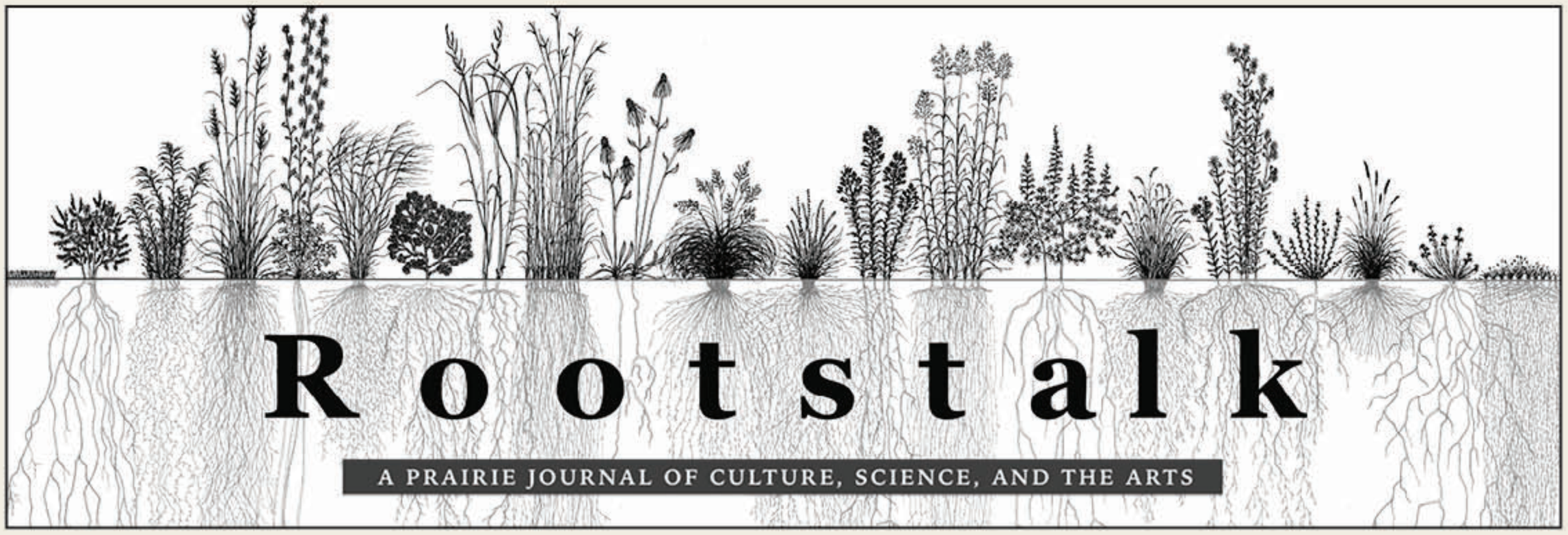


VOLUME IX, ISSUE 1, SPRING 2023

Rootstalk, *Spring 2023*
Volume IX, Issue 1
Supported by Grinnell College's Center for Prairie Studies
(https://www.grinnell.edu/academics/centers-programs/prairie-studies)
Rootstalk *is committed to promoting open expression and is hosted on Grinnell's Digital Grinnell server.*

A note on this issue's multimedia features: In addition to this "print-friendly" number of Rootstalk, *we've created an interactive multimedia PDF of the issue, which you can download at https://rootstalk.grinnell.edu. Interactive issues of* Rootstalk *include content featuring hyperlinks and—occasionally—embedded audio and video files, including short film, computer animations and graphics, and our podcast, "RootsTalk!"*

To access these features, you'll need to have the Adobe Acrobat Reader running on your computer. If you don't already have the software installed, you can download a trial copy at https://acrobat.adobe.com.

You can also use the Rootstalk *link (https://rootstalk.grinnell.edu) to read all the content for this and past issues of the journal online.*

Tilly Woodward *provided the painting we're featuring on the cover of this issue. It's titled "Rhubarb," and was done in oil on archival mat board in 2021.*

Cover design: Mark Baechtel, Jonathan Andelson
Table of contents photograph: "Prairie Light" by Carl Kurtz
Layout: Mark Baechtel, Jon Andelson

Photo courtesy of Jon Andelson

Jon Andelson *is the Publisher of* Rootstalk. *He is Rosenfield Professor of Social Science (Anthropology) at Grinnell College and co-founder and director emeritus of the College's Center for Prairie Studies.*

Publisher's Note: Some New Books about the Tallgrass Prairie Region

BY JON ANDELSON

Charles E. Connerly, Green, Fair and Prosperous: Paths To a Sustainable Iowa. *Iowa City: University of Iowa Press, 2020.*

Greg Hoch, To Find a Pasqueflower: A Story of the Tallgrass Prairie. *Iowa City: University of Iowa Press, 2022.*

Robert Michael Morrissey, People of the Ecotone: Environment and Indigenous Power at the Center of Early America. *Seattle: University of Washington Press, 2022.*

Cornelia F. Mutel (ed.), Tending Iowa's Land: Pathways to a Sustainable Future. *Iowa City: University of Iowa Press, 2022.*

The last three years have seen the publication of several excellent books about the tallgrass prairie. Here are a few of them that I would like to call to our readers' attention.

How well do we know the Tallgrass Prairie Region?

Sadly—but undeniably—one of the most trenchant observations one can make about the tallgrass prairie biome today is that almost all of it has been destroyed. The usual statistic cited for Iowa, which once had the highest percentage of its land in tallgrass prairie of any state (about 80 percent), is that less than one-tenth of one percent of the original prairie remains. The figure varies somewhat for the other prairie states, but the bottom line is the same: most of it is gone.

