protection Board listed 24 of the 62 extant species of mussel as endangered, 12 of which are listed federally endangered or threatened, and 3 additional species were listed as threatened.² Although they were only viewed as an economic asset starting in the early 1900s for their freshwater pearls, causing the overharvest of their populations, mussels have only been recently recognized for their contributions to the environment of the Fox River with their ability to filter plankton and clarify the river.

Phosphorus discharges in the Fox River alongside the uncontrolled growth of the algae population have disrupted the ecosystem of the river because of the declining mussel population, and the unkempt, unsightly growth of the algae in the river has brought attention to the fact that mussels are essential to the environment in their ability to clarify and clean the river. As a result, because the freshwater mussels native to the Fox River take on an essential role in the ecosystem in regulating the growth of algae and cleaning/filtering the river, the community must preserve the ecosystem and health of the Fox River by terminating their actions that cause the declining of their population.

¹ Arthur Malm, "The Fox's Formerly Phenomenal Filtering Freshwater Mussels | Friends of the Fox River," <https://friendsofthefoxriver.org/>, April 30, 2018, <https://friendsofthefoxriver.org/2018/04/30/the-foxs-formerly-phenomenal-filtering-freshwater-mussels/>.

² Illinois Endangered Species Protection Board, "Checklist of Illinois Endangered and Threatened Animals and Plants," www2.illinois.gov, May 28, 2020, <https://www2.illinois.gov/dnr/ESPB/Documents/ET%20List%20Review%20and%20Revision/IllinoisEndangeredandThreatenedSpecies.pdf>.

In the early 1900s, the pearl button industry gained traction, which had a tremendous impact on the entire state of Illinois.³ A button factory was established in Yorkville to compete with Muscatine for Fox River mussels in 1911. As a result, the increasing demand for buttons affected the harvest and use of mussels in the Fox River, where fishermen dug for mussel shells to sell to button factories. These shells that came out of the Fox River in Dundee, Illinois, sold for as high as \$125 per ton, which furthered the process and rate at which the button industry started causing the overharvesting and declining population of the mussels.⁴ However, by 1947, the pearl button industry started to decline because of the mass production of plastic buttons and zippers, which were more efficient to make and sell in large quantities. The pearl button industry could not keep up to pace and became obsolete as a result. Despite the elimination of commercial harvest and the passage of the Clean Water Act in the 1970s, the abundance and species richness still declined between those intervening years due other factors remaining in the river such as dams.⁵

Starting around the same time as the pearl button industry in 1908, the pearl fever of Elgin, Illinois had clam diggers actively searching for freshwater pearls in the Fox River, where they would “[wander] the river banks[,] ... wait until the river was low in the hot summer months, [and] then wade in until their feet touched a clam.”⁶ Consumers, such as jewelers and professional pearl buyers, incentivized this business model through making regular visits to the city to appraise and buy pearls. According to an article in 1911 from the *Record*, about \$2 million worth of freshwater pearls were being harvested annually in Illinois.⁷ Combined with the pearl button industry, both factors

³ Howard Edlen, “History of the Pearl Button Business in Meredosia, Illinois” www.museum.state.il.us, accessed December 12, 2022, <https://www.museum.state.il.us/RiverWeb/harvesting/harvest/mussels/industry/hedlen.html>.

⁴ Howard Edlen, “History of Pearl Button Business.”

⁵ Robert W. Schanzle et al., “The Freshwater Mussels (Bivalvia: Unionidae) of the Fox River Basin, Illinois and Wisconsin,” *Biological Notes*; No. 141, November 1, 2004, <https://hdl.handle.net/2142/95902>.

⁶ Alft, E. C. *Elgin: Days Gone By*. Carpentersville, IL: Crossroads Communications, 1992.

⁷ “When the Fox River Was Known for Its Pearls—and Pearl Buttons...,” *historyonthefox*, January 9, 2018, <https://historyonthefox.wordpress.com/2018/01/09/when-the-fox-river-was-known-for-its-pearls-and-pearl-buttons/>.

contributed to the overharvest of the freshwater mussels in the Fox River and caused their population to decline, resulting in an unhealthier, dirtier Fox River.

Decades later, although commercial harvest was terminated and the Clean Water Act was passed in the 1970s, the enforcement of these two protections could not explain why the mussel population still was declining and could not return to its original abundance. Considering that there were other factors contributing to the declining population, a contributor was the fact that the dams in the river caused habitat destruction. The presence of low-head dams in the Fox River degraded the habitat, water quality, and fragmented the river into a series of lentic ecosystems, which caused much of the Fox River main stem to be considered impaired for aquatic life from the sedimentation, changes in stream depth, and increased levels of phosphorus from the habitat degradation.⁸ These conditions were detrimental to mussels because most freshwater mussels depend on fish to reproduce, where they will attach onto the gills of fish, traveling upstream, for nutrition before dropping, fully formed, onto the river.⁹ The dams caused 50% of the Fox River to become dam backwater, where the sedimentation, changes in stream depth, and increased levels of phosphorus slowed the river and caused silt to routinely cover a great portion of the river floor. As a result, the dams destroyed the habitat that the mussels used to reproduce in as it is now contrived of uninhabitable conditions for the mussels as well as preventing fish to swim upstream with the mussels for their growth.

Alongside the dams, the urbanization of the Fox River watershed has also paralleled the decline in mussel species and species abundance because of habitat destruction and water pollution. The Lower Fox River includes the highest concentration of pulp and paper mills in the world, combined with around 270,000 people living in communities around the river. Before the 1970s,

⁸ Diane K. Shasteen, Sarah A. Bales, and Alison P. Stodola, "Freshwater Mussels of the Fox River Basin in Illinois," *Technical Report*, March 19, 2013, <https://hdl.handle.net/2142/45962>.

⁹ Arthur Malm, "The Fox's Filtering Freshwater Mussels."

untreated sewage and industrial wastes were often directly dumped into the river, contaminating the sediments in many areas and polluting the water.¹⁰ For example, during the 1950s through 1960s, the pulp/paper mills routinely used PCBs, which are highly carcinogenic compounds, in their operations, ultimately contaminating the river.¹¹ Specific consequences of these actions include polluted runoff, invasive species, lost wetlands, and overall contamination of the river. In principle, both the construction/presence of the dams in the Fox River as well as the urbanization of the surrounding area have caused water pollution and habitat destruction in the river, greatly damaging the mussels' ability to reproduce, live in their natural habitat, and resulting in their declining population.

Mussels take an essential role in the ecosystem of the Fox River, where as filter feeders, they use a siphon to filter bacteria and plankton out of the water column into their gill chambers for consumption, and then they expel back out filtered water into the waterbody.¹² A single adult mussel can filter up to 15 gallons of water per day, which clarifies the Fox River from excess phosphorus and nitrogen levels, algae, harmful pollutants, and small particulate matter. In addition, algae causes low dissolved oxygen levels that harm fish and other aquatic life, which indicates that algae blooms are seen as a major water quality problem for the Fox River.¹³ Mussels regulate the plankton population in the Fox River, maintaining the balance of the ecosystem and food chain, and they clarify/make the river look cleaner as a part of the natural abiotic/biotic interaction process. As a

¹⁰ "Green Bay & Fox," Wisconsin's Great Lakes Areas of Concern, accessed December 13, 2022, <https://fyi.extension.wisc.edu/aocs/fox-river-green-bay/#:~:text=Before%20the%201970s%2C%20untreated%20sewage.>

¹¹ US EPA, OSRTI, "FOX RIVER NRDA/PCB RELEASES," Epa.gov, 2019, [https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0507723.](https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0507723)

¹² Isabella Newingham, "Hidden within the Substrate Is an At-Risk Group of Species," Outdoor Illinois Journal, May 2, 2022, [https://outdoor.wildlifeillinois.org/articles/hidden-within-the-substrate-is-an-at-risk-group-of-species.](https://outdoor.wildlifeillinois.org/articles/hidden-within-the-substrate-is-an-at-risk-group-of-species)

¹³ Arthur Malm, "The Fox's Filtering Freshwater Mussels."

part of the ecosystem, they are essential food sources for some fish and mammals in the river, also maintaining the food chain balance as a result.¹⁴

In essence, mussels' crucial role in the Fox River ecosystem with its place in the food chain and its ability to filter the water can help rebuild the condition of the river through natural means and maintain a healthy condition for the river. However, due to decades of human activity such as overharvesting through industry with pearl buttons and pearls, destroying the habitat through dam building, urbanization, and pollution, the condition of the Fox River plummeted into inhabitable conditions for mussels to survive in, causing the mussel population of the river to decline significantly. To restore the health and water quality of the Fox River, the communities surrounding it must take action to undo the damage done throughout the 1900s to the ecosystem of the Fox River by cleaning up and preventing pollution, living sustainably by conserving water, conducting mussel surveys (regarding the abundance of their species), and doing other community-wide conservation efforts to increase the native mussel population as well as improve the Fox River ecosystem.

¹⁴ Isabella Newingham, "Hidden within the Substrate."

How River Otters Will Save Our Rivers

Christian Cline

Lontra Canadensis, more commonly known as the North American River Otter, is quite the unique mammal, as they have gone through quite a rich and complex history throughout their time in the Midwestern United States. Events like the numerous large-scale fur trades in the 19th and 20th centuries lead to their numbers rapidly decreasing, to the point that they were considered endangered for most of the 20th century in Illinois. However, the environmental movements in the 1970s lead to the revitalization of river otters across the state and tracking the history of the river otter in the state can provide insightful information on the historical health of these rivers, one of which being the Fox River. The history of the river otter in Illinois is a telltale sign that ecological river improvement is possible in Illinois, and it is, therefore, essential that we continue to protect, maintain, and observe river otters residing along the Fox River, as they can also help us understand how to better protect, maintain, and observe the Fox River itself.

River otters can be characterized by their slender, dark-furred bodies with only gold highlights on their face and chests. Found across all of continental North America where there's water, river otters seldom prefer human involvement, and yet still are quite social in nature, and can often be seen diving into the water and sliding around on mud or ice for seemingly pure entertainment. Some of the earliest documentations of River Otters in Illinois described seeing them slide down “otter slides” or “smooth, worn down pathways on the sides of banks and streams” and writers have seen them “sliding down these places much as a boy enjoys sliding down a hill in

winter.”¹ The playful and social, yet wild and instinctual natures they possess have drawn many to them; some for research and pure fascination, but some, for profit.

The otter population in the Illinois state area was rapidly decreasing at the beginning of the 20th century, almost to the point of extinction, but efforts from the Illinois Department of Natural Resources helped revitalize their populations, and this can therefore be taken as a sign that people have begun to care more about rivers in Illinois, such as the Fox River. Throughout the 19th and early 20th century, events such as the Green Bay Fur Trade and many others like it had depleted the Midwest of many of its local animals, some of the most targeted being otters, for being relatively easy to spot/hunt compared to other animals.² Along with the degradation of habitats, water pollution, and unregulated trapping in the 1900s, river otters were quickly considered an endangered species throughout the Midwest area.³ The reckless actions of these trappers, along with the growing demand for harvested fur also caused problems for the overall health of the rivers, which includes the Fox River. As the Chicago Tribune states: “The Fox River is in much better shape than 50 years ago when "the Fox" — an anonymous environmental activist — would plug sewer outlets going into the river and call out companies throwing pollutants into it.”⁴ A large-scale cause-and-effect chain followed shortly: because of the growing demand for otter fur, the companies that processed the fur would dump their waste products into the Fox River carelessly, which in turn with the excessive hunting and pollution, affected the populations of otters along the Fox River, and caused their numbers to drop dramatically enough to classify the species as endangered. However, the

¹ Charles B Cory, “The Mammals of Illinois and Wisconsin,” Google Books (Google, 1912), <https://books.google.com/books?id=KcdOAAAAMAAJ&pg=PA333#v=onepage&q=otter&f=false>, 333.

² Jeanne Kay, “Native Americans in the Fur - JSTOR,” JSTOR, 1985, <https://www.jstor.org/stable/pdf/3984337.pdf>.

³ Andrew Rutter, “In Search of River Otters,” Lake County Nature, June 25, 2018, <https://lakecountynature.com/2017/10/25/in-search-of-river-otters/>.

⁴ Gloria Casas, “Removing Dams on the Fox River Will Increase Number of Fish Species,” Chicago Tribune, May 10, 2019, <https://www.chicagotribune.com/suburbs/elgin-courier-news/ct-ecn-fox-river-st-0302-20150228-7-story.html>.

widespread Environmentalist Movements of the 1970s did much to raise ecological awareness and action across the country, and previously lost Midwestern river otters were no exception to this.

Prior to the 1970s, River Otters in the state of Illinois were hunted for their fur, almost to the point of extinction, but environmental protection agencies brought them back from endangerment, which in turn improved state rivers, like the Fox Rivers, environmental health overall. Awareness from the Environmental Movement brought large amounts of concern to the river otters, as well as their habitats, and this in turn eventually led the Illinois Department of Natural Resources to enact a recovery plan for the species between 1994 and 1997.⁵ The introduction of 346 river otters throughout the various waterways in Illinois was successful in its effort to reestablish a stable population of River Otters, as they now thought to have reached around 4,500 in number as of 2005, and this attention can also be attributed to the increased environmental health of state rivers like the Fox River as time moved on.⁶

Now in a more modern age, river otters have actually been seen adapting to more urban environments, which can be taken as a sign of potential ecological improvement in rivers all across Illinois. In February of 2022, WTTW News published an article about the sudden reappearance of otters in Cook County and wrote about the newly formed Urban River Otter Research Project which is designed to study these newly discovered otters further as to how and why they have adapted to urban styles of living.⁷ This is a very promising sign for the overall health of the rivers, because as Zach Hahn in the article states: “Otters are notoriously sensitive to polluted water. ... In

⁵Andrew Rutter, “In Search of River Otters,” Lake County Nature, June 25, 2018, <https://lakecountynature.com/2017/10/25/in-search-of-river-otters/>.

⁶Robert D Bluett et al., “Status of the River Otter (*Lontra Canadensis*) in Illinois, 1998–2004,” Illinois State Academy of Science, 2004, <http://ilacadofsci.com/wp-content/uploads/2013/08/097-23MS-2409-print.pdf>.

⁷Patty Wetli, “River Otters Are Back in Chicago. A New Research Project Aims to Find out How They're Adapting,” WTTW News, 2022, <https://news.wttw.com/2022/02/22/river-otters-are-back-chicago-new-research-project-aims-find-out-how-they-re-adapting>.

general, they're considered a 'sentinel' species that humans can look at to determine environmental health."⁸ Otters, while playful and loved by many, tend to be quite shy around many humans and generally avoid more urbanized spaces. This could mean many different things; perhaps they have just gradually evolved over the roughly 30 years of reintroduction to better adapt to human presence, or perhaps they were driven out of other areas for whatever reason. Whatever the case(s) may be, the mere fact that they are in these rivers at all is quite an astounding observation that can abolish preconceived notions that these rivers were permanently uninhabitable from problems like eutrophication from algae. The same can likely also be true for the Fox River.⁹

The Fox River, while likely much less polluted than other rivers around Illinois, prominently Chicagoland rivers, is still relevant to a lot of citizens' daily lives, and understanding how the recently reintroduced River Otter plays a role in the environmental health of the river can help bring a better understanding towards how to better protect, maintain, and observe the river itself. In the past, Midwestern River Otters were hunted for their pelts during the numerous fur trades that took place in the 19th and 20th centuries, to the point that for almost 80 years they were considered an endangered species. However, efforts from the widespread environmental movements across the country led to more people beginning to recognize these mammals and their habitats as something worth protecting, which in turn led to the Illinois Department of Natural Resources approving a plan, one in which the introduction of 346 River Otters from 1994 to 1997 quickly drew to an expected almost 4,500 in 2005, officially leading the population to be put off the endangered species list. Finally, modern River Otters have even been seen in more urbanized locations, an interesting find considering their rather reclusive and shy natures towards humans, and this discovery is no different for other rivers found across Illinois, such as the Fox River. Considering this whole

⁸ Ibid.

⁹ Gloria Casas, "Removing Dams on the Fox River Will Increase Number of Fish Species," Chicago Tribune, May 10, 2019, <https://www.chicagotribune.com/suburbs/elgin-courier-news/ct-ecn-fox-river-st-0302-20150228-7-story.html>.

historical life span of the River Otter, combined with the fact that River Otters by nature are rather selective animals, ones that prefer to stay away from human involvement and locations with large amounts of pollution, the fact that sightings today are as high as they've been for over 100 years is fantastic news, and can indicate that the reintroduction of River Otters not only helped save the species itself but also the rivers that they reside in, like the Fox. Therefore, we should look towards protecting, studying, and handing these creatures with more care than ever before, as they could bring about further improvements to polluted rivers across the country.

Invasive Species in the Fox River

Shanan Riley

For decades the ecology of the Fox River has been greatly affected by the introduction of several invasive species. These species include but are not limited to Zebra Mussels, Rusty Crayfish, and Round Gobies. Each of these species have had a unique impact on the Fox, overrunning native populations leading to widespread conservation efforts championed by both state governments and community organizations. While the introduction of each was unintentional, understanding how they found their way into the Fox River and how their populations have changed the ecology of the river is essential to understanding the impact of humans on the greater bioregion. By closely examining the role of invasive species in the Fox River, the role of humans in the alteration of the bioregion can be better understood.

To facilitate an understanding of these species in the Fox River, an overview of their role in their native environment is necessary. Zebra mussels are native to the Caspian and Black Seas in Ukraine and Southern Russia.¹ Here, they grow in relatively small quantities and help to increase the overall biodiversity of their ecosystems by filtering water, allowing for the growth of plant species. Beyond that, they are largely inconsequential to human life and serve little economic purpose/cause little economic detriment. Rusty Crayfish has a native range much closer to Fox River, in the Ohio River Basin spanning northward to Lake Erie. In these native ranges, the crayfish's main role is to control the overgrowth of plant species which allows for the growth of a broader range of species. Additionally, they can eat virtually anything including sediment, which makes them useful for

¹ Malgorzata Ozgo et al., "Invasive Zebra Mussel (*Dreissena Polymorpha*) Threatens an Exceptionally Large Population of the Depressed River Mussel (*Pseudanodonta Complanata*) in a Postglacial Lake," *Ecology and Evolution* 10, no. 11 (December 2020): pp. 4918-4927, <https://doi.org/10.1002/ece3.6243>.

clearing waterways which also promotes biodiversity.² Rusty Crayfish are frequently used as bait for fishing and can be eaten, both of which make them economically valuable in their native ranges. The Round Goby is also native to the Caspian and Black Seas and is important for controlling the population of other native species. Notably, they eat Zebra Mussels and other crustaceans.³ They are aggressive in nature and easily outcompete other fish in both their native and invasive habitats.⁴

The introduction of Zebra Mussels in North America was accidental and likely unavoidable given the economic importance of the Great Lakes system for the transportation of goods. The first record of the mussels in the Great Lakes system was in 1988 and the generally accepted consensus is that they likely came from ballast water that was discharged by cargo ships into the lakes.⁵ Interestingly, the presence of these mussels in the Fox can be almost entirely attributed to Soviet-US trade agreements. After a series of failed crops in the 1980's the Soviet Union was in desperate need of grain to sustain their agricultural industry, so President Ronald Reagan struck a trade deal that allowed for millions of dollars of Midwest grain to be shipped to Russia. Importantly, there were few goods that the US wanted in return for this grain, so ships were sent almost entirely empty from the Soviet Union to the Great Lakes system.⁶ An empty cargo ship must fill its tanks with ballast water, and thus millions of tons of Eurasian water was emptied into the Great Lakes throughout the 1980s, likely resulting in the introduction of Zebra Mussels.⁷ Not only was this introduction influenced by global political conditions, large scale environmental factors were also at play. This deal was

² Julian D. Olden, M. Jake Vander Zanden, and Pieter T. Johnson, "Assessing Ecosystem Vulnerability to Invasive Rusty Crayfish (*Orconectes Rusticus*)," *Ecological Applications* 21, no. 7 (October 2011): pp. 2587-2599, <https://doi.org/10.1890/10-2051.1>, 2588.