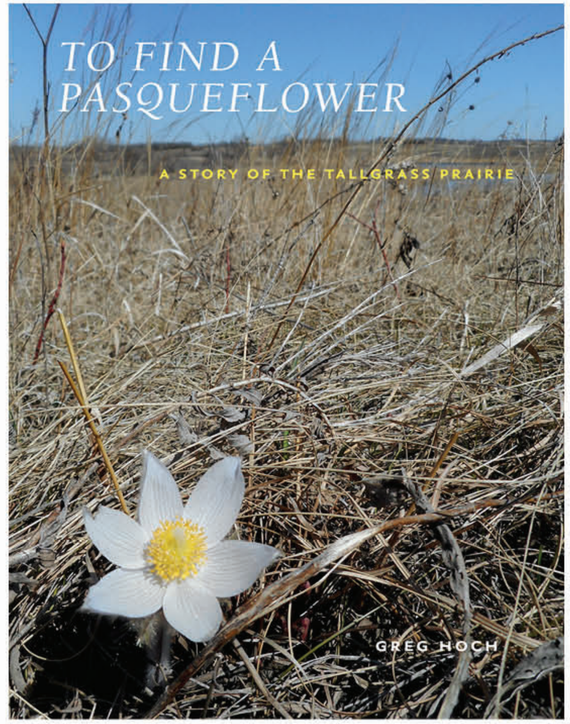


Photo courtesy of the University of Iowa Press

Based on the abundant facts and insights that are crammed into the 235 pages of Greg Hoch's *To Find a Pasqueflower: A Story of the Tallgrass Prairie*, and on the nearly 500 references in his bibliography, I venture to say that Hoch, a prairie ecologist with the Minnesota Department of Natural Resources, knows the tallgrass prairie as well as just about anyone. Yet one of the things that struck me in reading his book is how often Hoch points out how much we really do not know about the prairie, and how much of what we think we know is wrong. For instance, the conventional wisdom was that the tallgrass prairie had been a biome in equilibrium, a "climax" plant community, until its destruction in the nineteenth century. In fact, the tallgrass prairie was an unusually dynamic ecosystem that could change from year to year, decade to decade, and century to century on scales small and large as different species and different plant communities competed for space. However, knowing that it is dynamic does not mean we fully understand why it is. Hoch's remark on p.93 – "Tallgrass prairie never follows the rules" – constitutes a subtheme of the book. One of the virtues of Hoch's discussion is that he raises a great many questions that, in effect, constitute a primer for future research.

Another appealing feature of Hoch's book is the seamless way in which he combines his hard-edged scientific analysis of prairie ecology with historical and humanistic sensibilities. For example, he shows commendable attention to the Native American presence in and use of the prairie region, even though he is well aware that the evidence regarding the first 200 years of contact with Europeans, during which Native populations were highly disrupted by war, disease, and population movement, is sparse. (But see below the review of Morrissey's book.) He also begins each of the book's 16 chapters with six quotations from eighteenth and nineteenth century commentators on the prairie: explorers, creative writers, and ecologists, some well-known (Jean Nicollet, Willa Cather, Aldo Leopold) and others less so. And to personalize his account he uses the endearing device of commenting on the many prairie rambles he has shared with his dog.

Hoch spends a good deal of time in this book looking back in order to learn from the past, but what he really cares about is the future: the future of the prairie and of the people who live in the region in which, Hoch fervently hopes, both will thrive. He offers many specific suggestions for how this could happen. I will conclude by quoting from his final chapter: "If there's one theme for this book it's the role people played historically in the development of the prairie and the role people need to play in the future of the prairie. If there has ever been an ecosystem that shows there's no good

divide between people and nature, it's the tallgrass prairie" (p. 230).

Ecology and History as Mutually Causal

In *People of the Ecotone,* historian Robert Michael Morrissey's point of departure is historian Daniel K. Richter's idea of approaching the history of the Midwest not in the usual way, by standing with one's back to the East Coast and heading west, but instead by "facing east from Indian country." This shift in perspective leads, in Morrissey's book, to a number of new insights about the Indigenous cultures of the region in the late seventeenth and early eighteenth centuries (especially the Meskwaki and the Illinois), their relationship with the natural environment (especially the bison), and their relationship with European colonial powers (especially the French). The ecotone in the title refers to the eastern tallgrass prairie, a borderland between the central grasslands of the continent and the woodlands to the east, and the region in which much of the history that Morrissey analyzes took place.

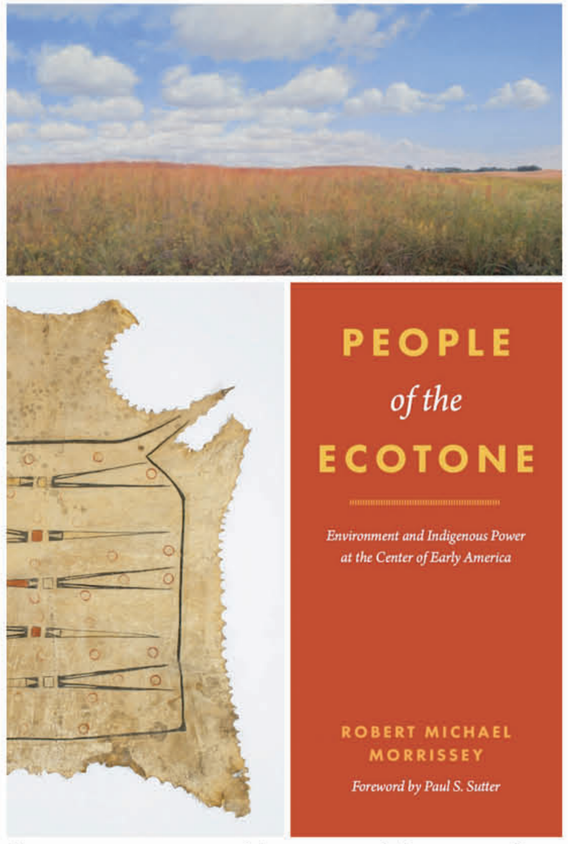


Photo courtesy of the University of Washington Press

The ecology of the region today bears little resemblance to what it was like prior to full-on European settlement in the first half of the nineteenth century, let alone in the late seventeenth century, and Morrissey is to be commended for his efforts to help us imagine how it was. He devotes considerable attention to the bison, which at times were so numerous in places like the Illinois Valley that Native hunters, pursuing them on foot, took them by the hundreds. Competition among the various tribes in the region for game resources pre-dated the arrival of Europeans and underlay cycles of warfare, which Morrissey describes in detail, but gained added significance in the context of colonial trade. By de-centering European colonialism in telling the story, Morrissey allows Indigenous politics, which followed its own logic and generated its own complex adaptive behaviors, to come into focus as an independent force and not merely a reaction to the colonial presence.

Morrissey's book is so rich in historical detail that no short summary can hope to do it justice. Suffice it to say here that the core of the story is the evolving interactions among the many Indigenous populations in the ecotone, with special attention to the fraught relationship between the Meskwaki and the Illinois, exacerbated by the arrival of the French and the endless jockeying for economic and political advantage among the various parties. The bloody climax of these conflicts were the so-called "Fox Wars" fought by the Meskwaki (Fox) and their sometime Indian allies on one side and the Illinois and French and their allies on the other. The wars spanned decades, and at one point the French declared what can only be characterized as a policy of extirmination against the Meskwaki. Over time, warfare and disease badly weakened both the Illinois and the Meskwaki, and the Meskwaki very nearly were extirminated in the battle of Arrowsmith (Illinois) in 1730. That they have not only survived until the present but today own over 8,000 acres of land in east central Iowa testifies to their remarkable resilience. The French exited the region in 1763 as a result of the Treaty of Paris that ended the French and Indian/Seven Years' War. Morrissey skillfully ties these historical events to ecology in ways both surprising and illuminating.

Repairing Iowa's Degraded Ecology

Cornelia Mutel's introduction to the volume of essays she edited about Iowa's ecology, *Tending Iowa's Land: Pathways to a Sustainable Future,* includes the following simple statement: "Iowa has major environmental problems" (p. xi). Whether we consider Iowa's soil, water, air, or wildlife – the four sections into which Mutel, retired senior science writer at IIHR Hydroscience & Engineering at the University of Iowa, has arranged the book's sixteen scientific chapters and twelve short personal stories interspersed among them – the basic picture is one of degradation, often severe. It has been said that Iowa is the most transformed state in the nation from its pre-European settlement character. That transformation, due mostly to agriculture, has produced enormous quantities of human food, animal feed, and more recently engine fuel for our various machines, as well as prosperity, but at the expense of the natural environment.

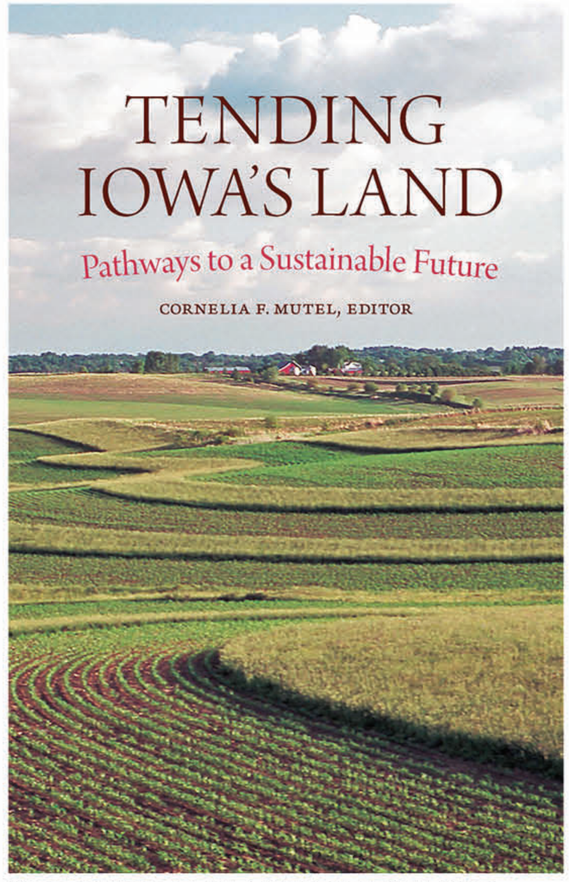


Photo courtesy of the University of Iowa Press

Many of the thirty authors in Mutel's collection were born in Iowa, and nearly all were born in the Midwest. A frequent theme in their essays is the contrast between the natural environment they experienced in their youth and what they see today in terms of soil quality, water quality, air quality, and biodiversity. The sum and substance of the changes are what contributor Larry Weber calls "a landscape badly out of balance" (p.122). Some of the authors do note environmental degradation that occurred before the 1940s, particularly in the areas of soil quality and biodiversity, and others note improvements in some specific measures (for example, control of waste water and point source pollution, the return of some animal species that had been extirpated from the state, and the generation of energy from renewable sources), but to most of the authors the situation has become grim, even dire, in the brief span of a single lifetime.

What are the reasons for this? Most of the authors blame industrial agriculture for the state's environmental woes and highlight various specific practices that degrade soil, water, air, and biodiversity. Another factor, touched on by nearly every contributor, is the ominous matter of climate change, which clearly is no longer a prospect but a present and growing reality that contrib-

utes to all of Iowa's environmental problems. Contributor William J. Gutowski, Jr., drives the point home: "These impacts should be viewed not individually, piecemeal, but collectively, as forces that are reshaping andultimately endangering Iowa's web of interacting natural, human, and societal systems" (p. 151). Climate change has the longest list of page references in the book's index; agriculture is second.

A related question, touched on by some of the authors, is why more has not been done to address the problems. Reasons include ignorance, due to an overall decline in the amount of interaction Iowans have with the natural world, and a lack of will, including political will. To her credit, Mutel understands that negativity and pessimism are poor foundations for positive action, and she asked her contributors to look for signs of hope, and generally they do. One of these signs, touched on by many of the authors, are the many public and private entities and organizations in Iowa that are working to reverse the damage: the Department of Natural Resources, the Neal Smith National Wildlife Refuge, the Iowa Flood Center, ReLeaf Cedar Rapids, Project AWARE, the Iowa Geological Survey, the Iowa Wildlife Center, and others too numerous to mention. Concerned readers will take heart from their efforts. But, as many of the authors say, individual residents of the state must also step up to address the problems through their words, actions, voting, and economic support of the above organizations. Collectively and individually, we can, and must, be willing to pay the price ($10 billion, contributor Larry Weber estimates; p. 125) to stop Iowa's decline into becoming an ecological sacrifice zone and an unhealthy place to live. It comes down to the choices we make.

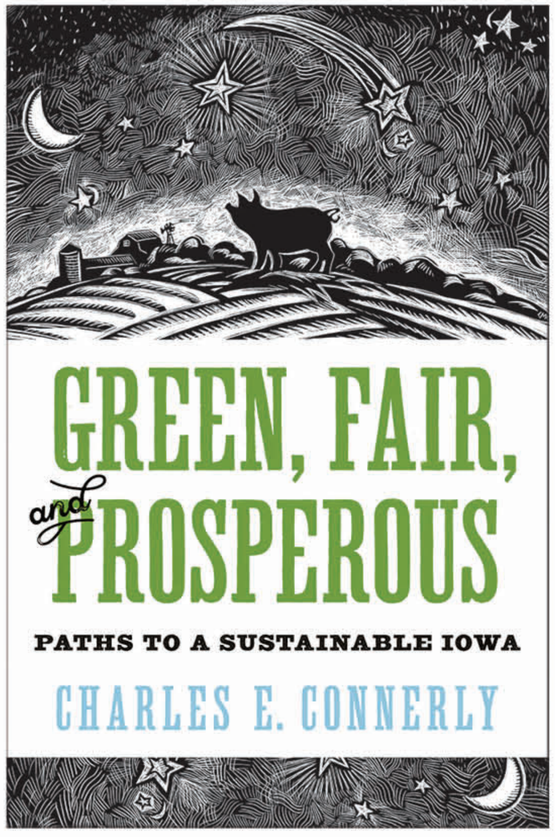


Photo courtesy of the University of Iowa Press

Iowa at A Crossroads: Which Path Will We Choose?