³ Dave Bosanko, "Goby Family," in *Fish of Minnesota Field Guide* (Cambridge, MN: Adventure Publications, 2019), pp. 56-58.

⁴ Ibid.

⁵ "Ballast Water and Nonindigenous Species," in *Stemming the Tide Controlling Introductions of Nonindigenous Species by Ships' Ballast Water* (Washington, D.C.: National Academy Press, 1996), 11-14.

⁶ Science, W., & Board, T, *Great Lakes Shipping, Trade, and Aquatic Invasive Species Special Report 291*. (Washington D.C., District of Columbia), p. 43-62

⁷ Jonathan M. Bossenbroek et al., "Forecasting the Expansion of Zebra Mussels in the United States," *Conservation Biology* 21, no. 3 (December 2007): pp. 800-810, <https://doi.org/10.1111/j.1523-1739.2006.00614.x>.

favorable to both parties given the failure of the Soviet crops caused by harsh climate conditions and the surplus of American grain caused both by a string to strong growing years and the high value of the dollar making the grain less favorable.⁸

The further dissemination of the mussels can be attributed to much smaller scale human action. The mussels traveled quickly through waterways connected to the Great Lakes system, with records showing their first appearance in the Fox River just one year after the first record of them in the Great Lakes.⁹ By the beginning of the 2000s the mussels had become one of the largest populations of invasive species in the Northern region of the Midwest.¹⁰ However, their spread beyond the interconnected waterways was, and remains, substantially slower than expected. The most common way the mussels are moved from one isolated body of water to another is by independent fishermen transporting their boats. Given the quick spread across the Northern region, most of these fishermen are traveling from one body of water that has been invaded to another where Zebra Mussels are already present. Thus, slowing the spread to other regions and bodies of water.¹¹ However, in recent years, there have been records of Zebra Mussels as far south as Louisiana and as far west as California.

The Round Goby is much less widespread than Zebra Mussels, however they were likely introduced in the same way at approximately the same time. Like the mussels, Round Goby are native to Eurasia and can survive for a long time with few resources. This makes them prime candidates for transportation across the Atlantic in ballast water.¹² Given that the first record is from

⁸ Bill Keller, "Reagan's Russian Grain Harvest," *The New York Times* (The New York Times, September 9, 1984), <https://www.nytimes.com/1984/09/09/business/reagan-s-russian-grain-harvest.html?pagewanted=1>.

⁹ "Zebra Mussel (*Dreissena Polymorpha*) - Species Profile," USGS Nonindigenous Aquatic Species Database, accessed November 13, 2022, <https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=5>.

¹⁰ JEFFREY L. RAM and ROBERT F. MCMAHON, "Introduction: The Biology, Ecology, and Physiology of Zebra Mussels," *American Zoologist* 36, no. 3 (1996): pp. 239-243, <https://doi.org/10.1093/icb/36.3.239>.

¹¹ Jonathan M. Bossenbroek et al., "Forecasting the Expansion of Zebra Mussels in the United States," *Conservation Biology* 21, no. 3 (December 2007): pp. 800-810, <https://doi.org/10.1111/j.1523-1739.2006.00614.x>.

¹² Ibid.

the early 1990s in the St. Clair River, a shallow portion of the route from the Atlantic inwards to the Great Lakes where many ships are forced to empty their ballast tanks to navigate, economists have determined that the goby were more than likely traveling on Soviet ships, like the zebra mussels were.¹³ Unlike Zebra Mussels, their spread across the region has been relatively slow across the board. Being that they are fish, it is much more difficult to accidentally transport them from one body of water to another, and for this reason they have remained invasive almost entirely to Michigan, and more recently to the Mississippi River watershed, including the Fox River.¹⁴ 2015 was the first time that a Round goby was discovered in the Fox River. This discovery has forced the closing of the lock that connects Lake Winnebago to the Fox River to prevent the invasion of the lake which would likely result in their spread to the Wolf River and across the state.¹⁵

The Rusty Crayfish was introduced to the Fox River not through large-scale, intercontinental travel, but because of individual fishing negligence. With a native range much closer to the Fox River, many fishermen who frequent the native range also frequent the invasive range of the crayfish.¹⁶ For this reason, the accepted consensus on how the Rusty Crayfish ended up in the Fox River and almost all of its other non-native zones is through transportation by angler fisherman who intended to use it as bait.¹⁷ The species works well as bait, so fishermen who did not understand the impact that they would be having on the ecology of the Fox River introduced it. Although there is

¹³ Harold M. Mayer, "Great Lakes--Overseas an Expanding Trade Route," *Economic Geography* 30, no. 2 (1954): p. 117, <https://doi.org/10.2307/142099>.

¹⁴ "Zebra Mussel (*Dreissena Polymorpha*) - Species Profile," USGS Nonindigenous Aquatic Species Database, accessed November 13, 2022, <https://nas.er.usgs.gov/queries/factsheet.aspx?speciesID=5>.

¹⁵ Patty Murray, "Invasive Round Goby Fish Discovered in Fox River," Wisconsin Public Radio, September 7, 2015, <https://www.wpr.org/invasive-round-goby-fish-discovered-fox-river>.

¹⁶ H.H. Hobbs, Joan P. Jass, and Jay V. Huner, "A Review of Global Crayfish Introductions with Particular Emphasis on Two North American Species (Decapoda, Cambaridae)," *Crustaceana* 56, no. 3 (May 1989): pp. 299-316, <https://doi.org/10.1163/156854089x00275>.

¹⁷ Christopher A. Taylor and Michael Redmer, "Dispersal of the Crayfish *Orconectes Rusticus* in Illinois, with Notes on Species Displacement and Habitat Preference," *Journal of Crustacean Biology* 16, no. 3 (August 1996): p. 547, <https://doi.org/10.2307/1548745>.

not a grand geopolitical reason for the introduction of this species, it has still had a massive impact on the ecology of the Fox River and shows how individual actions can create change in ecosystems.

The Rusty Crayfish is particularly dangerous for ecosystems because of its ability to outcompete and cross breed with other crayfish species. The Rusty Crayfish is more aggressive when feeding and can force other crayfish and crustaceans to abandon their ‘homes’ in search of more food.¹⁸ Additionally, the Rusty Crayfish lays hundreds of eggs at a time and frequently feeds on the eggs of other fish, creating an overpopulation under population problem.¹⁹ This problem is exacerbated by crossbreeding between the Rusty Crayfish and native crayfish, creating a hybrid population in smaller bodies of water like the Fox River can completely overtake the native populations, leading to further degradation of the ecosystems and making them much harder to contain.²⁰

Similarly, the Round Goby can breed up to six times in a single summer and its aggressive nature has led to food scarcity problems for native species, however its role in the ecosystem is much less straightforward.²¹ One of the main food sources for Round Goby are Zebra Mussels, which grow in overabundance in the Fox River. By eating the Zebra Mussels, the Goby are creating a positive impact on the ecosystem. Some ecologists argue that efforts to control the population of the Goby should be carefully monitored to ensure that a certain level remains in the waterways to

¹⁸ Julian D. Olden, M. Jake Vander Zanden, and Pieter T. Johnson, “Assessing Ecosystem Vulnerability to Invasive Rusty Crayfish (*Orconectes Rusticus*),” *Ecological Applications* 21, no. 7 (October 2011): pp. 2587-2599, <https://doi.org/10.1890/10-2051.1, 2588>.

¹⁹ Ibid.

²⁰ Tracy E. Arcella et al., “The Role of Hybridization in a Species Invasion and Extirpation of Resident Fauna: Hybrid Vigor and Breakdown in the Rusty Crayfish, *Orconectes Rusticus*,” *Journal of Crustacean Biology* 34, no. 2 (January 2014): pp. 157-164, <https://doi.org/10.1163/1937240x-00002204>.

²¹ A.-B. Florin et al., “Local Conditions Affecting Current and Potential Distribution of the Invasive Round Goby – Species Distribution Modelling with Spatial Constraints,” *Estuarine, Coastal and Shelf Science* 207 (2018): pp. 359-367, <https://doi.org/10.1016/j.ecss.2017.10.005>.

control the growth of other invasive populations.²² At the same time, their ability to outcompete other fish and survive in subprime water conditions makes them a huge threat to native populations. Trying to create balance between native and invasive species to optimize conditions in waterways is a difficult task, and again shows how humans have the ability to entirely change the ecology of a region.

Zebra mussels are both ecologically and economically dangerous. They are able to reproduce extremely quickly and can outcompete other filter feeders, leading to the decline of native populations which has a ripple effect across the entire ecosystem.²³ Beyond that, they are able to quickly attach themselves to man-made structures and are known to be a particular menace for drainage pipes. The Army Corp of Engineers has described them as the most troublesome biofouling organism in freshwater.²⁴ They can ruin beaches, water turbines, boat engines, and can even encrust and kill other animals. All of this results in hundreds of millions of dollars in damages every year.²⁵

The introduction of Zebra Mussels, Round Goby, and Rusty Crayfish has caused enormous damage to the environment and ecosystems in the Fox River. Examining the role of individuals and broader political systems reveals how humans have altered the ecology and economy of the Fox River.

²² Rahmat Naddafi and Lars G. Rudstam, "Predation on Invasive Zebra Mussel, *Dreissena Polymorpha*, by Pumpkinseed Sunfish, Rusty Crayfish, and Round Goby," *Hydrobiologia* 721, no. 1 (2013): pp. 107-115, <https://doi.org/10.1007/s10750-013-1653-z>.

²³ Shirley M. Baker and Daniel J. Hornbach, "Zebra Mussels (*Dreissena Polymorpha*) Attached to Native Mussels (*Unionidae*) or Inanimate Substrates: Comparison of Physiological Rates and Biochemical Composition," *The American Midland Naturalist* 160, no. 1 (2008): pp. 20-28, [https://doi.org/10.1674/0003-0031\(2008\)160\[20:zmdpat\]2.0.co;2](https://doi.org/10.1674/0003-0031(2008)160[20:zmdpat]2.0.co;2).

²⁴ "Zebra Mussels: A Dangerous Invader," Zebra mussels: a dangerous invader - King County, accessed November 13, 2022, <https://kingcounty.gov/services/environment/water-and-land/lakes/facts/zebramussels.aspx#:~:text=Zebra%20mussels%20can%20render%20beaches,such%20as%20this%20crayfish%20above>.

²⁵ Richard J. Blaustein, "A Plague of Rats and Rubbervines: The Growing Threat of Species Invasions," *Electronic Green Journal* 1, no. 17 (January 2002), <https://doi.org/10.5070/g311710487>.

Part Three—Industry

Sometimes, if you stand on the bottom rail of a bridge and lean over to watch the river slipping slowly away beneath you, you will suddenly know everything there is to be known.

—A.A. Milne, *Winnie the Pooh*

Paper Mills on the Fox River

Simon Hoffman

The Fox River in Illinois is a crucial provider of water for many industries along the river that require it for production. One of the many industries that use this water source is the paper industry. Paper mills along the river have been around for centuries, and while they are useful and provide for the economy in the valley, they can also be dangerous. The waste produced by the paper industry and the industries related to it have caused significant negative effects on the water quality of the Fox River as well as the environment surrounding it.

The paper industry is a massive one and it has been around for centuries. Ever since the invention of writing there has always been a need for paper. This need has only grown throughout the years, and now with so many of our society's institutions being so paper dependent, the need now is higher than ever. This has led to needing a strong and widespread paper producing industry, one that has grown in the US for a long time. The process to create paper starts with harvesting trees and turning them into small wood chips. The chips are then processed to create a pulp with the fibers from the wood. The manner that the wood is processed is very water dependent and requires a good number of different chemicals to produce the pulp to be the right consistency. After the pulp mixture is created, the pulp is poured into a thin sheet and compressed and dried. The entire procedure creates a lot of wastewater and since the primary material used in the process is wood fibers, the creation can be costly for the environment.¹ Throughout the centuries that paper has been made though, the methods to create it, and the amount of paper created, have changed drastically. There had been minor improvements and innovations that aided in the paper creation

¹ Greta James and World Paper Mill, "How Does Paper Mill Work? A Short Beginners Guide," World Paper Mill, February 22, 2019, <https://worldpapermill.com/how-paper-mill-work/>.

process throughout the years, but none of the innovations were as important as the water-powered paper mill. This innovation, created sometime between the 11th and 14th centuries made the process of paper manufacturing faster and more efficient than ever before.² The only issue with this form of paper production is that it required the mills to have access to even more water than before, which placed most of them directly next to rivers and lakes, the Fox River being no exception.

The main source of fibers for the paper making process are trees, specifically softwood coniferous trees such as spruce, pine, and fir trees. These trees are a necessity for the paper produced to be high in quality and efficient to create. This means that areas with these types of trees were much more ideal for the creation of paper mills since the materials needed would no longer need to be transported as far. This works well with the Fox River since it's located in the northern part of Illinois, a colder environment with a dense population of coniferous trees. The paper making process in general is also very water intensive, but since the creation of the water-powered paper mill it has become even more so. In fact, "to make 1 ton of newsprint, about 100 tons of water is needed".³ This makes the combination of the water on the river, the trees in the environment around the river, and the already existent industry along the river the perfect mix to have paper mills along the river.³

The Fox River has many paper mills as well as other mills along its banks. The precise number has changed a lot since the colonization and population of the area, but today there are around 9 major mills on or near the banks of the river. Each of these mills use the water from the river, and for the longest time these mills as well as other mills along the river would simply dump their wastewater directly back into the river.⁴ This had terrible effects on the river and the plants and

²"Brief History of Paper Mills," PaperTR, May 27, 2021, <https://www.papertr.com/brief-history-of-paper-mills/>

³ Smriti Chand, "Locational Factors of Pulp and Paper Industries," Your Article Library, February 8, 2014,

⁴ "The Fox River's Still Recovering from 'Gaslight Era' Pollution...," historyonthefox, July 14, 2020, <https://historyonthefox.wordpress.com/2020/07/13/the-fox-rivers-still-recovering-from-gaslight-era-pollution/>.

animals that rely on it. Many of the byproducts of the industries that dumped into the river were heavily toxic and many of them were harsh carcinogens. One of the main perpetrators of this type of pollution were coal mining, refining, and burning industries, and since the paper making process is very long, large-scale, and energy intensive, the paper industry is heavily responsible for a lot of the pollution created by the other industries as well since it required so much coal to be burnt in order to power the mills.¹

As mentioned before, the process by which paper is created requires a lot of water. One of the big things that this process requires water for is to help submerge the wood pulp in the chemicals required to make high quality paper. This means that all the water that is used is mixed with a long list of chemicals, one of the most common being chlorine. This chemical is used to help bleach out the color of the pulp to produce the bright white results that consumers expect in paper. The only issue with this portion of the process is that the chlorine also creates organochlorine compounds, very harmful and dangerous chemicals that are carcinogens to humans and toxic to most animals. This along with other chemicals, such as PCBs (polychlorinated biphenyls) are often very difficult to separate from the water once the pulp is done being processed, so a lot of it is recycled and used in the next batch of papermaking. However, the rest of the wastewater is normally just dumped back into the water supply that the mill got the water to begin with, which in this case is the Fox River.⁵

In recent history much more of this wastewater has been put to use in further production of paper, as new techniques have been found to be able to better re-use it. This in addition to the fact that a lot of work has been done to reduce the production and careless disposal of the dangerous organochlorine compounds, means that the wastewater pollution from the paper milling industry

⁵ Greta James and World Paper Mill, "How Does Paper Mill Work? A Short Beginners Guide," World Paper Mill, February 22, 2019, <https://worldpapermill.com/how-paper-mill-work/>.

has been significantly reduced within the past few years. The usage of chlorine in the paper making process has also become less prevalent since the 1990s, which means that much of the wastewater that is still dumped isn't as dangerous as it has been in the past.

In order to fulfil the demand for the massive amount of paper that the people of the Fox River Valley and surrounding areas that the paper was exported to wanted, the paper milling companies would need more and more pulp. This means that the pulping mills would need more and more wood chips to process into pulp, and in order to get the massive amount of wood required for this production. Since the most efficient way to make money as a paper mill is to have the logs for the production cut in the surrounding area to avoid transportation costs, the areas around the mills would begin to be cut down. Looking at maps of virgin forests in the United States you can clearly see that around the 17th to 19th centuries that a majority of, in fact, nearly all, the forests have been cut down or in some other way touched by humans.⁶ This is especially evident in the area around the Fox River, where there was nothing but untouched forest up until around the 18th century. Since the roots of trees are so important in the way that the banks of rivers form, when the trees in the surrounding area were cut, it caused significant changes in the shape and flow of the river. Trees also have a very important role in helping filter the water runoff that makes it into rivers, this means that the quality of the water suffered as well.

Around 1820 the first mills were being built on the river, originally most of the industry was sawmills, but eventually as the towns around the river grew so did the industry around it. These mills, and the paper mills that followed them changed the river drastically. Since these mills were water powered, there had to be parts of the mills that were in the water disrupting the flow of the water. Slightly diverting the flow of water caused the sediment at the bottom of the river to begin to

⁶ Evyn Magenbauer, "Map of the Week: American Deforestation over the Years," Map of the Week: American Deforestation Over the Years | Mappenstance., April 18, 2022, <https://blog.richmond.edu/livesofmaps/2022/04/18/map-of-the-week-american-deforestation-over-the-years/>.

move in a different manner than it had previously, which eventually changed the shape and depth of the river. This may seem like it would only make a subtle difference, but this is something that, when continued for a couple of centuries, can, and did, make a massive difference in the topography of the river. When the mills were being built along the river, they were not built in a manner that allowed the water around or beneath the mills to flow properly. This led to the creation of still pools of water at the bottom of the river, which meant that all the sediment that was getting washed into the water, in a larger quantity than normal due to the loss of the trees along the bank of the river, was no longer getting washed away further down the river. This caused the depth of the water to change throughout the entire length of the river.⁷

This change in topography along with some of the before mentioned effects of the mills on the river heavily impacted the fish that lived within the river. The change in depth of the river hurt the fish as a lot of the sediment that was moved around ended up blocking off the areas that were commonly used during spawning season. The mills and the dams connected to them also blocked off fish from coming to the surface to have their offspring. These two problems are compounded by the pollution in the water which has led to the fish in the Fox River being under a constant threat.⁷

The direct waste as well as the effects related to the Fox River have impacted far greater and far more widespread than we could possibly measure. The dumping of waste-water hurts the water directly, the wood cutting required to provide for the paper industry ripples effects into the river, and the topographical changes brought about by water powered paper mills in the 18th century has had lasting effects on the population of fish and the flow of the water.

⁷ “Hard-Won Environmental Gains Owe a Big Debt to a Local Environmentalist,” historyonthefox, May 10, 2022, <https://historyonthefox.wordpress.com/2022/05/09/hard-won-environmental-gains-owe-a-big-debt-to-a-local-environmentalist/>.