There is an obvious resonance between Cornelia Mutel's book title (see above) and the title of Charles Connerly's *Green, Fair, and Prosperous: Paths to a Sustainable Iowa.* Connerly is clearly cognizant of Iowa's environmental problems reviewed by the contributors to Mutel's volume, and he spends time discussing the impact of agriculture on Iowa's soil, water, and air. However, he contextualizes Iowa's environmental problems within a broader sustainability framework that includes economic sustainability and social sustainability as well, the three together often referred to as the triple bottom line of sustainability. To thrive, a society must achieve sustainability in all three dimensions, just as a three-legged stool needs all three legs to stand. It must be "green, fair, and prosperous." Connerly contends that Iowa is "far away" (p. xxiii) on all counts from being that.

Connerly, recently retired as professor and director of the University of Iowa's School of Urban and Regional Planning, brings an historical perspective to his analysis of where Iowa stands today in terms of the triple bottom line. Aspects of the drift toward unsustainability began even before Iowa achieved statehood in 1846. Illinois blacksmith John Deere's breaking plow, invented in 1836, enabled farmers to "break the prairie" and begin the use of unsustainable agricultural practices – later supplemented by agrichemicals -- that have continued to degrade Iowa's soil, water, and air quality. Iowa fares no better in terms of equity. In 1839, the Iowa territorial legislature passed laws "restricting the civil liberties and civil rights of black residents" (p. 98), and in 1845 federal treaties removed the Meskwaki, Sauk, and other indigenous people from the territory that became Iowa. Iowa became a predominantly white state by design, and as Connerly shows these early restrictions on people of color have essentially continued, with limited improvements, to the present, including the addition of poorly paid immigrants to the agriculture-related workforce. Iowa lags other states, he argues, in various measures of social sustainability. In the economic realm, the arrival of railroads, the rise of the meatpacking and other agribusiness industries, the growing reliance on ever-larger farm equipment, the patenting of seed corn, the introduction of genetically-engineered crops, the breaking of labor unions in the meatpacking and farm implement industries, the shift to confined animal feeding operations (CAFOs), and the turn to biofuels, especially ethanol, led to prosperity, but mostly for corporations. As a result, the wealth gap is widening, many of Iowa's small towns are dying, and the economy looks increasingly unsustainable.

Connerly's thesis, anticipating many of the authors in Mutel's book, is that Iowa (and, for that matter, much of the prairie region) is at a crossroads. If the state continues to go in the direction it has generally been going for the last half-century or more, it will draw ever farther away from being green, fair, and prosperous. Or Iowans can choose to go in a different direction – and in his final chapter Connerly offers a dozen specific, practical suggestions about what that other direction could look like – that moves the state toward environmental, economic, and social sustainability.

Gray-headed coneflowers and bee balm. Photo by Jon Andelson

The Editors

The editorial staff for the Spring 2023 issue of *Rootstalk* in front of Herrick Chapel at Grinnell College. First row, from left to right: Associate Editors Saul Chan Htoo Sang, Ky Klassen, Francisco Pantoja Martinez, Joanie Fieser. Back row, from left to right: Associate Editors Lucien Akira DeJule and Emma Walsh, Editor-in-chief Mark Baechtel, Publisher Jon Andelson, Associate editors Zach Spindler-Krage, Will Gresham, and Marty Allen. Photo by Saul Chan Htoo Sang

Interior detail, Louis Sullivan bank, Owantonna, Minnesota. Photo by Jon Andelson

Contents

In order of appearance

By category

Words

Sounds & Images

Photo by Paul Chan Htoo Sang. All other photos by the author

A Chicago native, Francisco Pantoja Martinez *is currently pursuing his studies at Grinnell College under the Questbridge Scholarship (https://www.questbridge.org). However, he has hasn't forgotten his roots and continues to advocate for the injustices his people back home face on a daily basis. He plans to pursue a career in public service, either in education or in law.*

La Voz de la Comunidad: the Effect of the Discount Mall's Closure on the People of *La Villita*

by Francisco Pantoja Martinez

Little Village (https://www.choosechicago.com/neighborhoods/little-village), a predominantly Mexican community located near the "Heart" of Chicago, recently lost one of its significant cultural roots. The Discount Mall, or "El Mall de veintiseis," as locals would call it since it sits along 26th Street, recently kicked out half of its vendors due to Novak Construction (https://www.novakconstruction.com), a major contractor, buying the plaza in which the mall is located. While the community rallied and pleaded with lawmakers and the company itself, all they were able to achieve was to delay the eviction date by a few months. Ultimately, after 31 years of business, the majority of vendors had to pack their bags and abandon what many of them had come to call their business home.

The Discount Mall has fostered a strong sense of community and encapsulates the culture of Little Village. When people think of Little Village, the Mexican culture stands out the most. What is "Mexican" culture? It's the food. It's the music. It's the hard-working people. It's the resilience, that even after being beat down day in and day out, you are still going home to your family with love. It's the family values that we hold near and dear to our hearts.

Due to the way contracts work at the mall, many of the vendors went under; there are two owners, for neither of whom was I able to receive any contact information. Both were given contracts to keep some percentage of their buildings respectively. The mall was one big building with doors in the middle dividing the left and right side. Each owner owned one half of the mall. Granted, no matter if they signed on or not, there was going to be some downsizing, but one of the owners refused to, which left him and the vendors under his contract without a place for business.

Novak Construction has announced plans for the future of the mall. This entails the laying off the majority of the vendors and bringing in larger commercial stores to the plaza. While it may be good for business, it defeats the purpose of the plaza, which, beyond its commercial purpose, is creating community strongly rooted in the Mexican culture of Little Village. It is gentrification in front of our own eyes.

> "[While Novak's plan] may be good for business, it defeats the purpose of the Plaza, which, beyond its commercial purpose, is creating community..."

I wanted to take a deeper dive and ask the vendors and customers who make the Discount Mall the pillar of culture for their perspective. Major news outlets only mention the closure briefly. I wanted the story—their story. I had the opportunity to interview three community member as well as vendors with anchor businesses within the mall. These are their stories.

A Vendor: Trajes*

I interviewed a vendor who is keeping their shop open even after all the chaos that Novak brought to the community. For the sake of their business, they have requested to remain anonymous. They immigrated from Mexico at the age of 15 and were presented with a job opportunity at a clothing store in Little Village, at their sister location at the Mall, where they've been for 20 years now.