The History of Dams on the Fox River

Halimat Sanusi

The historical river was not only used for entertainment purposes, but it also possesses a practical use as well. The multiple dams on the river provide hydroelectric power for the surrounding towns and areas, most notably the Dayton dam. The natural location of the river was utilized to create a pragmatic use for the humans around the Fox River.

Originally, the Fox River was used similarly to how other bodies of water are utilized: as a source of transportation, food, and other everyday necessities. As time progressed, technological advancements and eras began to take hold of American society. Businesses, factories, and towns with growing populations needed a way to receive energy to keep them all afloat. With fossil fuels being used as cheap means of energy that were chipping away at the environment, more sustainable methods of power were being sought after, such as hydroelectric power. The US Department of Energy added that it “allowed power to be transmitted long distances.”¹ Hydroelectric was generated in a similar fashion to that of a coal-fired power plant. Steam is used to cause a turbine to propel in a coal-fired plant whereas, with a hydroelectric plant, the flow of falling water causes the movement of the turbine. The turbine then produces electricity through the metal shaft of an electric generator.²

Many bodies of water across America were being used as a source of energy by the creation of dams along them and the Fox River was not privy to this. Besides the practical use, the government also built the dams for their visually appealing aspects. The beauty of the dams would

¹ US Department of Energy, "History of Hydropower," Energy.gov, accessed November 13, 2022, <https://www.energy.gov/eere/water/history-hydropower>.

² Water Science School, "Hydroelectric Power: How It Works | U.S. Geological Survey," USGS.gov | Science for a Changing World, last modified June 6, 2018, <https://www.usgs.gov/special-topics/water-science-school/science/hydroelectric-power-how-it-works#overview>.

attract more people to areas surrounding the Fox River, thus increasing the income of the surrounding businesses and economies.³ However, despite this monetary aspect of the dams, the core purpose of dams fluctuated from being sources of energy to channeling purposes.

There were a staggering fifteen dams built on the Fox River. Some, such as the Stratton near McHenry, had the intention of allowing for navigation and pool control. A few dams have recreational use, but the majority of the others had channeling purposes. They are used to outline a path for the flow of water in the river. Three of the fifteen dams, South Elgin, Elgin, and Dayton, were or still do provide hydroelectric power for the surrounding areas.⁴ The Dayton Dam in specific is the most noteworthy hydroelectric dam as it is still in use several decades after it was built.⁵



Figure 24 Locations of dams currently along the Fox River between McHenry and Dayton, Illinois.

³ "A Million Dollar Dam Being Built at Dayton," *The Earville Leader*, June 12, 1924, pg. 9, <https://daytonandthegreens.com/2020/03/11/dam-being-built-at-dayton-in-1924/>.

⁴ "Fox River Dams," Fox Waterway Agency | Serving the Fox River - Chain O'Lakes, accessed November 13, 2022, <https://www.foxwaterway.com/>.

⁵ "Fox River (Illinois River Tributary)," *Wikipedia*, the Free Encyclopedia, last modified August 17, 2022, [https://en.wikipedia.org/wiki/Fox_River_\(Illinois_River_tributary\)](https://en.wikipedia.org/wiki/Fox_River_(Illinois_River_tributary)).

The Dayton Dam was created in 1924 to replace one that had previously been washed out in 1904. The million-dollar dam located on the west bank of the river was planned to provide a renewable source of energy for LaSalle County. After intense investment from the government and surrounding neighborhoods, it was eventually built. Years later, the Dayton power station generates 3,700 kilowatts of hydroelectric energy. The facility itself churns out about “18 million kilowatt-hours of clean energy in a typical year.”⁶ This immense amount of power was used for refrigeration, milling grain into flour, and sawing trees into lumber. Although using hydropower to generate electricity is a significantly more environmentally friendly option than its harmful alternatives of fossil fuels and nuclear power plants, it is not as inexpensive. Thus, the Dayton Dam was effectively rendered to historical evidence of past technological advancements, rather than a sole source of energy for the surrounding area.⁷

Though it appears that dams only harbor positive effects, there were a slew of issues and generally negative feelings about the numerous dams along the Fox River. The dams were not cheap. Former governor of Illinois William Grant Stratton had asked for 7 million dollars to fund his entire project of creating multiple dams across the span of the Fox River.⁸ There was also an outcry for individual interest. Some outright disliked the dams as they would disrupt the “beauty spot of Illinois,” the Fox River. Others were worried about the state of their riverside properties.⁹ Besides opinions, the dams themselves could provide problems for the surrounding communities and

⁶ "Dayton," Eagle Creek Renewable Energy, accessed November 13, 2022, <https://www.eaglecreekre.com/facilities/operating-facilities/dayton>.

⁷ "Why Were the Fox River's Dams Built?," Friends of the Fox River, accessed November 13, 2022, <https://friendsofthefoxriver.org/why-were-the-fox-rivers-dams-built/>.

⁸ Avery, Suzanne, "STATE FUNDS TO BE SOUGHT FOR FOX RIVER: GOVERNOR TO ASK BOAT PROJECT GOV. STRATTON TO ASK FUNDS FOR FOX RIVER," *Chicago Daily Tribune* (1923-1963), Mar 22, 1959, <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/state-funds-be-sought-fox-river/docview/182270497/se-2>.

⁹ "CONGRESSMEN ASKED TO FIGHT FOX RIVER DAM." *Chicago Daily Tribune* (1923-1963), Sep 04, 1927. <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/congressmen-asked-fight-fox-river-dam/docview/180849809/se-2>.

organisms that inhabit the bodies of water. In terms of humans, there is the possibility of floodwaters for those who live farther downstream. In 2008, there was an ongoing debate on whether to open the McHenry and Algonquin dams due to communities living on both sides of the dams. Even slight adjustments to the dam by The Illinois Department of Natural Resources would have drastic effects on the surroundings. Civilian Thomas Nozeka reported how he “watched the swift Fox River current sweep away his pier when state officials cracked the dam [Stratton and Lock] open a bit on June 6.”¹⁰ Nozeka was able to rush out and wrestle down his pier but, unfortunately, other individuals were not as lucky when it came to their encounters with the dams. Dozens of individuals have lost their lives from drowning at the dams, ranging from children to adults.¹¹ Such grim reports along with personal opinions have garnered many individuals to be against the dams and consequently call for the removal of dams along the Fox River.

Environmentalists have expressed their distaste for the Fox River dams as they poorly impact the life and organisms around them. A 1997 edition of the *Chicago Tribune* shares the opinion of Steve Pescielli, a stream biologist. He expressed that “removing a lot of the dams along the river will increase water quality...without any barriers...various species would be free to inhabit all sections of the river.”¹² Regrettably, removing dams is not as facile as it seems. Sediment build-up from behind dams could run the risk of harming the wildlife in the bodies of water. As reflected by the planned removal of two hydroelectric dams along the Elwha River, the process of removing the

¹⁰ Long, Jeff and TRIBUNE REPORTERS Carolyn Starks, 2008, "Decisions on Fox River Dams Not Open, Shut: State Weighs Multiple Factors on Floodgates," *Chicago Tribune* (1997-), Jun 18, 2, <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/decisions-on-fox-river-dams-not-open-shut/docview/2355011136/se-2>.

¹¹ Robert McCoppin, "Dozens of Lives Have Been Lost at Dams on Illinois Waterways. Now Efforts Are Underway to Remove Them for Safety and the Good of the Environment," *Chicago Tribune*, last modified October 13, 2020, <https://www.chicagotribune.com/news/ct-illinois-dam-removals-20201013-jtcb2h3hpfhkhfgugacsw64lcu-story.html>.

¹² Gary Gibula Special to the Tribune, "Batavia Looks to Replace Dam Across Fox River: Some Advocate Complete Removal," *Chicago Tribune* (1997-), Jun 24, 2002, <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/batavia-looks-replace-dam-across-fox-river/docview/2325816607/se-2>.

dams has to be done slowly to ensure as little damage as possible. Once the dams are fully removed and the sediment-rich with nutrients is able to flow down the river, the salmon population in the river will begin to flourish. The fish will provide nutrients to the ocean and be a source of food when they die, in turn, supporting 100 other wildlife and aquatic species.¹³

Reflecting a similar idea on the Dayton Dam provides interesting results. The dam does serve as a principal of sustainable energy development, however, that is how far the significance of it goes. The amount of energy it produces pales in comparison to the billions of kilowatts per year produced by coal and nuclear plants. Removing the dam all at once could harbor some dire consequences. An immense amount of power being lost coupled with all the sediment flowing downstream would create nearly impossible living conditions for the wildlife and humans in the areas surrounding the Dayton Dam. Upon implementing a several-year-long plan, similar to that of the hydroelectric dams along the Elwha River, the Dayton Dam could be removed with little to no repercussions. Though the dam is not currently being considered for removal, it is a viable option for the future as it becomes less of an economically sound means of electricity. The dam may have been an inspiration in the past, but it is now more of a burden for the people and wildlife around it.

¹³ Renee Cho, "Removing Dams and Restoring Rivers," State of the Planet, last modified May 2, 2014, <https://news.climate.columbia.edu/2011/08/29/removing-dams-and-restoring-rivers/>.

Fox River's Bioregional History – Low-Head Dams

Janelle Thomas

Of the many factors that have contributed to the Fox River's bioregional history, the installation of low-head dams has by far had the most negative impact. Barriers such as these are categorized by their span across the entire river as well as their steep drop-offs. Being structured in this manner allows for river depth regulation, hydropower generation, and irrigation control. Though initially innovative, low-head dams have, in many ways, outgrown their usefulness. They have posed high risks to life in and along the river in innumerable ways. For this reason, I have chosen to investigate the demand for such barriers and their subsequent effects on their environment. With this, I aim to thoroughly understand the river's past in an attempt to predict its future.

The Fox River is a major waterway in Illinois that spans over 200 miles in total length. Its strong flow and accessibility made it a great source of hydropower for several counties during early settlement. As the river's recreational, transit, and sanitary uses, it became a target for industrial development. Thus, regulating naturally high-water levels became increasingly vital. As a result, numerous mills and dams were installed along the stream to maintain suitable water levels for aquatic activities.¹ Given decades of innovation, most of the mills are long gone and have since been replaced with hydroelectric dams.

¹ “Weather.gov > Indianapolis, IN > Avoid the Drowning Machine: Low Head Dam Public Safety Awareness Month.” n.d. National Weather Service. Accessed November 10, 2022. <https://www.weather.gov/ind/LowHeadDamPublicSafetyAwarenessMonth>.

Of the several types of barriers placed along the river, low-head dams have proven to be the most dangerous and destructive, owing mostly to their design.² Low-head dams differ from others in that they extend entirely across the width of the river. They control water flow by partially obstructing the channel and creating a backlog of water behind the dam. The water flows over the concrete abutment, ranging from 6 to 25 feet deep. This method of construction allows the current to stream continuously from bank to bank at a safe level.

Though initially useful in regulating water levels, low-heads have several adverse environmental effects. The most evident issue these dams present is water quality degradation. This is primarily due to the dam's ability to slow the river's current, enabling sediments to accumulate, burying fish food, and covering the habitat.³ Slowed currents also lessen the quantity of oxygen in the water, which is essential for fish and insect life.

Furthermore, nutrients like phosphorus can accumulate and trigger large algal blooms.⁴ The production of these blooms is unsightly, smelly and may have a rash effect on wildlife, as it can produce toxins poisonous to fish and humans, resulting in disease or death in severe cases.

In addition to quality hazards, dams also have a lasting impact on the ecology of the river system.⁵ Since they hinder the movement of fish and other aquatic species upstream, they greatly disrupt organisms' habits and reproductive cycles. Thus, areas of the river with dams have substantially lower biotic integrity and biodiversity than sections without.⁶

² Ibid.

³ Cosier, Susan. 2019. "After a Century of Being Dammed Up, Illinois Rivers Get to Go with the Flow." NRDC. <https://www.nrdc.org/stories/after-century-being-dammed-illinois-rivers-get-go-flow>.

⁴ Department of Natural Resources, Department of Natural Resources. 2020. "Safety at Dams - Water Resources." Illinois.gov.

⁵ "Low Head Dams/Sills." n.d. *Pearl Riverkeeper*. Accessed November 11, 2022. <https://www.pearlriverkeeper.com/low-head-damssills.html>.

⁶ Santucci, Victor, and Stephen Gephard. 2011. "Effects of Multiple Low-Head Dams on Fish, Macroinvertebrates, Habitat, and Water Quality in the Fox River, Illinois." *North American Journal of Fisheries Management* .25, no. 3 (January): 975-992.

Along with the abovementioned hazards, low-head dams pose a high drowning risk to swimmers, kayakers, and other recreationalists. They are often difficult to detect upstream, and once boaters or swimmers come close to them, the hydraulic pressures and recirculating currents may pull them under. In the past twenty-five years, eighteen people have died near a single dam on the Fox River.⁷ The optimal solution would be to eliminate or dismantle the dams entirely, but given their design, this is not always feasible.

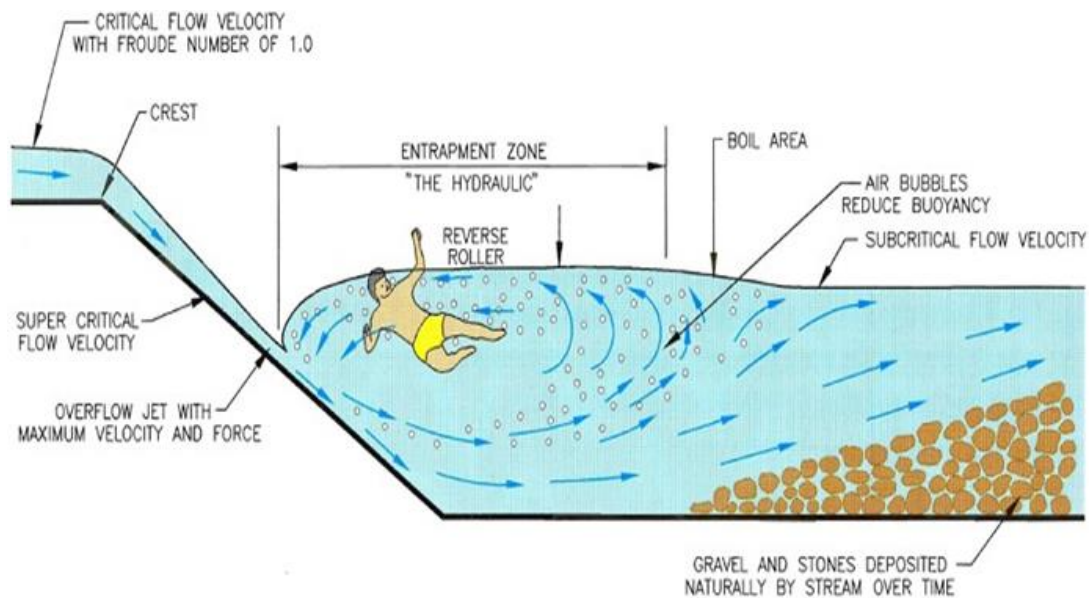


Figure 25 Emergency Rescues at Low Head Dams. Source: Wright Engineering

Today, thirteen dams remain on the Fox River, which have been improved and replaced throughout the years. While larger dams are regularly maintained, low-head dams frequently fall into disrepair due to their modest size.⁸ Likewise, innovation has made hydroelectric power less

⁷ Cosier, Susan. 2019. "After a Century of Being Dammed Up, Illinois Rivers Get to Go with the Flow." NRDC. <https://www.nrdc.org/stories/after-century-being-dammed-illinois-rivers-get-go-flow>.

⁸ Fortey, Ian. 2021. "Low-Head Dams: A Not-So Clear and Present Danger." *Boat Safe*. <https://www.boatsafe.com/low-head-dams-clear-present-dan>

necessary. As a result, many dams that remain on the Fox River no longer serve their intended purpose.

In recent years, an increasing number of embankments have been considered for removal in the interests of ecology, water quality, and public safety. Currently, the two dams in the planning stages of removal are located in North Aurora and Carpentersville.⁹ Of those that still stand, seven structures are being considered for demolition. Though the remedy may appear clear, the demolition verdict depends on the dam's direct effect on the surrounding areas. In some instances, dam removal may not be optimal. For example, it may give invasive fish an opportunity to infest new territory or be too costly of a project for a city to take on. Nonetheless, the benefits of dam deconstruction will likely outweigh the cons by leaps and bounds.

Regardless of the conditions, dam destruction could be critical in restoring the natural pattern of the ecosystem. Stream specialists that researched the Fox River discovered that following dam removal, the number of fish species increased by 6%, with most results being "almost immediate."¹⁰ Thus, removing such dams would aid in the restoration of biodiversity and ecological equilibrium within the river.

After a century of damming, deepening, and straightening rivers, hydrologists and aquatic ecologists have become more conscious of the harm dams inflict on riverine ecosystems and the people who enjoy them.¹¹ These types of barriers are now understood to degrade stream health and create hazardous conditions for river users. It now seems likely that despite their role in local history, all of the Fox River's dams will eventually be removed.

⁹ "RIVER RESTORATION | Fox River StudyGroup." n.d. Fox River Study Group. Accessed November 10, 2022. <https://www.foxriverstudygroup.org/river-restoration>.

¹⁰ Cosier, Susan. 2019. "After a Century of Being Dammed Up, Illinois Rivers Get to Go with the Flow." NRDC. <https://www.nrdc.org/stories/after-century-being-dammed-illinois-rivers-get-go-flow>.

¹¹ Ibid.

Safety of the Recreational Use of the Fox River near Hydraulic Dams

Avery Hedican

The Fox River is a 202-mile-long river flowing from southern Wisconsin into Ottawa, Illinois. Because the river is so vast, it is a popular spot for recreational activities such as fishing, kayaking, swimming, and much more. The users vary from families who are just visiting to go for a hike to people who have lived on the river their entire life. However, since the building of hydraulic dams to power mills and factories in the 1850s, the number of drownings in the river has increased significantly. The deep pools underneath the dams create death traps for unassuming patrons, which even very experienced swimmers cannot escape. Implementing hydraulic dams along the Fox River has caused significantly more deaths. This poses the question of how safe the river is for recreational use, specifically around the hydraulic dams, and what regulations are currently in place. The recreational use of the Fox River is not safe in relation to areas where hydraulic dams have been installed.

Many variables have changed within the many drownings that have occurred in the Fox River over the past fifty years. The drownings range from accidents involving small children with zero swimming experience to full-grown, capable adults who should have no difficulty navigating a body of water. However, there is a question to be asked here. Why are so many people drowning in the river? Especially ones who are strong swimmers who, historically, have had no problems navigating a body of water. The main culprit for so many drownings on the river is the dams. Placed there to generate power for mills and surrounding communities, the dams now serve no purpose and are not-so-silent killers. Drawing from ten previous cases of drownings, five were from the 1960s and 1970s, and five were from the 2010s and 2020s. Seven of those cases were either caused

by or occurred near dams on the river. The rolling currents that the dams create at their base are not necessarily visible to recreational users. A fact sheet about the usage of the Fox River written by a nonprofit group whose goal is to protect the watershed and the resources that lie on the river gives more information on the dangers of hydraulic dams, “dams create even greater risks by blocking the river’s flow and forming deep pools with hazardous currents.”¹ The same informational sheet refers to the treacherous currents formed at the foot of the dams as “drowning machines.”

One would think that with a nickname like that, people would be inclined to stay far away in order to protect themselves. However, that does not seem to be the case, as drownings are very rarely intentional. In the case of Terrance Tyscko, a 12-year-old boy who drowned in the river in 1966, he was fishing in a boat with his father when he jumped out to help him untangle the lines and was pulled into the dam’s current.² Another accident occurred in 2014 when a 26-year-old man was kayaking with a group of friends when he and another man lost control of their kayak and were pulled over the dam and into the boil.³ The area is known for being dangerous; however, people are still allowed to use it recreationally. Even officials and rescue personnel are aware of the dangers that happen around the dams. But since all of the drownings around dams were accidents involving people who didn’t intend to be put in that dangerous spot, should more regulations exist around those areas?

Looking back at the data gathered on the drownings in the Fox River, there is not one specific activity that can be pinpointed as what the victims were doing before their death. However, all were using the river recreationally. Near just one dam on the Fox River, there have been eighteen

¹ “Friends of the Fox River Foxfacts Fox River Dams,” Friends of the Fox River, accessed November 10, 2022, <https://friendsofthefoxriver.org/wp-content/uploads/2015/11/fact-sheet-dams.pdf>.

² “15 In Chicago Area Drown Over Holiday.” *Chicago Tribune*, July 5, 1966. <https://chicagotribune.newspapers.com/image/376482517/?terms=fox%20river%20drownings&match=1>.

³ “Kayaker Drowns on Fox in Geneva.” *Chicago Tribune*, April 24, 2014. <https://www.proquest.com/docview/1518605564?pq-origsite=primo>.

drownings in the past twenty-five years.⁴ Whether it be boating, kayaking, fishing, or just walking near the river. Part of the issue behind the plethora of drownings surrounding these dams is the continued encouragement of risky activities. Specifically kayaking in the whitewater rafting community. The website Americanwhitewater.org gives many spots where thrill seekers can kayak throughout the nation, and one of these is the Batavia dam. The Batavia dam, a known hotspot for kayaking, is extremely dangerous. Although the website warns of the dangers surrounding a hydraulic dam, American Whitewater claims that “this area holds very little risk.” Something which is known to be untrue from the history of drownings at the dam. The website lists the “River Features,” which sound more like amusement park attractions than possible death traps.⁵ Sites like these encourage inexperienced kayakers to go and try their luck at these features in order to get an adrenaline rush, contributing to the ever-increasing death toll in the river.

Along with the numerous cases of accidental deaths from boating, fishing, and kayaking, other cases of drownings exist, mainly with small children falling into the river. These cannot necessarily be blamed upon the river or the dams but instead upon the parents who did not keep a close watch on their children near a body of water. In fact, more children aged one to four die from drowning than any other cause of death.⁶ Two of the ten cases studied dealt with drownings for children under the age of four. Surprisingly, within both cases, occurring just over one year from one another, the victims were not at the river but wandered there from different locations.⁷⁸ There is

⁴ Cosier, Susan. “After a Century of Being Dammed up, Illinois Rivers Get to Go with the Flow.” NRDC, March 7, 2022. <https://www.nrdc.org/stories/after-century-being-dammed-illinois-rivers-get-go-flow>.

⁵ “American Whitewater,” American Whitewater, accessed November 13, 2022, <https://www.americanwhitewater.org/content/River/view/river-detail/4297/main>.

⁶ “Drowning Data,” Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, October 7, 2022), <https://www.cdc.gov/drowning/data/index.html>.

⁷ “Boy, 3, Drowns in Fox River in Algonquin.” *Chicago Tribune*, April 19, 1962.

<https://chicagotribune.newspapers.com/image/374801196/?terms=fox%20river%20drownings&match=1>.

⁸ “Fox River Drowning.” *Chicago Tribune*, March 27, 1961. <https://www.newspapers.com/image/374800302/>.

virtually no correlation between drownings and activities the victims were partaking in before they occurred.

When looking for the rules for the recreational use of the river, there don't seem to be any. Besides the general, if you want to drive a boat, you must have a boat license. This is problematic because the river can be quite dangerous if you are unfamiliar with it. Dams, fluctuating water levels, downed trees and branches, and seasonal river changes can become life-threatening hazards.⁹ Swimmers and recreational users of the river must be aware of these dangers and take necessary precautions in certain situations. However, the dams along the river are far more dangerous than a casual swim might seem. Even scarier than the lack of rules surrounding swimming in the regular parts of the river, there are no rules regarding swimming around the dams. Although the churning waters may look intriguing, even the most experienced swimmers can't maneuver out of the rapids. There must be some signage or posted warnings about the dangers of swimming near the dams and the hidden dangers lurking beneath those structures.

There is no way to calculate the statistics for the number of drownings from the 1910s through the 1920s in relation to the statistics from nearly 50 years later without individually counting the victims. However, in the past quarter of a century, eighteen people have died near one dam on the river.¹⁰ This explains why there has been such a large push for ridding the river of the dams altogether, as they no longer power mills or cities like they did when they were first built. In addition to causing numerous deaths and serious dangers to recreational users, they also harm the natural environment and the river's ecosystem. Currently, there are virtually no regulations or signage warning users of the dangers that lurk underneath the dams on the river. This needs to change.

⁹ "Safety Info for Paddlers - Fabulous Fox Water Trail," Fabulous Fox Water Trail -, October 27, 2022, <https://fabulousfoxwatertrail.org/safety/#:~:text=Although%20most%20sections%20of%20the,it's%20a%20proven%20life%2Dsaver.>

¹⁰Susan Cosier, "After a Century of Being Dammed up, Illinois Rivers Get to Go with the Flow," NRDC, March 7, 2022, <https://www.nrdc.org/stories/after-century-being-dammed-illinois-rivers-get-go-flow>.

People either need to be properly warned about the dangers with proper signage, or there need to be regulations in place for the recreational use of the river around hydraulic dams to ensure public safety.

Obsolete Technologies and Restoration on the Fox River

Rylie-Nicole Bozarth

The Fox River has a long history of disruption at the hands of humans. Be it the numerous dams built along the 202 mile stretch of the river or the paper mills of the 1950s, the aftereffects of these obsolete technologies are still being felt today. The compounded issue of climate change and the presence of dams have led to lower water quality and levels in recent years. The Clean Water Act of 1972 has proved useful in aiding efforts to improve water quality, but can do little to circumvent the effects of climate change and human expansion on the river. The Fox River is far from being returned to the state from before the industrial revolution, despite efforts from local, state and federal authorities over the past fifty years to enhance water quality.

The water quality of the Fox River before the industrialization of the surrounding area is rooted in the history of Native Americans. Before the French came in 1826, the Potawatomi, Sac and Fox tribes had been living off the Fox River for at least 10,000 years.¹ The practice of the Native tribes that inhabited the land allowed the Fox River to remain mostly unsullied by human interaction. Though the structures the Native people used for fishing did change the topography of the river due to river debris getting caught and creating artificial islands, none of their practices harmed the river due to how slowly these changes happened.² Other practices included only taking what fish were needed seasonally, allowing the river to replenish its population without the need to

¹ "Fox River," historyonthefox, November 1, 2022, <https://historyonthefox.wordpress.com/category/fox-river/>.

² "Carping about the Fox River..." historyonthefox, June 23, 2015, <https://historyonthefox.wordpress.com/2015/06/23/carping-about-the-fox-river/>.

restock and not dumping wastewater into rivers.³ In fact, waste became a serious issue that left the Fox River's fish population severely under populated once the Native Americans were forced to relocate in 1835 after the Indian Relocation Act of 1830,⁴⁵ The Colonizers that overtook the area dumped their sewage directly into the river. One of the only fish that could survive was the German Carp. A species of fish stock by the U.S. Fish Commission which were quickly blamed by the settlers for driving away the other fish species.⁶ This kind of unmonitored dumping of chemicals continued well into the late twenty-first century until the passing of the Clean Water Act in 1972.

After the colonization of northeastern Illinois, the industrialization of the area soon followed. From the mid-20th century until the Clean Water Act, many companies such as the East Dundee's Haeger Pottery dumped their unfiltered effluent (liquid waste) directly into the Fox River. One of the most notable offenders is the Western United Gas & Electric Company situated in Aurora, Illinois. This company produced coal gas. Coal gas is a highly flammable gas whose byproducts were highly carcinogenic.⁷ With no federal laws preventing the dumping of refuse into the river, the Aurora gas plant was free to dump all of their byproducts.⁸ In 1922 nearly 40 years after the picture was taken, many people started to take notice of the state of the river causing the president of the company to put out a statement acknowledging his practices. This, however, was

³ Gary Mechanic and Barbara, "Our Waters, Our Fox," Friends of the Fox River (*Bravo Magazine*, May 22, 2017), <https://friendsofthefoxriver.org/2017/05/14/our-waters-our-fox/>.

⁴ "Fox River," historyonthefox, November 1, 2022, <https://historyonthefox.wordpress.com/category/fox-river/>.

⁵ "Carping about the Fox River...", historyonthefox, June 23, 2015, <https://historyonthefox.wordpress.com/2015/06/23/carping-about-the-fox-river/>.

⁶IBID

⁷ "The Fox River's Still Recovering from 'Gaslight Era' Pollution...", historyonthefox, July 14, 2020, <https://historyonthefox.wordpress.com/2020/07/13/the-fox-rivers-still-recovering-from-gaslight-era-pollution/>.

⁸ Aurora's Manufactured Gas Plant, 1883, Vernon Derry collection.

not the downfall of the coal gas corporations. Instead, it was the availability of natural gas following the construction of a natural gas pipeline from Texas in 1931.⁹

Technological advancements also put an end to water powered grist mills that were popular in the 1840's. These mills disrupted water flow and were often swept away when the Fox River



Figure 26 Coal Gas Company refuse along Fox River. Source: Vernon Derry collection

flooded. The distribution of the water way barred fish and other species from reaching spawning grounds.¹⁰ It wasn't until 1881 when steam-powered grain elevators were available that water mills fell out of use.¹¹ These environmentally harmful practices did not stop because they were harmful, they stopped due to the technology becoming obsolete. Other

practices, such as dumping wastewater and dangerous chemical byproducts still took place.

Despite efforts from local community members and the U.S. Environmental Protection Agency (EPA), there were still chemical related contamination events with very few clean-up efforts occurring well into the early 2000s. In the late 1960's one Kendall County resident, Jim F. Phillips saw dead baby ducks walking near a stream. Outraged, he began a series of demonstrations under the alias "the Fox" that quickly caught the attention of the public eye.¹² Others began copying him. His followers combined with the national attention of the 1962 book *Silent Spring* by Rachel Carson brought light to the horrors of chemical pollution. Which led to the creation of the U.S Environmental protection agency (EPA) in 1970. An agency who could enforce the standards of the

⁹"The Fox River's Still Recovering from 'Gaslight Era' Pollution...", historyonthefox, July 14, 2020, <https://historyonthefox.wordpress.com/2020/07/13/the-fox-rivers-still-recovering-from-gaslight-era-pollution/>.

¹⁰ "Fox River Mills Served Both Kendall's Rural and Small Town Communities," historyonthefox, February 12, 2020, <https://historyonthefox.wordpress.com/2020/02/12/fox-river-mills-served-both-kendalls-rural-and-small-town-communities/>.

¹¹ IBID

¹²"Pollution," historyonthefox, May 9, 2022, <https://historyonthefox.wordpress.com/tag/pollution/>.

Clean Air Act of 1963 and the Clean Water Act of 1972. However in 1999, American Rivers named the Fox River one of the most endangered rivers in America.¹³ Very few clean-up efforts were made after the CWA was put in place, and many companies were not compliant with the law.

The Gem Cleaners in McHenry Illinois were one such company that illegally dumped their chemicals. The dry-cleaning company would dump their solvents contaminating the groundwater. These compounds were not discovered until 2007 when the location was enrolled in the Illinois EPA clean-up program.¹⁴ Two people's wells were contaminated with the solvent and five people's wells had a product of the breakdown of the solvent. Another two wells in the area had gasoline related contamination, most likely because the location also served an auto mechanic shop after the Gem Cleaners.¹⁵ Beyond contamination, clean-up efforts were few and far between until the early 2000s. In the early 2000s the Illinois EPA introduced the SCALE program.¹⁶ SCALE is a program that gives out grants to local clean up groups. In 2005 forty-five groups with other 11,000 participants went out to clean up garbage. 500 tons of garbage across 800 miles of stream banks of Illinois rivers were removed.¹⁷

Many challenges with restoring the river still remain, one of the biggest challenges are the dams. Currently, there are fifteen dams on the Fox River. Twelve of these are remnants of the gristmills and old power sources. Like the coal gas company, these low head dams were rendered obsolete with advancing technologies. Unlike the coal gas company, these dams were not removed. The dams are utilized now for recreational boating and water sports.¹⁸ Calls for removal of the dams

¹³ Gary Mehanic, "Love Our River Days," Friends of the Fox River, May 17, 2018, <https://friendsofthefoxriver.org/2018/03/03/love-river-days/>.

¹⁴ "Fact Sheet 2," Illinois.gov, September 2007, <https://www2.illinois.gov/epa/topics/community-relations/sites/gem-cleaners/Pages/fact-sheet-2.aspx>.

¹⁵ IBID

¹⁶ "Illinois EPA Supports Local Efforts to Clean up Illinois Streams and Lakes with 'SCALE' Program," Illinois.gov, May 2009, <https://www.illinois.gov/news/press-release.4705.html>.

¹⁷ IBID

¹⁸ "River Restoration," Fox River Study Group, 2022, <https://www.foxriverstudygroup.org/river-restoration>.

have been around since at least 1999. With many deaths and injuries being associated with the dams, and more projected as recreation increases along the river.¹⁹ Beyond safety concerns, the dams affect the water quality and local wildlife. Dams stop fish from traveling upstream, which in turn prevents fish from reaching tributaries and spawn points. Without the ability to move into different segments of the river, when the environment is stressed, like in a drought, it prevents fish from moving into healthier areas.²⁰ It has been shown that rivers that are free flowing have, on average, four times as many individual fish and retain more intolerant fish species than rivers that are dammed.²¹ In the Fox River, data from 1980 showed that thirty species of fish are only found in the lower portion of the river. Freshwater mussels are also at a historic low due to not being able to reestablish their population throughout the Fox River.²² Plans to remove the dams are underway, but no dam has been removed since 2006. The benefits of removing the dams extend past safety and improved water quality and to better recreation activity, opening the river up to kayakers and canoers and away from the boats and water skiers.²³ Removing the dams will allow for improved water quality, fish populations and safety.

Although the EPA and CWA have been created, there is still a long way to go to improve the water quality on the Fox River. Cleaning and decontamination of the river is underway with thousands of volunteers every year picking up hundreds of tons of trash. Even still, the Fox River still has wastewater and chemical runoff leaching into it. Along with dams impeding fish populations and hurting the water quality. Looking toward the future removal of the dams and future cleaning efforts should help return the Fox River to its former state.

¹⁹David Solzman, "Fox River," *ENCYCLOPEDIA of CHICAGO*, 1999, <http://www.encyclopedia.chicagohistory.org/pages/481.html>.

²⁰ "River Restoration," Fox River Study Group, 2022, <https://www.foxriverstudygroup.org/river-restoration>.

²¹ Max McGraw, "Fox River Fish Passage Feasibility Study" (Springfield, Illinois: Illinois Department of Natural Resources, 2003), pp. 1-352, iv.

²²IBID

²³ IBID

Glowing in Ottawa

Evan Kuzukas

Radium was first discovered in 1898 by Marie and Pierre Curie. They had noticed that pitchblende, an ore containing uranium, was more radioactive than pure uranium. They hypothesized that there must be an undiscovered radioactive element in this ore. Eventually they discovered two new radioactive elements: polonium and radium, and isolated radium.¹ This earned the couple the 1903 Nobel Prize. The news of radium soon spread around the globe and because of little understanding of radiation, radium was soon sold as a cure-all. There were radium waters, tonics, and pills, radium spas and clinics, radium lingerie, jock straps, chocolates, and even radium suppositories. Radium was also used to treat cancer after it was discovered that focused radiation could destroy tumors.² One of radium's most interesting properties is its light blue glow, known as Cherenkov radiation.³ Radiation, when combined with the proper other materials, can also induce fluorescence⁴. This discovery was soon put to use in making watches, alarm clocks, and dials for airplanes that glowed in the dark.⁵ Companies sprang up around the country to take advantage of this new market.

The Fox River valley's own little town of Ottawa became home to one of the biggest of these companies, the Radium Dial Company. The Radium Dial Company hired hundreds of

¹ Alan Chodos and Jennifer Ouellette, "December 1898: The Curies Discover Radium," American Physical Society (American Physical Society, 2004), <https://www.aps.org/publications/apsnews/200412/history.cfm>.

² Elan Lui, "The History of Radium," The history of radium (Stanford University, March 23, 2021), <http://large.stanford.edu/courses/2021/ph241/lui2/>.

³ Sengupta P. 2000. Classical Electrodynamics. 1st ed. New Delhi: New Age International.

⁴ Richter, Elizabeth, "The Radium Dial Painters: Workers' Rights, Scientific Testing, and the Fight for Humane Treatment" (2018). *Departmental Honors Projects*. 74. <https://digitalcommons.hamline.edu/dhp/74>

⁵ "Radioactivity in Antiques," EPA (Environmental Protection Agency), accessed December 11, 2022, <https://www.epa.gov/radtown/radioactivity-antiques>.

young women in Ottawa to paint these dials with a radium-based paint. They were taught to use a camel hair brush that they “lip pointed” meaning they used their lips and tongue to swirl the brush to a finer point.⁶ As Catherine Wolfe Donohue said, “Miss Lottie Murray taught us how to point camel-hair brushes with our tongues. We would first dip the brush into the water, then into the powder, and then point the ends of the bristles between our teeth.”⁷ They were told that this was a perfectly safe practice, but it was not. Charlotte Nevins recounted these lies saying, “When I was working in the plant they always told me the radium would never hurt me. They even encouraged us to paint rings on our fingers and paint our dress buttons and buckles.”⁸ The human body treats radium like calcium, depositing it into the bones. Eventually, if enough radium is ingested, it begins to break down the body from the inside out.⁶ The company ignored these dangers and continued to produce dials with radium paint. The operation of this radium painting factory in Ottawa Illinois caused both devastation to the employees and long-lasting environmental damage that still affects citizens of Ottawa today.

The health effects of radium ingestion soon manifested in the girls. Their bones began to erode and fall apart, they began to sprout tumors, they became severely anemic, and they lost much of the structural integrity in their bones. One girl, Peg Looney, had bits of her jawbone fall out of her mouth and became too weak to even walk. Others had massive jaw tumors that grew as big as their heads. They all began to lose weight and strength and soon most were bedridden. One of the girls, Catherine Donohue, ended up weighing sixty pounds towards the end of her

⁶ “Washington State University,” U.S. Transuranium and Uranium Registries (Washington State University), accessed December 21, 2022, <https://ustur.wsu.edu/radium-studies/>.

⁷ Dan Klefstad, “Ottawa's 'Radium Girls' at Forefront of Worker Protections,” Northern Public Radio: WNIJ and WNIU (Northern Public Radio, May 22, 2017), <https://www.northernpublicradio.org/illinois/2017-05-18/ottawas-radium-girls-at-forefront-of-worker-protections>.

⁸ Kate Moore, *The Radium Girls: The Dark Story of America's Shining Women* (Naperville, IL: Sourcebooks, 2018).

life.⁹ The company did its best to hide their involvement in the sicknesses and eventual deaths of the dial painters. For example, when Peg Looney died in 1929, the company tried to bury her body before the family could have it analyzed. Looney's brother was able to stop them and get them to do an autopsy that was supposed to be overseen by the Looney family's doctor. However, when the doctor got there, the company had already performed the autopsy and destroyed all of the parts of Peg's body that showed signs of radiation poisoning.¹⁰ In July 1934, after years of lies and deceit from the company, seven brave women each filed a lawsuit for \$50,000 in damages against the Radium Dial Company. This suit alleged that the company violated occupational health standards and subjected the women to a dangerous working environment. However, this was not the end of their sad story, but rather the beginning of a brutal legal fight.