"It was after the pandemic that I knew Novak bought the mall" said Trajes. "Things between the vendors haven't been the same since this news. We've limited the amount of merchandise we would usually get, we would live with the fear of losing our jobs that we've worked so hard to keep for more than 20 years."

This is the first time I got a clear timeline regarding the announcement of closings. It's shocking that a company would come in and take people's livelihoods from them, but even more so after a devastating pandemic. As this vendor goes on to say, Novak's actions changed the behavior even of businesses that were not evicted. When I visited the Mall, there wasn't the same lively atmosphere, the shops weren't popping, and everything seemed to be much more conservative, and I now know why. These vendors knew that their shops might not make it, and while they cling to faith, it's better to be pleasantly surprised than to be disappointed. They brace for the worst by having less merchandise and expect to sell what they have and move on to whatever may be next.

Every day for them

*Trajes *is an alias used to preserve the vendor's anonymity.*

felt like an uphill battle, and maybe today would be the day they get the call that they have to pack. Maybe it's the day they see the bulldozer outside their workplace. Or maybe today would be the day they longed for, when the owners or even the alderman came in with a contract, informing them that eviction was avoided. However, for more than half the vendors the worst has already happened: they lost not just their jobs, but also their life's work with nothing more than a memory to show for it.

Trajes told me:"Discount Mall is more than just an experience, it's a state of mind." It's a very small quote, but it carries so much weight. While many, including me, would walk in and spend a Sunday with the family at the Discount Mall, grab an elote and maybe even buy something, it was when I walked in in March of this year that something had vastly changed. Something was missing, and while I couldn't put my finger on it at the time, I realize now that the passion had left. Everyone seemed beaten down and distraught at the prospect of losing their shops, their lives. There wasn't a fight there anymore. Some vendors shared feelings of frustration, others shared feelings of sadness, but they all expressed love for the Mall. However, they have all accepted the inevitable – not because they wanted to, they were just exhausted.

Maricela Iñiquez: Iñiquez Unisex Hair Salon

Originally from Mexico, but naturalized in the States, Maricela Iñiquez is a professional hair stylist who has been working for more than thirty years, starting when she was still a sophomore in high school, balancing both high and cosmetology school. The years of training paid off quickly since she opened her shop at the Discount Mall when it first opened in 1991. She shares her story full of a mixture of emotions: opportunity, faith, and hope, but at the same time frustration and disappointment for the place that has given her so much ends so abruptly.

Maricela Iñiquez says:"Tenemos 30 años trabajando. Dia a dia. Se mira simple, humilde, sace mis dos hijos. Sace carreras de aqui. Por la bendición de este hogar" Translation: "We have 30 years working here; – day to day. It looks simple, humble even. I got my two kids through life with this, I made careers here. Because this place is a blessing we call home."

It's been thirty years of business for her. It's no longer just a "job" for her, it's her life. While vendors such as Maricela may live as much as an hour away, the mall is where their friends are, where they watched their kids run around, get dirty, and grow up. Maricela feels all of this, but in addition to the sadness and frustration, she, along with many other vendors, calls this place a blessing. It has given them more fruit than any tree, and more shade than any umbrella. She has had numerous people come to work for her, and now her ex-employees run their own hair salons in Mexico, Uruguay, and Argentina. She, along with the other vendors, know that this mall isn't as grand as the Mall of America, nor is it trendy like malls downtown. It's simple, but it's rooted.

Maricela Iñiquez said "No sace ni un cinco de el gobierno, ni para mis hijos. No estamos pidiendo, estamos trabajando. Están cortando el corazón de Chicago, pero yo estoy riendo y bailando con la muerte porque sin nosotros no tienen nada." Translation: "I've never accepted a single dollar from the government, not even for my children. We're not begging, we're working. They're cutting the heart of Chicago, but I'm laughing and dancing with death because without us you're nothing."

Maricela's statement is directed at Novak Construction, the buyers of the mall, and at the American capitalist system in general. Maricela emphasizes that the vendors are hardworking people who must pay rent on a weekly basis. If they do not sell a certain amount, they're evicted. Despite these constraints, they take pride in their work. It's not a side hustle for them; it's their livelihood—they keep their families alive with this money. This is often overlooked by Novak and anyone else who looks at this building as a source of profit.

> "I like being here, I like my job, I like the community, I like to talk with people that come from afar." ~ The Wife

When Maricela refers to the "heart," what she means is that the mall is located close to an area known as the "Heart of Chicago." This location is the reason Novak Construction was tempted to buy out the mall. For Chicago, Little Village is a gold mine; known as the Second Magnificent Mile, it brings in around $900 million annually. Yet these businesses are run by forgotten people who don't need fancy stores or skyscrapers to generate big revenue, just hard work and a spirit rooted in community and culture. When Novak Construction buys the mall to pursue only economic gain, they are seen by the vendors as a symbol of death, bringing the end of an aspect of the community that is beloved. While many people, from vendors to community members, are scared or even furious about the future of the mall. Maricela isn't fazed, but rather laughs at Novak because she knows that without the vendors, the community, the people, the plaza is nothing. This "dance" that she refers to is a nod to traditions in Latin culture, where dances often symbolize a new beginning or an ending to something great.

Maricela Iñiquez says "El hombre que trabaja tiene honor, tiene vida. El hombre que no trabaja no tiene nada y los que ni quieren trabajar tienen menos, y por eso cortarle el pescuezo. Y aqui esta mío, cortamelo porque yo tengo todo." Translation: "The man that works has honor, he has life. The man that doesn't work has nothing, and those who don't even want to work have less, and because of that, cut off their [Novak] necks."

Maricela's statement is directed at Novak. Honor is one of the most valued qualities in a person within Mexican culture. To earn honor, one must work, get their hands dirty, so that they can say that what they accomplished or made is by their own labor. Since Novak and its people only signed a check to acquire the mall, she labels them as people without any honor. It's the injustice of the capitalistic system, in which the person with money can swoop in and buy out a place of great significance, purely for financial gain.

Los Esteros: A husband and wife duo

One of the most well-known vendors in the mall is a husband-and-wife duo that sells stereos. Anyone who has spent time at the mall remembers walking near the south end of the mall to be greeted by flashing LED lights and heavy bass-boosted Mexican music. It's a very popular and vivid stand, one that cannot go unmentioned when the Discount Mall is brought up. They too shared their story but preferred to remain anonymous.