After victories in two lower courts, the women lost in the Illinois Supreme Court due to a ruling that the state's Occupational Disease Act was unconstitutional on the basis of its vagueness. The women were, at this point, out of money and their lawyer would not help them when a new Occupational Disease Act was passed in 1936. Eventually they found a lawyer sympathetic to their plight and he brought a case against the company on behalf of Catherine Donohue; a test case.¹¹ After years of appeals, brutal court hearings including some at her own home when she became too weak to go to the courthouse, and continued delays on the behalf of the company she died in 1938. However, in 1939 she won for the final time, a hollow victory that awarded her only \$6,000 and left only \$4,000 to be distributed among the rest of the

⁹ Tara McClellan McAndrew, "Illinois Issues: The Radium Girls - an Illinois Tragedy," Illinois Public Media (National Public Radio, January 30, 2018), <https://will.illinois.edu/news/story/illinois-issues-the-radium-girls-an-illinois-tragedy>.

¹⁰ Kate Moore, "The Girls: The Radium Girls," The Radium Girls, accessed November 1, 2022, <https://www.theradiumgirls.com/the-girls>.

¹¹ Ross Mullner, *Deadly Glow: The Radium Dial Worker Tragedy* (Washington, D.C.: American Public Health Association, 1999).

workers.¹² This victory set a precedent for workers compensation and protection that has had a lasting effect today and their suffering was not in vain. It led to new standards in worker protection and occupational safety. However, the company did not just harm these women, but also the environment.

The Radium Dial Company was built in an old high school in the middle of Ottawa, overlooking the Fox River. Eventually they went out of business and the founder of the Radium Dial Company founded a new company called Luminous Processes just a few miles away.¹¹ After the Radium Dial Company went out of business the building became a meatpacking plant, and then home to the Farm Bureau, Farm Supply, Home Bureau, Ag Soil Conservation Association, IAA Insurance, FB Soil Testing Service, Breeding Cooperative, Ottawa PCA, Ottawa National Farm Loan Association, Illinois State Employment Service and the Ottawa Women's Club.¹³ Nobody spoke up about the hazards of using radioactive sites, especially for food processing. The building was finally demolished in 1968, but the radioactivity danger lived on. Rubble from the site was as fill and construction material throughout the whole city, scattering radioactive debris across Ottawa. The second company, Luminous Processes, was in operation painting radium dials until 1978 and once again this building too was used for food, becoming a meat storage locker.¹⁴ In the late 70s the state discovered the radiation hazard posed by the luminous processes site from a state trooper's Geiger counter.¹⁵ In 1981 it was placed on the EPA's toxic waste site list but little was done other than erecting a few fences around the

¹² [Newspaper Clipping Letter Images] "Courtesy Charles Deering McCormick Library of Special Collections, Northwestern University Libraries", MS113.

¹³ Ridings and Hustis, "Did Radioactivity Hit Meat?"

¹⁴ Stewart, Ian, "The Human and Environmental Impact of the Radium Dial-Painting Industry" (2012). *Honors Capstones*. 1195.

<https://huskiecommons.lib.niu.edu/studentengagement-honorscapstones/1195>

¹⁵ *The Daily Times*, "New Device Used to Monitor Radiation," February 9, 1979.

site.¹⁶ In 1984 a \$2 million plan for cleanup of the luminous processes building was approved and in 1985 it was demolished.¹⁷ However, the demolition process likely spread radioactive dust throughout Ottawa and some of the rubble may have been used as fill material.¹⁸ The EPA finally began a more comprehensive study and cleanup plan in 1988, starting with aerial monitoring of radiation, soil sample measurement, and radiation measurements.¹⁹ The EPA identified sixteen different sites of radioactive contamination.²⁰ Eight residential areas were found to be contaminated and one park near a local high school was found to have extremely dangerous levels of radiation.¹⁸ The EPA determined that significant resources would need to be allotted to clean up these sites.²¹

Unfortunately, the EPA did not receive sufficient funding. The EPA prioritized the sites closest to residential areas, but as time and money ran out, standards slipped, and some areas were left contaminated. Ten of the sites were considered fully remediated but six were not.²² These sites were deemed too extensively contaminated that it would take \$35 million to completely clean these sites up. The EPA did not have the time or money to devote to this project.²³ Two sites were not cleaned at all, most importantly one on the bank of the Fox River. This was used as a dumping site and was not near human activity so the EPA did not clean it up.

¹⁶ JoAnn Hustis, "Judge Cites Radiation 'Leakage' at Luminous Processes Building," *The Daily Times*, July 13, 1981; Mike Cunniff, "2 Local Sites on EPA List," *The Daily Times*, July 27, 1982; Mike Cunniff, "Is Fencing Needed at Luminous?" *The Daily Times*, February 12, 1983

¹⁷ Dold, "Radium Deaths;" ATSDR, 3

¹⁸ ATSDR, 3; Roy F. Weston, Incorporated, Site Assessment/or Ottawa Radiation Sites, Ottawa, Illinois (Chicago, Illinois: United States Environmental Protection Agency Region V, 1988), 7.

¹⁹ Weston Solutions, Feasibility Study Report: NPL-II Site, Ottawa Radiation Areas, Ottawa, Illinois, Revision 2 - March 12, 2010 (Chicago, Illinois: United States Environmental Protection Agency Region V, 2010), 1-7; ATSDR, 3.

²⁰ USEPA Superfund Sites (United States Environmental Protection Agency, n.d.), <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0500634>.

²¹ Verneta Simon to Valdas V. Adamkus, 1988, "Action Memorandum - Funding Request for an Interagency Agreement for the Ottawa Radiation Sites, Ottawa, IL," 2; Weston Solutions, NPL11 Site, 16; Weston Solutions, Feasibility Study Report: NPL-8 Site, 13

²² Weston Solutions, NPL-II Site, 17-18; Weston Solutions, NPL 1,4,9, 11, and Illinois Power, 16-17.

²³ Weston Solutions, NPL 1, 4, 9, 11, and Illinois Power, 16-17.

They believed the clay in the soil would stop radioactive runoff so they only cleared vegetation to stop potential animal ingestion.¹⁴ This was again also deemed to be a minimal issue because the EPA determined that the risk of human contact from contaminated animals was minimal.²⁴ However, the vegetation clearing increased soil erosion and likely led to further contamination of the river and surrounding areas.²⁵ The other site that was left uncleared was possibly the most dangerous. Site 11 had cleanup efforts begin and thousands of tons of radioactive soil were disposed of, but the cleanup crews eventually hit the water table which flooded the worksite. Rather than find a solution the EPA decided to fill in the site even though there was radium in direct contact with groundwater.²⁶ It is worth noting that the EPA did not think this would affect Ottawa residents because shallow groundwater is not used for drinking.²⁴ However, a nearby creek could easily have been contaminated with runoff.²⁶ These cost cutting measures not only have left the environment damaged, but may have a human cost.

In 1997 the Illinois Department of Public Health, the Center for Governmental Studies at Northern Illinois University, and the Agency for Toxic Substances and Disease Registry of the United States Public Health Service conducted a joint study of cancer rates in Ottawa to see whether the contaminated sites caused an increase in cancer rates. They broke up Ottawa into various “census tracts” and studied different types of cancer diagnoses and distance from the contaminated sites. They found higher than expected cancer rates throughout Ottawa with the

²⁴ [Redacted], phone discussion with author to author, November 22, 2022.

²⁵ ATSDR, Health Assessment, 9; Weston Solutions, Feasibility Study Report: NPL-8 Site, 13- 16; Weston Solutions, Risk Assessment, NPL-8 Site, 13-14.

²⁶ Weston Solutions, NPL-II Site, 17-19.

highest cancer rates closest to contaminated sites.²⁷ In 2006 a public health review of Ottawa studying radium was released by the Illinois Department of Public Health. This study found that:

Elevated levels of radium-226 exist in soil and exposure may occur in the future if they are not removed. USEPA estimated that residents, workers, and trespassers have a low increased risk of cancer from exposure to contaminated soil. Based on current site conditions, IDPH concludes that exposure to radium-226 in soil at NPL-11 and NPL-8 poses a public health hazard. USEPA is planning to clean up these two remaining areas of contamination. This should eliminate the exposure pathway and prevent future exposures.

As of 2022, site NPL-8, the site with direct access to the Fox River, has not been remediated and work continues to secure funding for cleanup of this site. However, the other fifteen sites have all had some level of decontamination and soil removal.²⁰

The story of Ottawa's "deadly glow" and its battle against corporate interest, short-sighted thinking, and environmental apathy continues to cause harm to the Fox River and the residents of Ottawa. However, the pain and suffering that the Radium Girls went through led to great change in occupational safety for Illinois workers. The decontamination efforts, however, remain incomplete and hopefully one day the invisible killer will no longer plague Ottawa and the Fox River delta.

²⁷ Illinois Department of Public Health, The Center for Governmental Studies at Northern Illinois University, and The Agency for Toxic Substances and Disease Registry of the United States Public Health Service, GIS Analysis of the Incidence of Cancer and Adverse Pregnancy Outcomes in LaSalle County, Illinois Surrounding the Ottawa Radiation Sites (Atlanta, GA: Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, January 1998): 1-4.



Figure 27 Parker Gristmill on the west bank of the Fox River, above Oswego, IL (approx. 1900). Source: Little White School Museum Collection



Figure 28 Fox River industry in Aurora, IL (approx. 1890s). Source: Library of Congress



Figure 29 Hydroelectric generating Dayton Dam. Source: Friends of the Fox River



Figure 30 Carpentersville Dam (2020). Source: Chicago Tribune



Figure 31 Pontoon boat nearly plunges over Algonquin Dam on Fox River (2014). Source: CBS News



Figure 32 Danger sign at Batavia Dam (2020). Source: Chicago Tribune



Figure 33 Point source pollution in the Fox River (2020). Source: Friends of the Fox River



Figure 34 Aerial view of Ottawa, Ill., showing junction of Illinois River and Fox River, postcard (approx. 1940s)

Hear Case of Dying Woman



Industrial commission with Donohue

On a couch in her cottage in Ottawa, Ill., Catherine Donohue lies dying from radium poisoning. The scene pictured in the cottage is a hearing by the Illinois Industrial commission into her illness, declared caused by radium poisoning contracted while working on luminous dials in a watch factory. Mrs. Donohue has two children.

Figure 35 Hear Case of Dying Woman (1938). Source: Worcester Democrat & the Ledger Enterprise (Pocomoke City, MD)



Figure 36 American Rivers cleanup crew. Source: American Rivers



Figure 37 Mother and daughter pair monitor water quality of the Fox River (2008). Source: Friends of the Fox River



Figure 38 Community volunteers help to clean up pollution on the Fox River and replant native species (2006). Source: Illinois Department of Natural Resources



Figure 39 Illinois State Senator John Linebaugh, who proposed Senate Bill 1576, which would make portions of the Fox River an Illinois Scenic River Area.



Figure 40 The Grand Victoria Casino, Elgin, IL, on the Fox River (2005). Source: WBEZ Chicago



Figure 41 Elgin, Kane Co. Illinois (1880). Source: A. B. Upham.

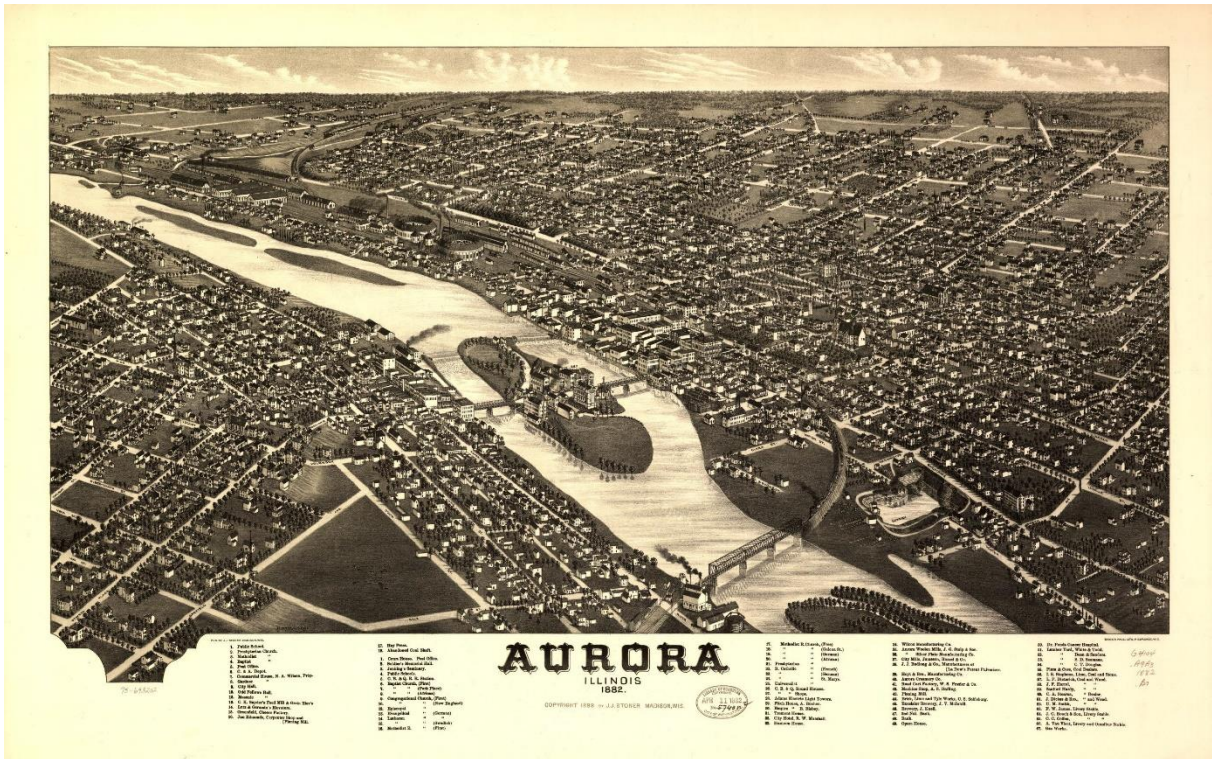


Figure 42 Aurora, Illinois (1882). Source: Library of Congress.



Figure 43 Christopher Stone, author of *Should Trees Have Standing?*. Source: New York Times

Part Four—Modernity

Early man walked away as modern man took control
Their minds weren't all the same, to conquer was his goal
So he built his great empire and he slaughtered his own kind
Then he died a confused man, killed himself with his own mind
Go!
—Bad Religion, “We’re Only Gonna Die”

Fox River's Endangerment Status

David Love

In 1999, Fox River was listed as the 7th most endangered river by American Rivers.¹ This endangerment status had massive implications for the river and governments surrounding it. Fox River was not in a bad state at the time, but if efforts were not made to prepare for the future pollution would have been near inevitable. Growing population and land usage surrounding the river threatened the clean water of Fox River and conversely the growing population that utilized it. Fox River's endangerment status was a significant move but was necessary to prevent the river from becoming polluted.

American Rivers is a nonprofit national organization based in Washington, D.C. While American Rivers is not affiliated with the U.S. Government, they receive federal funding and grants to aid them in their conservation efforts. Every year, American Rivers publishes a list of the 10 most endangered rivers in America, as a way to bring attention to these rivers for both their volunteers and local governments. It is important to note that the endangered rivers list is not meant to be an attack on the people responsible for these rivers, but a way to call attention to these rivers and prevent them from becoming polluted or otherwise harmed. Additionally, the rivers put on this list are commonly not already in a polluted or unhealthy state but may be approaching this if action isn't taken. This was the case with Fox River, where the river still had a relatively healthy ecosystem and the water was clean, as Jeff Stein of American Rivers stated in 2002 in a local newspaper article.

¹David Sharos, "Fox River Cleanup Efforts Reflect 'a Trend to Celebrate,' Expert Says," *Chicago Tribune* (Chicago Tribune, May 22, 2019), <https://www.chicagotribune.com/suburbs/aurora-beacon-news/ct-abn-fox-river-update-st-0114-story.html>.

“Right now, the Fox in terms of cleanliness and wildlife, is in pretty good shape,’ Stein said. However, “if sewage treatment plants aren’t updated to handle the population increase, bad things can happen.”² With the help of Friends of the Fox River and the Sierra Club, American Rivers identified that Fox River was quickly heading towards being polluted, and interfered.

Friends of the Fox River is a nonprofit local organization of both citizens and organizations who want to protect the Fox River. Currently, Friends of the Fox has over 4,500 citizens participating in their programs which range from water quality monitoring to education events. This number has grown significantly over the years, with Friends of the Fox having only 500 citizens in the early 2000s.³ Undoubtedly, some of this growth can be attributed to American River’s designation. Friends of the Fox was founded in 1990, running cleanup efforts, community outreach, and commenting on debates and EPA designations about the Fox River. While their efforts were significant before 1999, the endangerment designation was crucial to securing the Fox River for decades to come. Friends of the Fox is still active as of 2022 and continues to protect the Fox River.

A holistic approach was necessary to save the Fox River. Previous to the endangerment designation, attention on and efforts to protect the Fox River were separated by jurisdiction, leading to many decisions to not be considerate of the entire river. Dams are an example of these decisions. Friends of the Fox specifically highlights dams as something that is harmful to the Fox River in their 2003 report, “free-flowing portions of the river have more species and individuals of fish, and greater numbers of harvestable-sized sport fish. There are higher quality macroinvertebrate communities (i.e., aquatic insect larvae and freshwater mussels) in free-flowing portions of the river compared to impounded areas.” For the Fox River to continue to have a diverse biosphere of algae

²Brett Koppen, “Fox River,” Fox River - St. Charles History - Then and Now - Illinois Digital Archives (Illinois Digital Archives, December 20, 2002), <http://www.idaillinois.org/digital/collection/stc/id/1139/>.

³ “Organization History,” Friends of the Fox River (Friends of the Fox River, February 18, 2003), <https://web.archive.org/web/20030218055946/http://www.friendsofthefoxriver.org/history.htm>.

and fish, construction of dams needed to be stopped. Unfortunately, local jurisdictions that manage portions of the Fox River did not consider the problem as a problem for the entire Fox River, but only the segment they manage, and built dams that acted as quick solutions for regulating water levels. Friends of the Fox, alongside the Sierra Club, understood the problem from the perspective of the entire Fox River and nominated the Fox River for this endangerment status to bring state level attention to the issue. While this endangerment status reflected somewhat poorly on the area, it was necessary to get the entirety of the Fox River working together with the longevity of the river in mind. Without the endangerment status, Fox River likely would have never been approached holistically and local governments would have continued to make changes only for their area.

Construction of dams needed to be halted, if not reversed, for the Fox River to maintain its biodiversity. A 2003 study conducted by Friends of the Fox funded by the Illinois Department of Natural Resources found that dams were overall detrimental to the Fox River. “The distribution of fish species among station types during summer indicated that most fishes favored free-flowing portions of river over impounded areas created by dams. Further, we’ve found higher quality fish communities in the free-flowing river...”⁴ Friends of the Fox found overall that dams hurt the consistency of oxygenation, biodiversity of fish, and consistency of water levels. This issue is a somewhat controversial one, with some locals believing that dams aided in fishing and prevented the Fox River from draining completely. Friends of the Fox addressed all of these claims in their report, finding that the dams were not effective for flood protection, and that removal of dams could actually make fishing easier and more consistent throughout the river.⁵ This report came after the

⁴ “Fox River Fish Passage Feasibility Study.” Friends of the Fox River. March 11, 2003. Friends of the Fox River. Retrieved November 13, 2022, from <https://friendsofthefoxriver.org/wp-content/uploads/2018/03/FoxRiverFishPassageFinalReport.pdf>

⁵Art Malm, “Frequently Asked Dam Questions,” Friends of the Fox River (Friends of the Fox River), accessed November 13, 2022, <https://friendsofthefoxriver.org/dam-questions/>.

American River's endangerment designation, and some funding for it was national with the U.S. Environmental Protection Agency funding this report. Local government evidently agreed with the findings, as Fox River had no new dams built after this 2003 report. Without the national attention generated by the designation, this investigation may not have been possible. The endangerment designation allowed Friends of the Fox to find that construction of dams needed to be halted as soon as possible.

Growth of urban development and population around the Fox River caused increasing flood risk for the Fox River. The 2003 state of the Fox River report stated that "increasing the amount of impermeable surfaces such as roads, parking lots, and rooftops of buildings delivers more floodwaters to the Fox and its tributaries."³ Effectively, building surfaces like parking lots that do not absorb water well led to the Fox River having higher velocity streams and increased volume. This leads to corrosion of stream banks and destabilization of the river. Friends of the Fox was aware of this issue but finding funding to purchase lots of wetlands wasn't possible before the designation. The designation was successful in securing this funding. Friends of the Fox received funding from multiple sources in 2003, with the Wayne Village Board committing funding to the Fox River Study Group from both the Wayne Village Board and the Illinois Environmental Protection Agency.⁶

The designation of Fox River as the 7th most endangered river in America was effective in gaining publicity and saving the Fox River. As previously discussed, Friends of the Fox River has grown massively since the designation. Additionally, their efforts have proven effective. Fox River did not become polluted, and its biodiversity has been protected. More dams have not been

⁶David Sharos, "Fox River Cleanup Efforts Reflect 'a Trend to Celebrate,' Expert Says," *Chicago Tribune* (Chicago Tribune, May 22, 2019), <https://www.chicagotribune.com/suburbs/aurora-beacon-news/ct-abn-fox-river-update-st-0114-story.html>.

constructed, and wetlands have been reserved to aid in it not flooding. Finally, water quality is better than it was previously, with the Fox River currently not having the heavy metal and pesticide contamination it once had.⁷ The designation of Fox River as endangered by American Rivers was important to saving the Fox River, and was effective in doing so.

⁷Gary Mechanic, “Who Drinks the Fox River?” Friends of the Fox River (Friends of the Fox River, June 2, 2018), <https://friendsofthefoxriver.org/2018/06/01/who-drinks-the-fox-river/>.

The History of Restoration Projects on the Fox River

Sofia Zasiebida

The Fox River has a long history of pollution from point and nonpoint sources.¹ Pollution poses a problem for local residents because they rely on the Fox River for drinking water, recreation, and wastewater conveyance.² Restoration projects are initiatives that aim to improve the water quality of the Fox River and restore the river back to a healthier state before humans polluted it. When implemented, these projects can look like garbage removal, planting native species, and dam removal. Local groups have historic significance in advocating for restoration projects on the Fox River. Notable community involvement started in the late 70s when concerns about water quality first started, in the 90s, organized groups formed and advocated for the condition of the river to be recognized nationally. Today these groups lead the charge to protect the river by developing extensive restoration plans and working to gain governmental support. Community organizations have the most personal stake in the health of the river and relatedly, take the most action to protect it. Communities do the necessary work of educating citizens and obtaining scientific data to secure support and funding from governmental agencies.

The Environmental Protection Agency enacted the Safe Water Drinking Act in 1974.³ The Act sets contamination limits for pollutants in water sources to ensure that water is safe for consumption.⁴ The Act also demands action if a water source is found to be unsafe for drinking.⁵ The enactment of this act encouraged local residents to get involved with the quality of water of the

¹ "State of the Fox River Report 2003." Friends of the Fox River. Crystal Lake, (2003): 1.

² "State of the Fox River Report 2003," Friends of the Fox River, 1.

³ McHugh, Richard P. "The Impact of the Safe Drinking Water Act." *Journal (American Water Works Association)* 70, no. 12 (1978): 666–69.

⁴ McHugh, Richard P. "The Impact of the Safe Drinking Water Act," 666–69.

⁵ McHugh, Richard P. "The Impact of the Safe Drinking Water Act," 666–69.

Fox River.⁶ In a 1984 news article about the restoration of the Fox River from the Chicago Tribune an organizer said the following, “A lot of it was just getting people aware of the river and what it could become. It’s an asset now- not just a dumping ground.”⁷ Much of the restoration that was happening during this time included organized group clean-up of physical pollution.⁸ The community started to get involved because they realized that the river was an important resource for them to drink and for recreation practices as well.

As land development and suburban sprawl occurred in the 80’s and 90’s, pollution increased from sources like construction runoff.⁹ This decline in the quality of the river caused community members to realize that their small-scale action was not enough to protect the river.¹⁰ People who lived on the watershed were invested in protecting the river because they relied on it for recreation and drinking water; they also valued the biodiversity and presence the river had in their environment.¹¹ In an attempt to take action and protect their resource, an organization called Friends of the Fox River formed in 1990.¹² It was the first of three major groups dedicated to conserving and restoring the Fox River to form in the decade to come. The other two organizations include the Fox River Ecosystem Partnership which formed in 1996¹³ and the Fox River Study Group which formed in 2001.¹⁴ These local groups were invested in restoring the river because of the vital role it played in their lives. They have a particularly powerful role as beneficiaries of the river to protect and advocate for its advancement.

⁶ Nelson, Eleanor. "The Fox--a Cinderella River: From Pollution to Recreation Fox River." *Chicago Tribune*, (1984), 7.

⁷ Nelson, Eleanor. "The Fox--a Cinderella River: From Pollution to Recreation Fox River," 7.

⁸ Nelson, Eleanor. "The Fox--a Cinderella River: From Pollution to Recreation Fox River," 7.

⁹ Van Matre, Lynn. "Sprawl Puts Fox River on Endangered List." *Chicago Tribune*, (1999).

¹⁰ "State of the Fox River Report 2003." Friends of the Fox River, 1.

¹¹ "About the Fox River Study Group." Fox River Study Group. (2022).

¹² "About Us: Friends of the Fox River Mission, History and Work." Friends of the Fox River.

¹³ "About the Fox River Ecosystem Partnership." Fox River Ecosystem Partnership. (2022).

¹⁴ "About the Fox River Study Group." Fox River Study Group.

These organizations formed with the goals of educating the public, enacting scientific monitoring programs, and advocating for government involvement to protect the Fox River.¹⁵ For the past thirty years, these groups have created educational content for residents of the Fox River Watershed to get them to understand the river's vital presence and care for it.¹⁶ They also lobby for governmental funding and legislation that helps remove pollution and restore the river.¹⁷ Finally, they do a large majority of scientific research that demonstrates the water quality and condition of the Fox River.¹⁸

The first example of the work that these community groups do was in 1999, when awareness raised by these organizations caused the Fox River to be listed as one of the 10 most endangered rivers by the publication, *American Rivers*.¹⁹ These groups wanted to put the Fox River in the national spotlight. As inhabitants of the watershed became aware of the damage being done to the Fox River, the Illinois Environmental Protection Agency (IEPA) was prompted to take action.²⁰ The community organizations did the activism work required to get the attention of larger governmental agencies. In 2002, the IEPA categorized the Fox River as impaired.²¹ The conditions that led to this decision included a high concentration of PCBs in fish tissues, suspended solid pollution, and the habitat destruction caused by dams.²² This classification, though it has a negative connotation, was a step forward for community organizations. By acknowledging that the Fox River was impaired, it released resources and additional funds from local governments to help protect and fix the river.

¹⁵ "About Us: Friends of the Fox River Mission, History and Work." Friends of the Fox River.

¹⁶ "About Us: Friends of the Fox River Mission, History and Work." Friends of the Fox River.

¹⁷ "About Us: Friends of the Fox River Mission, History and Work." Friends of the Fox River.

¹⁸ "About Us: Friends of the Fox River Mission, History and Work." Friends of the Fox River.

¹⁹ Van Matre, Lynn. "Sprawl Puts Fox River on Endangered List."

²⁰ "State of the Fox River Report 2003." Friends of the Fox River, 1.

²¹ "State of the Fox River Report 2003." Friends of the Fox River, 1.

²² "State of the Fox River Report 2003." Friends of the Fox River, 1.

This classification was a turning point for the health of the Fox River that was initiated by the local community groups.

The same pattern of strong, local involvement driving positive change can be seen today. In 2015, after a culmination of a decade of collaboration between the three major civilian groups listed above, The Fox River Implementation Plan (FRIP) was published.²³ The plan's main goal is to increase water quality by reducing excessive algae growth and improving dissolved oxygen in the river.²⁴ To achieve water standards, the plan outlines a variety of different strategies including dam removal and phosphorus reduction.²⁵ The FRIP is an example of the dedication that local groups have for preserving natural resources. The introduction reads, "The FRIP is the product of more than a decade of extensive planning, data collection, scientific assessment and modeling undertaken by the Fox River Study Group with the support of the IEPA, the Illinois State Water Survey (ISWS), the regulated community, and environmental groups."²⁶ The FRIP is evidence of the tremendous work that community groups undertake to protect their local environments.

Due in part to the compelling case made by the FRIP, significant federal support was obtained for restoration projects. In June of 2022, 250,000 dollars in federal funds were obtained for the plans outlined in the FRIP.²⁷ The IEPA, now in collaboration with the U.S Army Corps of Engineers, will work to implement strategies that were outlined in the FRIP. Mainly, the groups will focus on removing dams to restore habitats, improve water quality, and recolonize local populations.²⁸ These funds were only obtained because of the extensive activism executed by

²³ The Fox River Study Group. *Fox River Implementation Plan: A Plan to Improve Dissolved Oxygen and Reduce Nuisance Algae in the Fox River*. Fox River Study Group, (2015).

²⁴ The Fox River Study Group. *Fox River Implementation Plan*, xi.

²⁵ The Fox River Study Group. *Fox River Implementation Plan*, xi.

²⁶ The Fox River Study Group. *Fox River Implementation Plan*, 1.

²⁷ Office of Dick Durbin. "Durbin Announces \$250,000 In Federal Funding for Fox River Restoration." Dick Durbin press release, (2022).

²⁸ US Army Corps of Engineers. "IL Fox River Connectivity & Habitat Study." Chicago District of the US Army Corps of Engineers. (2022).

community groups. The data they collected through monitoring programs validated the need for funds and support. Raja Krishnamoorthi, a house representative for district 8 in Illinois, said the following about the relationship between community groups and governmental agencies “The efforts of the Fox River Study Group, as well as the public-private partnerships which it’s developed with leaders across our region, is a model for improving our environment for generations to come, but even more fundamentally, making a difference.”²⁹ Krishnamoorthi identified the vital role that community organizations play in enacting local change and rallying support from governmental agencies. When residents turn their concern and care into action, they can enact real, positive change to preserve their environment.

The restoration of the Fox River is a historic example of the power that strong, community-based groups have to protect the environment. Organizations like the Friends of the Fox River valued the river because it was a vital resource for them. When they saw that this river was being harmed, they took action. These groups started to educate, advocate, and initiate programs and legislation that restored the Fox River’s water quality. This work gained the attention of governmental agencies which helped get funding for their proposed recreation projects. The history of the restoration of the Fox River shows that no one will care more about the local environment than the people who inhabit it. When people value, organize, and advocate for their communities, they spark real change and support from governmental agencies. Saving the environment requires people to start with small action in their own communities, fighting to protect every part of the natural world.

²⁹ Office of Dick Durbin. “Durbin Announces \$250,000 In Federal Funding for Fox River Restoration.”

Policies and Regulations on the Fox

Irene Park

Policies and regulations are oftentimes required for natural regions, which may need to be protected from humans. The Fox River is no exception to this as numerous government agencies tried to regulate the Fox River through a series of policies. Whether it was by helping preserve the nature of the Fox River or prioritizing human-centered corporations, numerous bills have been passed or proposed in Illinois regarding the Fox River. Though the state government extended its powers by proposing laws that both preserved the ecology of the river and helped human corporations, the laws have primarily been intended to help the Fox River ecosystems, rather than prioritizing human advancements.

As a matter of fact, many bills focused on helping the ecology of the Fox River passed with immense support. An early example is from 1833, when Senators Benjamin Howland and Henry L. Brush proposed that a mill dam be built across the Fox River.¹ Ultimately, through the debate of other legislators, the final vote decided that the Fox River was “indisputably a navigable stream...any obstruction imposed by the action of this Legislature would affect injuriously the citizens of that region” and the bill did not pass the House.² Though the reasons were because the residents living around the Fox River would be disrupted if too many people started using the Fox River as transportation for trade services, it still saved the river from being overburdened with a dam. Dams can have negative impacts on the ecosystems they are placed in. They often trap

¹ Benjamin Howland and Henry P Brush, “Internet Archive,” Internet Archive § (2014), <https://archive.org/details/journalofsenateo09illi/page/312/mode/2up?q=fox>.

² *Ibid.*

sediment flow, ruin and break habitats within the river, and prevent fish from passing as they please.³ As such, because the legislators decided to not build the dam, the Fox River was not turned into a place for energy production, allowing fish and other wildlife in the Fox River to thrive without human intervention or disruption.

The state government continued to help the Fox River through the Scenic River Bill proposed and passed in 1972. Before the 1970s, corporations would dump their untreated sewage and industrial wastes directly into the water.⁴ For example, carbonless copy paper was discovered in the river, which released Polychlorinated Biphenyls (PCB).⁵ The river took a direct toll, as the lower part of the river suffered from “excessive loadings of sediment, nutrients, bacteria and heavy metals resulting in degraded aquatic habitat and an unbalanced fish community with low populations and limited diversity.”⁶ In response, the Scenic River Bill (Senate Bill 1576) made the Fox River in Kane and Kendall County a scenic river area, acquiring five miles for public property from strip mines.⁷ Turning this area into a scenic river area would designate it as a place “with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads,” according to the National Park Service and accepted by the state of Illinois.⁸ The bill noted that the Department of Conservation would purchase lands around the river, reimburse the coal mine

³ September 18, “The Downside of Dams: Is the Environmental Price of Hydroelectric Power Too High?,” *Scientific American* (Scientific American, September 18, 2012), <https://www.scientificamerican.com/article/how-do-dams-hurt-rivers/>.

⁴ Ashley Rhodebeck, “How Clean Is the Fox River?,” *Shaw Local* (Shaw Local, November 23, 2020), <https://www.shawlocal.com/2011/07/26/how-clean-is-the-fox-river/a9a3okh/>.

⁵ *Ibid.*

⁶ “Lower Fox River Basin,” Lower Fox River basin (Wisconsin Department of Natural Resources), accessed November 13, 2022, <https://dnr.wisconsin.gov/topic/Watersheds/basins/lowerfox#:~:text=Water%20quality%20studies%20reveal%20that,limited%20diversity%3B%20sedimentation%20and%20excessive.>

⁷ John Linebaugh Knuppel, “Illinois General Assembly,” Illinois General Assembly § (1972), <https://www.ilga.gov/Senate/transcripts/Strans77/ST060272.pdf>.

⁸ “What Are Wild and Scenic Rivers?” National Parks Service (U.S. Department of the Interior, 2021), <https://www.nps.gov/orgs/1912/what-are-wild-and-scenic-rivers.htm#:~:text=Scenic%20Rivers%3A%20Those%20rivers%20or,accessible%20in%20places%20by%20road.>

companies for revenue lost, and would use the money requested to prevent acid run-off.⁹ This specific piece of legislation was beneficial for the ecology of the Fox River, as acid run-off can cause contaminated drinking water, corrode bridges, and disrupt the reproduction of plants and animals living in the river.¹⁰ As such, by investing in the reduction of run-off effects, the wildlife in the Fox River could live in a cleaner and safer environment.

More recently, in 1990, the Stormwater Management Commission (SMC) was established, managing the negative impacts of storms. House Bill 3656 proposed the creation of the SMC to create watersheds in needed areas and create a council that would manage impacts of floods and storms.¹¹ Watersheds (at least, those that are considered healthy) are good for the river they are placed in, providing benefits such as increased biodiversity, soil formation, water filtration, flood control, and reduced effects of climate change and other natural disasters.¹² HB 3656 was helpful for not only the ecosystem, but also for the inhabitants around the Fox River, because the SMC was also dedicated to reducing impacts of floods on neighboring communities and ecosystems.

Combined with the establishment of the SMC, tightened fishing regulations prevented decreased biodiversity as well. For instance, the Fox River Harvest Regulation limits fishers to one flathead catfish over twenty-eight inches or two catfish under twenty-eight inches, preventing overfishing.¹³ The SMC ensured that these regulations were met, and people were not abusing natural resources in the Fox River, prioritizing the preservation of the river.

⁹ *Ibid.*

¹⁰ “How Does Mine Drainage Occur?” How does mine drainage occur? | U.S. Geological Survey (U.S. Department of the Interior), accessed November 13, 2022, <https://www.usgs.gov/faqs/how-does-mine-drainage-occur#:~:text=Problems%20associated%20with%20mine%20drainage,of%20infrastructures%20such%20as%20bridges>

¹¹ Greg Zito, “Illinois General Assembly,” Illinois General Assembly § (1990), <https://www.ilga.gov/Senate/transcripts/Strans86/ST062990.pdf>.

¹² “Benefits of Healthy Watersheds,” EPA (Environmental Protection Agency, 2022), <https://www.epa.gov/hwp/benefits-healthy-watersheds>.

¹³ *Ibid.*

On the other hand, there are instances of government oversight that intended to harm the Fox River. The most famous is the Indian Removal Act of 1830, which allowed the federal government to forcibly move Native Americans into western lands.¹⁴ In 1835, natives including the Potawatomi, Chippewa, and Ottawa tribal bands living at the Fox River Valley were forced to move west of the Mississippi River, allowing the white settlers to take advantage of the Fox River's natural resources.¹⁵ Soon after the removal of Natives, the first dam on the Fox River, in St. Charles, was built in 1836.¹⁶ Clearly, the state and federal government intended to remove native populations so that they could capitalize on building more dams, emphasizing the importance of people over nature.

Similarly, bills like Senate Bill 1481 aimed to build more dams in the Fox River, damaging its wildlife. SB 1481 was proposed and passed in 1978 by Senator Robert Mitchler, which would repair and reconstruct the North Aurora Dam.¹⁷ According to Senator Mitchler during a June 1978 debate, the dam “ruptured about 1/4th on the east bank causing excessive flow downstream.”¹⁸ This helped the ecology near the Fox River because the trees on the shoreline and park district area near it would not continue to be destroyed. Of course, it must be considered that the absence of a functioning North Aurora Dam wiped away “fifteen to twenty feet” of the Fox Valley Park District, which was equally as detrimental for the plants and animals there.¹⁹ Though Senator Mitchler argued that if the

¹⁴ “Indian Removal Act: Primary Documents in American History: Introduction,” Research Guides (Library of Congress, 2019), <https://guides.loc.gov/indian-removal-act#:~:text=The%20Indian%20Removal%20Act%20was,many%20resisted%20the%20relocation%20policy>.

¹⁵ “Fox River,” History on the Fox (History on the Fox, 2022), <https://historyonthefox.wordpress.com/category/fox-river/>.