The wife said: "Me gusta estar aquí, me gusta mi trabajo, me gusta la comunidad, me gusta platicar cuando la gente viene de afuera." Translation: "I like

being here, I like my job, I like the community, I like to talk with people that come from afar."

It's a sentiment shared by many vendors. They are not forced to take this job, nor are they wishing for another job. These people know that life might be hard financially, but they do not care. This is because the mall connects back to the community, and they like, even love, the community. "Community" in this case can be understood in two ways: the community of Little Village and the community within the mall itself. The Discount Mall gathers people from everywhere who are connected through culture, something so rare and beautiful, but it's still being stripped away.

The wife says: "Nos supimos por la noticas que se iba vender el mall." Translation: "We found out through the news that they were going to sell the mall."

The harsh, unfortunate reality is that the vendors were denied the respect they deserved by not being told the news of the mall being sold to their face. Instead, many found out about the eviction from the television news. This was a major slap in the face for these people, and they were still left in the dark when they posed questions about their future. The husband-and-wife shop owners told me that they had reached out to their alderman at the time but heard nothing back. They also reached out to their mall landlord and again heard nothing. No one was willing to talk, and they were left confused and scared.

The husband says: "Yo digo, yo de aquí digo. No tengo otro trabajo. Toda mi vida he estado aquí trabajando y manteniendo de aquí mis hijos, mi casa, mi familia. Se me hace injusto que no nos permitan quedarnos." Translation: "I'll say it right here, I have no other job. All my life I have worked here, and I have maintained my kids, my house, and my family afloat through this job. I think it's unjust that they don't let us stay."

Everyone who is impacted by the mall's closure has said similar things. They don't know what's next. This was their only source of income, their literal life's work. For this couple, this is all they know. The husband began to work at the stereo shop as a high schooler, and he later took the opportunity to run the shop. His wife soon joined, and this has been their life ever since.

The people who buy out this mall seem not to care that this impacts entire families and communities. It won't just be the vendor being hurt by the closing. It's also their children that are dependent on them. It's also the family down the block that makes visiting the mall their weekly family activity.

Morelia Bermudez: a community member

Morelia Bermudez grew up within the community, developed strong ties within it, and has been a part of the Discount Mall in multiple ways, both through relations with vendors and by being a vendor herself when she was younger. She now attends the University of Illinois in Chicago (UIC; https://www.uic.edu) but remains rooted in her community. She shares her thoughts on the mall closing.

"My aunt had a candy shop, it was fun and nice to see people appreciate something as small as candy, and it brought people together. And another friend had a shop of trajes (dresses)."

Morelia went to the mall every weekend growing up. She helped her aunt with her shop, and it showed her the joy of candy. She reminisces about how happy older people got when they saw candy from their childhoods back in Mexico. This small, sugary thing brought them back every week, asking for more. She also refers to a close friend and their family business of trajes. Trajes are dresses and outfits for any occasion. However, in Latin-American culture it is deeply rooted in some of our biggest life milestones. Typically the first time someone wears one is in their Baptism: the boys wear a white suit and the girls a white dress. This later carries onto other religious achievements such as The First Communion and Confirmation. But the biggest reason that people buy these trajes is for a girl's Quinceañera, when a girl enters adulthood in Latin American culture.

"They jumped through hoops just to sell, and they did it with so much happiness while knowing that the money wasn't reliable," says Morelia. "I admire these people, they're working hard day in and day out, but they stayed. They were the backbone to what made Little Village, Little Village."

Here Morelia is referring to what is needed to sell in the mall. While it may seem that all you need is to fill out an application, that's far from the truth. Each vendor needs to secure a license, negotiate with the landlord, and on top of that pay the weekly rent. The key part in all of this is that income to pay the rent is not guaranteed, and these vendors know that. However, they do their work with a smile on their face because this is their very own business. Many think these people did research and knew that money will pour in, but that just isn't the case. They're selling for their livelihoods, but they also know that they won't become rich. This is a passion of theirs.

The second part of the quote really shows how the community views these people. All of this you find in every vendor. These vendors are the embodiment of Mexican culture, from the work ethic to the high value they place on their families and community. The vendors made the mall into a haven for all of us to enjoy.

There's a saying that I grew up with, one that my father said was common back home in Michoacan: "Todo a su debido tiempo," or, "everything in due time." I look at the photographs I took of the mall. The vendors knew above all that it was time to go. Shortly after these interviews were conducted, the contracts expired, and most vendors were kicked out. While it was abrupt and not the ending they were hoping for—one where they have the power to call their last ever sale—it was the end nonetheless. They overcame numerous obstacles and struggles to come to where they are now, and this is nothing more than just that, an obstacle. With plans to relocate the vendors to a new location, there is still a sliver of hope that these vendors cling onto. It's the fire that will ignite again, that will get them through this, because that is what they all share. A fire to keep going. Currently, the plaza is under construction, and while the plans may look aesthetically pleasing, it is now a shell of what was once there.

Photo courtesy of Zara Pylvainen

Peter Chan Min Sang *(left), born in Myanmar/Burma (https://en.wikipedia.org/wiki/Myanmar), graduated from Carleton College (https://www.carleton.edu) in Northfield, Minnesota, in 2017 with a major in Political Science and a minor in Education. In 2019, he obtained his master's degree in education from the University of Minnesota. Since then, he has been teaching at a public magnet school in St. Paul, Minnesota (https://www.stpaul.gov). Peter and his wife, Zara, call the Twin Cities home.*

Associate editor Saul Chan Htoo Sang (right) *recently graduated from Grinnell College with an independent major in Ethnographic & Media Studies. Upon graduation, he plans to go back to Myanmar/Burma to create documentary films and work at his parents' ethnographic textile gallery, Yoyamay (https://www.yoyamay.com).*

Interview:

New Lives in the Midwest

by Peter Chan Min Sang & Saul Chan Htoo Sang

On the last day of March 2023, I was able to interview my older brother, Peter Chan Min Sang, about his experience working as an ESL teacher, with immigrant and refugee students in St. Paul, Minnesota. I recognized that my brother was in a unique position because many of his students—most of whom are Karen people (https://en.wikipedia.org/wiki/Karen_people)—are also from Myanmar/Burma. In this interview, we talked about the histories and experiences that led the Karen people, as well as Peter, to the land of 10,000 lakes.

Myanmar/Burma is a heterogeneous country with more than 135 ethnic groups, who are assigned to seven states and divisions administratively. My family belongs to one of the smaller ethnic groups, the Chin (https://en.wikipedia.org/wiki/Chin_people), who traditionally reside along the northeastern mountains of Myanmar/Burma, near India and Bangladesh. The Karen people are constitutionally given a state at the western borders of Myanmar/Burma, next to Thailand. Despite the distance between the Karen and the Chin States, our ethnic communities live close to one another in Yangon (https://en.wikipedia.org/wiki/Yangon), the largest city of Myanmar/Burma, where my brother and I grew up.