¹⁶ Ashley Rhodebeck, “A Look into the Early History of the Fox River,” Shaw Local (Shaw Local, November 22, 2012), <https://www.shawlocal.com/2012/07/19/a-look-into-the-early-history-of-the-fox-river/af5p9nj/>. ¹⁷ Robert Mitchler, “Illinois General Assembly,” Illinois General Assembly § (1978), <https://www.ilga.gov/Senate/transcripts/Strans86/ST062990.pdf>.

¹⁷ Robert Mitchler, “Illinois General Assembly,” Illinois General Assembly § (1978), <https://www.ilga.gov/Senate/transcripts/Strans86/ST062990.pdf>.

¹⁸ *Ibid.*

¹⁹ *Ibid.*

dam was left malfunctioning, the flow from the Fox River could also harm people who live nearby, water contamination caused by dams can also directly impact residents of Illinois.²⁰ However, building more dams and fortifying their existence only worsened the negative impacts on the Fox River, continuing to destroy and unnaturally divide natural habitats in the water, among many other negative effects.

Harmful bills continued to be proposed, though not all were passed. For instance, in the 77th General Assembly in 1972, Senate Bill 4293 was proposed, which would allocate twenty million dollars to the state government to purchase lands around the Fox River and develop it to increase its value. A supporter of this bill claimed that “phosphates in detergents are not causing all of that algae growth...this is a hoax by those ecology nuts.”²¹ Ultimately, this bill did not pass, saving the Fox River from becoming overdeveloped and used for its natural resources. However, this bill shows that some politicians in the Illinois General Assembly were more concerned for land value and development, not for preserving and protecting the environment.

Environmental protections are always controversial. Though many different bills were proposed in Illinois and the United States throughout the nineteenth to twentieth centuries to build dams or develop the land surrounding the Fox River, most efforts have been intended to preserve the Fox River and put it before human or corporation development. Many bills were passed to improve river quality and be considerate of the environmental impacts dams were making. Of course, though no political efforts are perfect, the overall intentions of the bills regarding the Fox River were intended to keep it as untouched by humanity as possible and minimize the effects of

²⁰ “How Dams Damage Rivers,” American Rivers (American Rivers, July 26, 2018), <https://www.americanrivers.org/threats-solutions/restoring-damaged-rivers/how-dams-damage>.

²¹ John Linebaugh Knuppel, “Illinois General Assembly,” Illinois General Assembly § (1972), <https://www.ilga.gov/Senate/transcripts/Strans77/ST060272.pdf>.

natural disasters on surrounding ecosystems. We can see the positive impacts by legislation on the Fox River even today, as the area is relatively free from excessive human development.

Behind the Glitz and the Glamor

Jeff Duan

Following the emergence of riverboat casinos along the Fox River in 1992, the subsequent decades have seen the continued popularity of the glamorous vehicles. As a means of perpetuating their use, proponents of riverboats insisted the vehicles would produce positive environmental effects on the polluted river. In truth, riverboat casinos have hoarded funding that would otherwise prove invaluable to environmental agencies, while simultaneously releasing dangerous pollutants into the river stream. Despite the acclaim of the practice and the assertions of advocates, riverboat gaming has exacerbated environmental issues along the Fox River by appropriating funding and releasing harmful chemicals, and therefore must cease before kindling further damage to mother nature.

The story of Fox riverboat casinos began in earnest with the legalization of several forms of gambling throughout the 20th century, which culminated in the passage of the Riverboat Gambling Act. In 1971, for instance, the Illinois General Assembly legalized gambling in bingo games.¹ Subsequently, across the 1980s, venues began launching a chain of lottery games, such as Illinois Pick3 and Illinois Pick4.² Finally, heading into 1990, Illinois joined Iowa in legalizing riverboat gambling with the instatement of the Riverboat Gambling Act of 1990.³ As the legislation states, the intended purpose of riverboat gambling was to “[assist] economic development, [promote] Illinois tourism, and [increase] the amount of revenues available to the State to assist and support education,

¹ Illinois Legislative Investigating Commission. Rep. Bingo in Illinois: A Report to the General Assembly. Chicago, Illinois: National Institute of Justice, 1982. <https://www.ojp.gov/pdffiles1/Digitization/83530NCJRS.pdf>.

² Ibid.

³ Illinois General Assembly. (230 ILCS 10/) Illinois Gambling Act, 1990. <https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1399&ChapterID=25>.

and to defray State expenses.”⁴ The text’s heavy economic flavoring makes it clear that riverboat gambling was, from the start, meant purely for monetary gain. Meanwhile, Section 5 of the act declared the establishment of an Illinois Gaming Board, a group of five members appointed by the governor that would have authority over all powers mentioned in the Act, including the ability to greenlight riverboat construction efforts by granting an organizational gaming license as the board saw fit.⁵ However, the board granted such licenses sparingly, as can be seen in one case in December 1990. During this time, Arnie Millan, the vice president for the Steamboat Casino River Cruises of Bettendorf, Iowa, turned his eyes to the Fox River, and promptly proposed the legalization of riverboat gambling. The board, comprised of mixed opinions, ultimately rejected his proposal due to the minimal time they had to form a decision.⁶ Similar stories were commonplace, but even so, the emergence of riverboat casinos would soon prove to be significant to the Fox River.

After the instatement of the Riverboat Gambling Act, the practice would quickly grow in popularity. The first riverboat casino constructed along the Fox River, the *Empress River Casino*, was created six miles south of Joliet in June 1992 and would herald an era of widespread riverboat construction.⁷ Within the next two years alone, six new riverboat casinos launched along the Fox River, each of which offered its own accommodations ranging from craps and roulette to blackjack.⁸ Among the most notable was *Harrab’s Casino Joliet* fifty miles southwest of Chicago, which featured an entire mega-yacht comprising of three 210-foot decks, along with the *City of Lights I*, a 145-foot

⁴ Ibid, Sec. #2. Legislative intent.

⁵ Ibid, Sec. #5. Gaming Board.

⁶ V, Dion Haynes. "Riverboat Gambling on the Rocks: Despite Sagging Economy, Elgin Mayor Expects Council to Reject Plan." *Chicago Tribune* (1963-1996), Dec 25, 1990. <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/riverboat-gambling-on-rocks/docview/1444456180/se-2>.

⁷ "Six Casinos Afloat in Chicago Area." *New York Times* (1923-), Feb 20, 1994.

<https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/six-casinos-afloat-chicago-area/docview/109297494/se-2>.

⁸ Ibid.

riverboat stationed in Aurora that would later expand by 88-feet in 1995.⁹ Meanwhile, the *Empress* would expand its 222-foot span with the addition of a 238-foot boat by December, and ultimately housed over 1,000 video poker and slot machines in total.¹⁰ Characterized by explosive success, the years shortly after the instatement of the Riverboat Gambling Act saw the launching of frequent large-scale construction efforts.

The common usage of riverboat casinos continued into the 2020s. Although the original *Empress River Casino* met its end through a fiery accident in 2009, the number of functioning riverboat casinos rose from six in 1995 to eleven in 2022.¹¹ Across the intermediate decades, the Gaming Board legalized various other forms of entertainment to be included in riverboat casinos, such as Video Gaming Terminals (VGTs), causing them to become all the more successful.¹² In fact, upwards trends in riverboat gambling are prominent when observing the gross receipts collected by the Illinois Gaming Board. While 605 million dollars were collected in 1993, the number had risen to 1.98 billion by 2007, and more recently lay at 1.4 billion in 2016.¹³ From the consistently high activity apparent in Fox River casinos, it is clear that riverboat gambling quickly became a significant component of entertainment and culture in Illinois.

Misguided business officials were quick to argue that this rapid success of riverboat casinos would be environmentally advantageous due to their utility as a source of revenue, which would allow Illinois to fund environmental agencies tackling the Fox River. Though such claims of

⁹ Baniak, Peter. "CASINO'S ADDITION A MARITIME MARVEL AURORA BOAT BECOMING 88 FEET LONGER WITHOUT LEAVING THE FOX RIVER: [SOUTH SPORTS FINAL EDITION]." *Chicago Tribune* (Pre-1997 Fulltext), Apr 18, 1995.

<https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/newspapers/casinos-addition-maritime-marvel-aurora-boat/docview/283960133/se-2>.

¹⁰ "Six Casinos Afloat in Chicago Area." *New York Times* 1994.

¹¹ Illinois Gaming Board. 2016 Annual Report, 2016.

<https://www.igb.illinois.gov/FilesAnnualReport/2016IGBAnnualReport.pdf>.

¹² Ibid.

¹³ Ibid.

environmental benefit were unfounded, with there being no legislative clause mandating such actions, there was good reason to attempt to environmentally aid the Fox River. After all, for decades before the emergence of riverboat casinos, the Fox River had been chalked full of phosphorous and other toxic chemicals to such an extreme extent that eco-terrorists rose to tackle environmental harmful organizations.¹⁴ One such “eco-terrorist” (although whether their acts were violent enough to constitute being considered a “terrorist” is a separate matter entirely), under the persona Jim “The Fox” Phillips, became a local legend by dumping refuse into companies’ sewer pipe outlets.¹⁵ In 1994, Illinois business executive John Sander asserted that riverboat casinos would bring an end to the necessity of such violent measures. At the time, the Waterway Management Agency of Illinois did not earn nearly enough income to tackle serious issues of water pollution along the Fox River.¹⁶ Sander reasoned that by granting funds towards riverboat projects, up to five million dollars from riverboat profits could be donated to environmental foundations, contributing to efforts in dredging, wetlands restoration, and bank erosion.¹⁷ But while Sander’s promises may have seemed tempting, they are anything if rational. In the *Chicago Tribune*, Sander wrote:

Whatever one’s conviction on legalizing riverboat gambling, it is a foregone conclusion that it is not only a reality in Illinois but will continue to spread throughout our state. The challenge now is no longer whether to permit riverboat gambling; it is to find a way for our society to improve as a result.¹⁸

That Sander accepts riverboat gambling as an inevitable truth means he is merely trying ‘find a way’ to make the best of the situation and does not truly believe riverboats would directly aid the

¹⁴ Young, D. (1999, Apr 18). STILL SOME FIGHT LEFT IN THE FOX 1ST ECOTERRORIST NOW QUIETLY WATCHES RIVER: [CHICAGOLAND FINAL EDITION]. *Chicago Tribune* Retrieved from <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/newspapers/still-some-fight-left-fox-1st-ecoterrorist-now/docview/418931601/se-2>

¹⁵ Ibid.

¹⁶ Sandner, J. (1994, Apr 09). Fox riverboat would aid environment. *Chicago Tribune* (1963-1996) Retrieved from <https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/historical-newspapers/fox-riverboat-would-aid-environment/docview/1977160224/se-2>

¹⁷ Ibid.

¹⁸ Ibid.

environment. Clearly, Sander's reasoning is mere grasping at straws, which shall become ever the more apparent upon observing the damaging consequences of riverboat casinos.

A primary disadvantage to the practice of riverboat gambling is their monumental costs, which offsetted any promises Sander made to begin with. Recall that Sander planned for each individual riverboat to contribute five million dollars to environmental aid, meaning that even if all eleven Fox River riverboats extant in the present day contributed Sander's given amount, only fifty-five million dollars would be allotted. This measly sum is easily squandered by costs historically needed in the construction of riverboat casinos themselves. The aforementioned project of expanding the *City of Lights I* by 238 feet required twenty million dollars alone, a hefty price that would greatly increase when considering the price for building the riverboat in the first place.¹⁹ What's more, significant funds are spent on decor: over the six months preceding the expansion, 1.5 million dollars were wasted on constructing Hollywood-themed artifacts to be placed within the boat.²⁰ In a more extreme case, the riverfront pavilion complex from which the *Hollywood Casino-Aurora* departed, home to complementary Hollywood and Las Vegas-themed entertainment, necessitated an entire seventy-five million dollars during its construction.²¹ In short, while Sander claims riverboat casinos would result in a net profit for the environment, a considerably more markable contribution could be made by simply reallocating the funds originally used for riverboat casinos into environmental agencies.

Aside from funding concerns, riverboats also directly dispense harmful materials into the Fox River. For instance, due to sediment suspension caused by physical disturbances of boating (which in turn releases nutrients into the water, to be consumed by toxic species of algae), the

¹⁹ Baniak, "CASINO'S ADDITION A MARITIME MARVEL AURORA BOAT BECOMING 88 FEET LONGER WITHOUT LEAVING THE FOX RIVER" *Chicago Tribune*.

²⁰ Ibid.

²¹ "Six Casinos Afloat in Chicago Area." *New York Times* 1994.

resultant abundance in sediments and algae causes the obstruction of sunlight from marine life.²² Additionally, waste and debris from the bodies of riverboats have found their way into aquatic ecosystems and have caused further damage by entangling native marine species, or even worse, being ingested.²³ Such deposits also alter the chemistry of the river stream by modifying concentrations of compounds such as copper or zinc, as well as acidity through the discharge of petroleum into the river stream.²⁴ In a similar manner, internal combustion engines commonly release greenhouse gases (particularly nitrous oxide, methane, and carbon dioxide) or dangerous hydrocarbons into the water through exhaust gas.²⁵ Since many marine species may only thrive in particular environments, even the most minor alterations (which have surely been far surpassed by the intrusiveness of riverboat casinos) in river streams are fatal towards marine ecosystems.²⁶ Evidently, in the desperate pursuit to manifest some environmental advantage to riverboat gaming, Sander failed to consider the disadvantages in front of his very eyes.

These detriments are illustrated by data on the watershed. The Illinois Rivers Decision Support System (IRDSS) found that through 1997-2002, nine separate stations across the Fox River yielded concentrations of zinc, nickel, cadmium, and copper that surpassed the standard of what could be considered “chronic.”²⁷ Furthermore, a 2002 examination of Fox River water quality from a U.S. Geological Survey found elevated levels of phosphorous and nitrate within the river stream.²⁸

²² Byrnes, Troy A., and Ryan J. K. Dunn. 2020. "Boating- and Shipping-Related Environmental Impacts and Example Management Measures: A Review" *Journal of Marine Science and Engineering* 8, no. 11: 908. <https://doi.org/10.3390/jmse8110908>

²³ Ibid.

²⁴ Fields, Scott. "The Environmental Pain of Pleasure Boating." *Environmental Health Perspectives* 111, no. 4 (2003): A216–23. <http://www.jstor.org/stable/3435238>.

²⁵ Ibid.

²⁶ Byrnes and Dunn. 2020. "Boating- and Shipping-Related Environmental Impacts and Example Management Measures: A Review" *Journal of Marine Science and Engineering* 8, no. 11: 908. <https://doi.org/10.3390/jmse8110908>

²⁷ ILRDSS. Fox Water Quality Data Base: Water Quality Analyses, Fox River Watershed Investigation, 2002-2003. http://ilrdss.sws.uiuc.edu/fox/downloads/Fox_Chapter_5.pdf.

²⁸ James Evans Special to the Tribune. (2002, Nov 20). 17 groups join forces to examine condition of fox river water quality: [northwest final, NW edition]. *Chicago Tribune* Retrieved from

Even the financial benefit that Sander promised was sorely lacking in 2016, when the Fox Waterway Agency generated approximately 2.6 million dollars.²⁹ The measly sum was leagues away from the amount necessary to tackle the 100,000 cubic yards of sediment that filtered into the river annually, as well as the six to ten million cubic yards of sediment that exist in the Grass Lake sub region alone.³⁰ Data collected by environmental agencies highlights the severity of environmental issues along the Fox River, and the negative contributions made by riverboat casinos.

Though riverboat casinos have been celebrated nigh religiously about the Fox River since 1990, the cruel practice must come to an end. No matter what advocates such as Sander may spout about potential environmental benefit, riverboat gambling has already proven incredibly costly, while also unleashing devastating pollutants to the Fox River. It is not within jurisdiction of the gambling citizen, nor that of the Illinois Gaming Board, to incite such pain and misery upon the Earth that births us all. To this end, the Illinois Gaming Board must consider a severe overhaul in legislation through amendments to the Gambling Act, including but not limited to lessened funds for riverboats, greater selectiveness (if not complete cession) of licenses for riverboats, and, if this were to be impossible, to at the very least consider dedicating a greater split of profits towards environmental attention. For twenty years, the splendor of slot machines and the glory of profits has blinded the Gaming Board to the light of Mother Nature, which day by day dwindles at the hands of their avarice.

<https://go.openathens.net/redirector/imsa.edu?url=https://www.proquest.com/newspapers/17-groups-join-forces-examine-condition-fox-river/docview/419492020/se-2>

²⁹ Ibid.

³⁰ Ibid.

The Growth of Elgin and the History of the Fox River

Alan Hernandez

The Fox River is a two-hundred-mile-long river that stretches from southeastern Wisconsin to Ottawa, Illinois. Elgin is a city that is near the center of the Fox River's path. However, 200 years ago, Elgin had not existed yet but would be founded soon by the Gifford brothers. Elgin would be relying on major companies and the Fox River to keep itself sustainable. Eventually, Elgin acquired technology to help the city create buildings for people to reside in and allow itself to become a city for people to live in. Dan Flores spoke about a place where traditions and customs are cultivated by the people who live there and Elgin residents adapt to its environment to sustain the city and themselves. However, more advanced issues would arise, and the Fox River would get polluted after aiding Elgin in its urbanization. Despite the issues currently, the Fox River helped Elgin's urbanization as a city to an extent.



Figure 44 443 E. Chicago Street in Elgin, built in 1845. Source: *Historic Elgin*

Elgin was founded by Hezekiah Gifford and James Gifford in 1835 and was given its name after a Scotch hymn, "The song of Elgin". Natural resources of the Fox River were of good quality until the need for urbanization as civilizations grew larger and larger. The

beginning of urbanization and growing a place includes removing trees and vegetation to have space

for the start of building houses as well as drilling wells and sewers.¹ There are two prime examples of this. A building called the Elgin Academy was built in 1856, four years after being founded.² The academy is now education for Elgin's young, gifted, and talented students. The other building is a house that was built around 1845 on 443 E Chicago Street in Elgin.³ The effects of having a river next to a place were already proving to have urbanized it really quickly. However, those activities had a small negative effect on the Fox River which included sediments being washed into the river from drilling wells.⁴ At the time, it wouldn't be an issue, not until later.

The Fox River would continue to be prevalent for the residents of Elgin. A source of drinking water was a necessity for residents so the City of Elgin served them water from the Fox River in the 1880s.⁵ No treatment was performed on the Fox River, however, residents were able to tell that the water was of rich quality. They knew this because later on in the 1900s, more and more communities were using the Fox River beside the people of Elgin.⁶ There were people from the north and people from the south also using the Fox River for their own purposes besides drinking water. Recreation and industry were also used on the Fox River. It meant multiple areas were all polluting the Fox River in the aftermath of urbanization.⁷ This all led to the Fox River becoming more prevalent in waterborne diseases and becoming unusable as it was stripped of its natural resources which made the Fox River so valuable in the first place.

This did not stop Elgin's growth as there was one major cooperation named the "Elgin National Watch Company" that kept Elgin stable before and after the Fox River was becoming unusable. The Elgin National Watch Company, founded in 1864, manufactured and was one of the

¹ Water Science School, *Urbanization and Water Quality*

² *Encyclopedia of Chicago*, "Elgin, IL"

³ 443 E. Chicago Street, *Historic Elgin*

⁴ Water Science School, *Urbanization and Water Quality*

⁵ City of Elgin, *History of Fox River*

⁶ Ibid.