On February 1st of 2021, the military took over the central government of Myanmar/Burma in a *coup d'état*. Since then, the civil war in our country has become more violent and devastating. Many more people have begun to seek for asylum in neighboring countries, hoping to find better lives elsewhere in the world. However, this interview taught me that the refugees who end up in the first world still struggle to thrive due to language and culture barriers.

SCHS: Could you introduce yourself?

PCMS: My name is Peter Chan Min Sang. Currently, I teach English as a second language to mostly immigrant students at a high school in St. Paul. I've been doing this for four years. I was born and raised in Myanmar/Burma. I came to the United States in 2013 for college. I went back home to teach for a year before I came back here in 2018. I did my Master's in teaching at the University of Minnesota. I've been teaching in the St. Paul Public Schools since then.

SCHS: Let's start way back. Could you tell me about your early experience of education?

PCMS: I went to a public school in [Insein township in] Yangon. It's a government-run Kindergarten to Eighth Grade school. It's a bit outside of the city, but it's still a decent sized school. I think there were about 2,000 students. It's a very, I want to say, traditional Burmese school. We had a uniform that was white and green.

SCHS: I also attended that school. And what I remember is that a lot of our schoolmates were, in a sense, immigrants to the lowland because a lot of them are Karen [people].

PCMS: [The Karen people whom we grew up with] are actually from the [Irrawaddy River] Delta. There's a huge Karen population in the Delta.

SCHS: I did not know that. I think that there is something to be critical about assigning certain land to an ethnic group. Because that gives a false perception that the people that live on that land will only be from that ethnic community or that an ethnic community will only reside on the land assigned to them. In reality, ethnicity is so fluid and mixed [and the state borders are arbitrarily created for the central government to rule the people easily.]

PCMS: Yes, another strange thing is that Insein [became a warzone] right after World War II. [During the British occupation of Myanmar/Burma from 1824 to 1948], the British-Burma army has different battalions based on ethnic groups, and the Karen battalion was one of the strongest military battalions that they had. Right after [Myanmar/Burma gained] independence [from the British in 1948], the Karen battalion tried to take over lower Myanmar. There was a huge battle in Insein, and the Karen almost won. But at that time, the Chin Battalion sided with the regular Burma Army, which is one of the reasons why the Karen Army failed to take over lower Myanmar.

So, it's kind of weird growing up as a [Chin], and they know we're Chin. I mean, our classmates are too young to know the importance of this history, and it's not taught in school. So, our classmates are not aware of it, and they didn't really treat us differently. But I remember requesting a friend's parents to study at their house one time, but they weren't big fans of that. I didn't know why. In retrospect, I think it's because of that history, but it could also be something else. I don't know.

SCHS: When did you decide to become a teacher?

PCMS: The summer between my junior and senior year [of college in 2016], I went to teach in Falam, in Chin State. Joe Decker, my former teacher at the Pre-Collegiate Program of Yangon (or PCP for short), was leading a school there. And after

that summer, I knew for sure I wanted to be a teacher.

And I wanted to teach at PCP. So, right after I graduated [in 2017], I reached out. Helen Waller was the academic director then, and she was super excited to have me. But she was also leaving. So, as I became a teacher at PCP, she was no longer in Myanmar/Burma. But, I had so much fun. I was teaching sociology. Basically, based on everything I learned in college, and all the good things that I enjoyed, I get to create my own class. I did a unit on economic justice. I did a unit on identity. I took my students to a labor union office in Hlaing Thar Yar [which is the main working-class neighborhood in Yangon]. I mean, it was one of those things where I worked long hours, but it never felt like working, because I was really enjoying it.

SCHS: How did you become a public-school teacher in St. Paul, Minnesota?

PCMS: While I was teaching at PCP back in Yangon, Zara [who is now my wife] was here [in the US]; we were in a long-distance relationship and I knew that I wanted to be with her. So, in 2018, I left PCP and applied for the teaching program at the MU [University of Minnesota]. I was excited, though, because there were a lot of Karen students here. Even before starting the program, I looked up which schools had the most Karen students. I also reached out to my adviser, and they told me that the public school they worked with has students from Myanmar. So, I joined the program. It was a one-year master's program, which was also very appealing. It'd cost less money, and I could make money right away afterwards.

But, it was intense. Academically, it was still okay, and I felt like I knew what I was doing. But as soon as I started student-teaching, it felt hard because then I was expected to do everything by myself. And for me, I was still new to the public school system in the U.S. So, it was a completely different ballgame for me. And when I started student-teaching, there wasn't much curriculum. So, I had to create everything from scratch. But, because a lot of my students were either born here or they started in kindergarten, I couldn't even tell if they were English language learners or not. Things got really blurred.

SCHS: Why are your students still in the English as Second Language (ESL) program then?

PCMS: They are mainly still in the ESL program because every year they have to take a test, and only if they get a certain score in the test can they exit the ESL program. But even a native English speaker will not pass it. It's too hard. So, a lot of our students are still in [the ESL program] because the test is too hard for them.

> "There is this vested interest in the school district to not let the students exit the ESL program, because funding is based on the headcount of students who are labeled ESL."

SCHS: So, the system is kind of rigged.

PCMS: Yes, and it's so weird. There is this vested interest in the school district to not let the students exit the program, because funding is based on the headcount of students who are labeled ESL. But also, in a way, if there is more funding, it does help everyone because we get more teachers in what we call the Language Academy [also known as the ESL programs]. But I always feel kind of icky about it, though.

SCHS: Okay. Let's switch back to your teaching experience. So, you were telling me about your student-teaching days when you were still in the Master's program. What was your experience like when you became a full-time teacher?

Washington Technology Magnet School in St. Paul, Minnesota. Photo Courtesy of Saul Chan Htoo Sang.

PCMS: I graduated in 2019, and I started my full-time job as an ESL teacher at the school where I'm still working. St. Paul Public Schools have what they called the Co-taught Model. Basically, there are two teachers in one classroom for English as Second Language Learners. There's a content teacher, and then there's an ESL teacher. Technically, we're supposed to be co-teaching, co-planning, co-grading but a lot of the time there's an [imbalanced] power dynamic. As an ESL teacher, I was going into [the content teachers'] classroom. Sometimes, I was considered this glorified assistant. I was paid as a teacher, but I was in the classroom just helping. I mean, my co-teachers did respect me. They allowed me to grade. They allowed me to do small group work, but on their terms. I was doing everything based on what they wanted me to do. And the curriculum already exists. So, even if I tried to come up with new things, I was only modifying the content a bit. Basically, they have the full creative control. And I have very little.