⁷ Farmer, Sarah, *Streams through the City: Water Quality and Quantity*

largest industrial companies in the world by 1874.⁸ Elgin produced such high-quality watches with advanced technology, tools, and techniques that competitors were no match. Watches were previously handmade and had to be repaired by that same craftsman, but the company was mass-producing watches which was extremely successful. They were able to mass-produce watches because of the number of their employees. Around 4,500 people were working in the Elgin Watch Factory to create these watches. The population of Elgin kept growing from 5,441 in 1870 to 17,823 in 1890.⁹ This meant that over 80% of people were working in the factory from the early years of the company. The Elgin Company had an Observatory built in 1910 to measure time because atomic clocks were not created yet.¹⁰ The Observatory is now currently a Planetarium owned by Elgin U-46 District to have students get an experience with space as an interest. This all is a key major point of Elgin's rapid development as a city.



Figure 45 First Elgin High School, built in 1844. Source School District U-46.

Elgin's education also was a key factor in its growing population. School District U-46, my old home district, had its first high school in 1844, Elgin High School.¹¹ The legislation was passed in 1851 that

⁸ Sexton, Jeff, *The Elgin National Watch Company*

⁹ *Encyclopedia of Chicago*, "Elgin, IL."

¹⁰ Sexton, Jeff, *The Elgin National Watch Company*

¹¹ U46, *History of U-46*

approved the use of local taxes to fund free public education to create and build more high schools. The population kept rising from 1940 to 1950. It went from 38,300 people to 44,200 people and to supply the number of school enrollment, U-46 built another building to call Elgin High School.¹² Schools were also allowed to act independently from the city in 1873. All these resources allowed U-46 as a district to capitalize on it to create more schools and the permanent Elgin High School was founded in 1869. This would be home later to the rival of my old school, Larkin High School which was founded in 1962 to accommodate the population because it has already grown by 5,200.¹³ Three more high schools would open up in South Elgin, Bartlett, and Streamwood. Middle and Elementary Schools would also rise across 85 square miles by 1946. 21,000 students attended 30 schools within the U-46 district.¹⁴ U-46 went above and beyond by including bilingual classes in 1971 to accommodate the big Hispanic population in Elgin.¹⁵ This goes to show just how important it was for Elgin's school district in the rise of Elgin's population because it had urbanized plenty for people wanting to reside and live here.

The great Elgin National Watch Company had its doors closed a few years later in 1968. It was around this time that the people of Elgin decided that having a clean river would benefit them a lot and decided to have projects to clean the Fox River. The Fox River had to go undergo serious changes after all the pollution it had from the urbanization of multiple cities using the river. It was starting to become alarming as, by 1970, Elgin was taking 7 million gallons of water a day of water use from its population of 55,700 people.¹⁶ It would take a decade but in 1982, the Riverside Treatment Facility was complete and the Fox River could process 16 million gallons of water a day.¹⁷

¹² Illinois, Elgin, *Elgin, Illinois Population*

¹³ Ibid.

¹⁴ U46, History of U-46

¹⁵ *Encyclopedia of Chicago*, "Elgin IL."

¹⁶ Illinois, Elgin, *Elgin, Illinois Population*

¹⁷ City of Elgin, *History of the Fox River*

Practically doubling the amount of water available, the Fox River once again supplies water for its Elgin residents. This would double yet again in 1997 when the Water Department invested in a 17.5 million dollar project to expand the Riverside Water Treatment Plant.¹⁸ The official website of Elgin has links on their website to help protect the Fox River and raise awareness as well as other sites for the modern era.¹⁹ Currently, 94% of Elgin's raw water is from the Fox River after treatment with the remaining 6% from deep wells.²⁰

This goes to show that while the Fox River didn't help with the entirety of Elgin's urbanization and growth, it still helped Elgin to an extent. To be fair, Elgin was one of the reasons why the Fox River was polluted in the first place, however, Elgin is currently treating it and making sure the Fox River doesn't go anywhere. The Fox River acts as a backbone for Elgin, supplying water, while the urbanization of Elgin does the rest. Elgin is now a city with more than 100,000 people residing in it. It has homes for people as well as a big school system that tries its hardest for the students to supply them with what they need to excel. The origin place of the Elgin National Watch Company is now a plaza that has a bakery, a grocery store, a shoe store, and typical modern stores. Elgin can be quiet at times but nonetheless, it is a place filled with culture where residents have adapted to make Elgin their home and I have fun memories of fishing with my dad along the great Fox River.

¹⁸ Ibid.

¹⁹ Friends of the Fox River, *Friends of the Fox River*

²⁰ City of Elgin, *History of the Fox River*

Personhood of Natural Entities: The Case of the Fox River

Nooriyah Doriwala

The proposition of personhood of natural entities has been growing in popularity since Christopher Stone's debut of the idea in 1972. Since then, grassroots organizations and governments have navigated the legal system to provide this distinction to ecosystems, including rivers. While pursuing environmental personhood for the Fox River is not a favorable distinction, the designation would be an important step to shifting our ideologies from nature's conservation for human recreation to nature's inherent right to exist.

What is Personhood?

Christopher Stone, a professor of law at University of Southern California, developed the concept of personhood in his book titled: *Should Trees Have Standing?—Towards Legal Rights for Natural Objects*. Stone examines the seemingly outlandish claim that “we give legal rights to forests, oceans, rivers and other so-called ‘natural objects’ in the environment – indeed, to the natural environment as a whole.”¹ Stone tackles three framework concepts: can the legal system support the assignment of natural objects as “persons,” whether humans have an obligation to do so; and is society better off for it. To each of these, he answers yes, providing examples such as the legal standing of other non-human entities (e.g. corporations), the ability for natural entities to receive reparations for actions taken against its best interest (e.g. monetary), and that since ultimately, humans rely on the

¹ Christopher Stone, “Should Trees Have Standing? Towards Legal Rights for Natural Objects,” *Southern California Law Review* (1972) <https://iscethics.files.wordpress.com/2013/02/stone-christopher-d-should-trees-have-standing.pdf>

environment, shifting our ideology and actions to reflect its importance beyond recreational purposes is vital.²

Presently, to sue an entity for damages to a natural entity, one must do so through the lens of human harm. If a community wanted to sue a corporation for dumping sewage into a lake, they could only do so in the context of “the sewage in the lake harms human quality of life,” and therefore only the humans would receive reparations. Stone’s proposal of personhood would allow “natural objects [to] have rights to seek redress [on] their own behalf” and turn, say, the lake from property to nature again.³ Additionally, Stone outlines the legal proceedings that would be required for a natural entity to be granted personhood, and these as well as alternative routes have been successful in a variety of places.

Case Studies: Pennsylvania & India.

The legal battle to grant a natural entity personhood is far from easy – but oftentimes it’s a last-ditch tactic to protect a natural entity. Fought by local advocates, these battles historically see higher success rates when Indigenous communities are involved because there is a more comprehensive record of destructive impact on people tied to destruction of the natural entity.⁴

In Pennsylvania, specifically Grant Township with a total population of just 700 residents⁵ the Environmental Protection Agency (EPA) approved the Pennsylvania General Energy (PGE) (an oil and gas company) to “inject forty-two thousand gallons of fracking wastewater... including

² Id

³ Id

⁴ Kaitlin Sheber, Legal Rights for Nature: How the Idea of Recognizing Nature as a Legal Entity Can Spread and Make a Difference Globally, 26 *Hastings Env'tl L.J.* 147
https://repository.uchastings.edu/hastings_environmental_law_journal/vol26/iss1/8

⁵U.S. Census Bureau; Population and Housing Unit Estimates, 2021 Annual Estimates of the Resident Population for Counties: April 1, 2020 to July 1, 2021 (CO-EST2021-POP) <<https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html>> (12 November 2022).

carcinogenic and flammable chemicals...heavy metals and radioactive elements”⁶ into bedrock that residents worried would leak into and contaminate the Little Mahoning watershed — the township’s primary source of drinking water”.⁷ In 2014, residents contacted the Community Environmental Legal Defense Fund (CELDF) to write a Bill of Rights, that includes the Rights of Nature⁸ — a concept that stems from Stone’s original claim that “nature holds inalienable rights”.⁹ The law firm filed appeals against the EPA’s approval of the PGE’s dumpsite “notably, the ordinance provided not only the residents, but also the Little Mahoning Watershed, with the right to ban detrimental environmental activity.”¹⁰ It outlined another one of Stone’s proposals, allowing residents of the township to act on behalf of the watershed and enforce its rights. Ultimately, the personhood of the watershed was never recognized. The courts’ denial of the motion allowed PGE to act within the EPA’s approval and inject wastewater concerning close to the residents of Grant Township, Pennsylvania.¹¹ This example highlights the methods and circumstances in which a local community might seek a personhood demarcation for a natural entity.

In India, the Ganges & Yamuna River runs through the Northeastern edge of India, starting near Delhi and leaving off in the Bay of Bengal. It spans 800 miles and is a major site of the major Hindu festival Kumbh Mela. About 59 million people (about 70% of Delhi’s population) depend on the river as their drinking water supply. Additionally millions use the river for fishing, irrigation, and

⁶ Justin Nobel, “How a Small Town Is Standing up to Fracking,” *Rolling Stone* (Rolling Stone, June 25, 2018), <https://www.rollingstone.com/politics/politics-news/how-a-small-town-is-standing-up-to-fracking-117307/>.

⁷ “Indiana County Township Claims Ecosystem Has Legal Rights,” State Impact Pennsylvania (NPR, December 1, 2014), <https://stateimpact.npr.org/pennsylvania/2014/12/01/indiana-county-township-claims-ecosystem-has-legal-rights/>.

⁸ Melissa Troutman, “Rights of Nature Report: Pennsylvania Ecosystem Fights Corporation for Rights in Landmark Fracking Lawsuit,” *PUBLIC HERALD* (Public Herald, September 28, 2020), <https://publicherald.org/grant-township-speaks-for-the-trees-in-landmark-fracking-lawsuit/>.

⁹ “What Are Rights of Nature?” *INVISIBLE HAND - Rights of Nature Documentary* (Invisible Hand Film, February 3, 2021), <https://www.invisiblehandfilm.com/what-are-rights-of-nature/>.

¹⁰ Caroline McDonough, Will the River Ever Get a Chance to Speak? Standing Up for the Legal Rights of Nature, 31 *Vill. Envtl. L.J.* (2020). <https://digitalcommons.law.villanova.edu/elj/vol31/iss1/4>

¹¹ *Id.*

bathing as well as worship of the Mother Ganga.¹² However, the immensity of traffic is taking its toll on the waterway where “every day, around three million liters of sewage is emptied into the Ganges ... [including] waste from tanneries, chemical plants, textile mills, slaughter houses and even hospitals.”¹³ As the monsoon and Himalayan glaciers that feed the river become more unpredictable due to climate change, the fate of the river hang in the balance. Clean up, re-planting, and recycling efforts have been aggressive and passionate - but often only making a small dent in a massive problem.¹⁴ In 2017, the lack of regulation or protection prompted officials to bring the case to state courts who decided “extraordinary measures needed to be taken to protect the river” or else it may “lose [its] very existence.” The Ganges River was granted personhood, leaning heavily on its “sacred and revered” position in Hinduism. However, due to lack of clarity on who would serve as the guardian of the river — that spans four distinct territories in India, the personhood distinction was revoked by authorities.¹⁵

As the previous two examples show, for a natural entity to be granted personhood there are a couple of implicit requirements: there must be a part who can clearly be designated guardians; the natural entity must face a significant threat in viability; it must be demonstrated that the natural entity has a characteristic that elevates it from a human-centered purpose to one larger (and perhaps more spiritual in nature) and without a doubt, there must be clever legal team behind the cause.

Historically, cases where personhood has been and remained successful have a heavy participation from Indigenous communities. Comprehensive examples can be seen in the case of New Zealand's Whanganui River and the Māori people as well as in Ecuador's constitution, which

¹² “Yamuna River,” *Encyclopedia Britannica* (Encyclopedia Britannica, Inc.), accessed November 12, 2022, <https://www.britannica.com/place/Yamuna-River>.

¹³ Stuart Butler, “The Ganges: River of Life, Religion and Pollution,” *Geographical*, May 27, 2022, <https://geographical.co.uk/culture/the-ganges-river-of-life-religion-and-pollution>.

¹⁴ Fred de Sam Lazaro and Sarah Clune Hartman, “India's Effort to Clean up Sacred but Polluted Ganga River,” PBS (Public Broadcasting Service, February 11, 2020), <https://www.pbs.org/newshour/show/indias-long-term-effort-to-clean-up-pollution-in-sacred-ganga-river>.

¹⁵ Sheber, *supra* note 4.

utilized the Indigenous philosophy of “Buen Vivir” to integrate the “Rights of Nature” into their constitution.¹⁶ The involvement of Indigenous communities raises the stakes and can often fulfill the criteria of identifying a devoted guardian, recognizing the presence of an unnatural threat and adding an urgent theological perspective. Though, it’s important to recognize that Indigenous communities that push for natural rights do not exist in every country ... [though] the power that [they] hold should not be underestimated.” Furthermore, the benefit Indigenous communities have on nature may go both ways: “by codifying indigenous values into law, nations afford more respect to indigenous beliefs and rights”.¹⁷

The Case of the Fox River.

The purpose of outlining the concept and examples above is to recognize that practically, the Fox River is not a good candidate for personhood. The fight to deliver a natural entity personhood status is extremely difficult, and in the case of the Fox River, the odds are not in its favor. It spans two states making it difficult to appoint a guardian. While there are many dangerous pollutants of the river, the threat is not urgent (though that may absolutely change in the future). Additionally, suits against corporate polluters of the Fox River through the more traditional path of human-focused threats have been pursued and successful, resulting in over one billion dollars in clean-up and restoration projects, leaving little to be desired from personhood distinction.¹⁸ The Native American population in major areas near the Fox River is miniscule with an average of 0.62% of total population (between Naperville, IL (0.2%) ; Schaumburg, IL (0.6%); McHenry, IL (0.1%); Burlington, WI (0%); Milwaukee, WI (0.56%); and Mukwonago, WI (0.4%)),¹⁹ illustrating that

¹⁶ Id

¹⁷ Id

¹⁸ “U.S. Files PCB Cleanup Lawsuit against 12 Polluters of Wisconsin's Fox River,” The United States Department of Justice, September 16, 2014, <https://www.justice.gov/opa/pr/us-files-pcb-cleanup-lawsuit-against-12-polluters-wisconsin-s-fox-river#:~:text=The%20Superfund%20lawsuit%2C%20brought%20jointly,Fox%20River%20and%20Green%20Bay.>

¹⁹ U.S. Census Bureau, generated by Nooriyah Doriwala. <U.S. Census Info> (November 12, 2022)

Indigenous communities would lack presence in the hypothetical fight. Finally, while the Fox River is an important component to many, it is not vital in the context of human quality of life.

In the hypothetical event that the Fox River is granted personhood though, the impact would benefit wildlife and the river's ecosystem. Take the PCB clean up and clean water act directed at paper mills. Despite the cost of that effort, "the environment for fish in the bay appeared to be getting worse." Specialists and residents discovered "the fish had literally been suffocating" due to the oxygen levels plummeting. The cause was not the paper mill or sewage industry as it had once been, "The Clean Water Act did what it was supposed to do," instead it is because of 45,000 lbs. a year of phosphorus waste draining into the River and irrevocably altering its ecosystem.²⁰ Without personhood distinction, community members would have to pursue legal action through the avenue of detriment to humans. For example, the argument that it will be a minimum of forty years until fish from the Fox River are safe to consume may hold stronger than the rivers ecosystem becoming dangerously unsafe for its natural wildlife.²¹ Pursuing personhood would transform the River from the property of humans into a part of nature that's been here long before humans, and if we manage not to destroy it, will be here long after humans.

Furthermore, in much of the reporting surrounding the effect of pollutants on the river, reporters, government officials, and citizens talk about the need for protective measures often in the sole context of ensuring human access to the Fox River for recreational purposes as opposed to the inherent right the Fox River has to remain safe and healthy. In Stone's original criteria, being a holder of rights is "to have a legally recognized worth and dignity in its own right, and not merely to serve as a means to benefit 'us.'"²² Recognizing the Fox River's dignity seems the least necessary

²⁰ Dan Egan, "Dead Zones Haunt Green Bay as Manure Fuels Algae Blooms," *Milwaukee Journal Sentinel* - Milwaukee and Wisconsin breaking news and investigations (Journal Sentinel, September 2, 2021), <https://www.jsonline.com/in-depth/archives/2021/09/02/dead-zones-haunt-green-bay-manure-fuels-algae-blooms/8100840002/>.

²¹ Rebecca Renner, "Massive PCB Dredging Proposed for Fox River," *Environmental News* (Environmental News, December 1, 2001), <https://pubs.acs.org/doi/pdf/10.1021/es012568t>.

²² *Supra*. Note 1.

action seeing as it has supported countless economic developments from paper mills, to fishing industries, to family life since the 1800's. Though it may not fulfill the historical requirements of a successful candidate for personhood, the intended consequences of Stone's theory was to recognize that there shouldn't be requirements for a natural entity to be considered inherently valuable - all natural entities, rivers, mountains, and ecosystems have a purpose beyond human recreation and unless we realize that, these natural entity won't last much longer under our abusive care.

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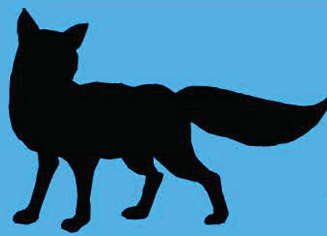
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Following the Current is an illuminating look at a little corner of Earth that also tells bigger stories about human history. It's an admirable model of collaborative bioregional history.

—**Leif Fredrickson, Director of the Public History Program at the University of Montana and co-creator of the award-winning *Death in the West* podcast.**

Ambitious and personal, Jackie G. VanZahms' history of Illinois' and Wisconsin's Fox River reveals the ever-changing ebb and flow of the relationship between humans and nature across time. *Following the Current* is bioregionalism at its most essential...and a river runs through it.

—**Sara Dant, author of *Losing Eden: An Environmental History of the American West***

Of all Earth's landforms, rivers might well be the most fundamental to civilization, but are the most neglected and abused ecosystems. Yet, we are invariably drawn to such waterways, as the rivers and streams that pass through our cities, suburbs, and neighborhoods are often our first encounters with the wild—the more than human world. These are also hybrid ecosystems—blending the human and natural systems. In assembling this fine volume of essays on the Fox River, Dr. Jackie G. VanZahms unpacks the complexity of this hybridization on their home water. Although Dr. Shawn Bailey calls this a “microhistory” in the Introduction, it is also the history of American's evolving relationship to the natural world.

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Except for the dubious distinction of once being listed as one of the most polluted rivers in the country, the Fox River of Illinois shares both a deep-time and modern history with scores of other rivers in the U.S. That makes the story laid out here a lesson with wide relevance. Coursing southward 200 miles from its Wisconsin sources past Chicago to empty into the Illinois River, and eventually the Mississippi, the Fox was once a river of Mound Builder natives, then European fur hunters, then Midwestern settlers, dam builders, and now urban recreationists and environmentalists. Each successive population has transformed the Fox into a different river and an entirely new place for humans and wild creatures alike. And sometimes—as with modern efforts to remove its more than a dozen dams—that has meant turning the previous place on its head. An exemplary river narrative, *Following the Current* is a truly fine anthology of the kind of microhistory we need to tell about much of America.

—**Dan Flores, *New York Times* bestselling author of *Wild New World: The Epic Story of Animals and People in America***