SCHS: For some context, could you talk about the school where you currently work and your students' demographics?

PCMS: I teach at a sixth through twelfth grade school—middle and high school combined—in St. Paul. It's one of the two schools that has a sixth through twelfth program. It's a huge building. By building size, it's the biggest. We have the biggest square foot in the district. And we have about 1700 students.

Half of my students are Karen (from Myanmar/Burma). And I have a couple students from Rwanda. Three Somali students. Six Latino students. And some of them I now have in my senior year class. But it's a bit sad. A lot

of my female students got pregnant, and they've either dropped out or they're in a school for pregnant women and moms. But I have about five students who made it all the way to senior year. And one of them got into St. Olaf College (https://wp.stolaf.edu).

SCHS: How did the immigrant communities end up in the Twin Cities?

PCMS: The Hmong came here in the late '80s. I don't know if you've heard about this. During the American-Vietnam War, a lot of Hmong served as interpreters for the American military. After the war a lot of them were targeted by the Viet Cong soldiers. Many fled to Thailand and sought asylum there. Then many of them got resettled in the US. And it was a policy back then that [the U.S. Government] wanted new immigrants to be as far away from existing immigrant communities as possible so that they would assimilate. So, they put them in places like Minnesota, where there were no former immigrant communities from Asia. So, the Hmong are the biggest Asian immigrant community in St. Paul.

The same thing happened with the Karen refugees later in the late 1990s. I have students who came here when they were in middle school.

There are also a few Ethiopian and Somali students. But more of them are in Minneapolis, so we don't have as many of them [in St. Paul]. But even then, there's a good ten to fifteen percent of Somali and Ethiopian students; there are also students from other African countries like Rwanda, Congo, and Kenya. But now, the more recent students in the newcomers' program are immigrants from Latin America -- El Salvador, Guatemala, and Honduras.

SCHS: Could you talk about how your Karen students and the Karen people in general got resettled in the Twin Cities?

PCMS: Many of our Karen students were refugees in Thailand. A lot of them were born in the refugee camps. Some of them had schools, some of them didn't. So, it's a mix. A lot of them fled to Thailand because of the civil war in Myanmar/Burma. And they call their homeland, *Kaw Htoo Lei*. They don't refer to it as Karen State. Currently, there's an active war there. [Editor's note: The fighting is between the central government's military, known as the Tatmadaw, and the Karen resistance armies. This conflict, which began in 1949, is considered the longest civil war in the world.]

> "All of them literally had to flee because there were bombs being dropped on their villages. For many of them, Thailand was home because the [refugee] camps are where they grew up."

All of them literally had to flee because there were bombs being dropped on their villages. For many of them, Thailand was home because the [refugee] camps are where they grew up. We might think camp is like this place where it's fenced in, but it's more like a village. There are checkpoints, but it's not necessarily fenced in. If you want to go into a city or go through the main road, you will have to go through a checkpoint and you need paperwork. And you get support from the U.N. in terms of food, because you can't really grow food. Some people have small farms, but it's a different land from where they are used to [farming].

I know a lot of my students have family members who had left the camp and now are working in either Chiang Mai or Bangkok. And they decided to stay there. Also, not everyone who signed up got resettled in developed countries. I don't know what the system is like—it might be some sort of a lottery system. But even then, some family members decided not to go because they've been [in the refugee camps] for like five to ten years and they have become familiar with life there. Many of them are long term residents now, although they have no official paperwork that says they're Thai citizens or Myanmar citizens.

SCHS: It's a problem of statelessness. I took a class called Migrants, Refugees, and Diaspora with Sharon Quinsaat, a Sociology professor at Grinnell College. We read a lot about how these camps in the borders become very dystopian-like villages. But getting back to the new immigrants coming to Minnesota, what are some of the challenges and the struggles that you see your students facing as they are making their lives in the Twin Cities?

Poster Wall with Children's Drawings with Caption: "I'm A Scientist." Photo Courtesy of Saul Chan Htoo Sang

PCMS: For most of them, they don't know the system here well enough. I mean, they know the things that they need to know. They know how to apply for Supplemental Nutrition Assistance Program (SNAP). Their parents have figured out how to file taxes. But when it comes to college planning, a lot of the students struggle with that. Also, because their parents never went to college, when you ask them things like, "Do you want to go to college?" They don't know. They don't know if it's the right thing or not. Because there aren't that many role models for them. They don't know what options are out there after high school. They'll just say, "I'll work in a grocery store." There's nothing wrong with working in a grocery store, except for not being paid enough to have a family. And that makes me worried. Because I want them to be healthy, happy, and be able to spend quality time with their family.

SCHS: What happens to your students when they don't go to school anymore? What do they do?

PCMS: A lot of them enter service jobs like shops, restaurants, Uber. And because their parents don't speak English, they'll work at meat-packing factories. A few who are fortunate enough to figure out how to do college, they work for nonprofits, in the city, the government. There are some people who work for private companies, too, but not that many. The vast majority works at these odd jobs.

SCHS: As a teacher, how do you see your own teaching career going?

PCMS: Well, I'm going to quit this year. I'm taking at least a year off, because my wife and I are expect-

ing a baby in June, I want to stay home with my baby. But part of me is also done with the teaching career. We get paid, okay, if we're single. But as soon as you get a baby, or you want to have more than one kid, all these health insurance expenses go up. We will still be able to afford it, but we won't be able to save any money as soon as we have one kid. And if we have two kids, it's even going to be more costly. And my wife's also a teacher. So, it's not sustainable for both of us to be teaching. And I've always thought about doing something else. So right now, I'm thinking of just quitting and getting hopefully a stay-at-home job, or hybrid jobs so that I can be home more often. But part of me, I know, I love teaching enough that I see myself going back to the classroom; maybe five years down the road, if we only have one kid. If we have more than one, it might be a bit longer. That's my plan for the next few years. And if this career transition works out well, the other thing I really want to do is teach at PCP again at night.

SCHS: Is there anything that you want to add?

PCMS: I feel worried about the teaching career profession in the U.S. Because I know I'm not the only one who's quitting. A lot of people I know have quit, and [not many] newer people are not signing up to become teachers. So, I think it's something that the U.S. must reckon with. Especially in the south, where the teachers are paid like fifteen to sixteen dollars an hour, and they make more working somewhere else. Even at our school, if you are an educational assistant, where you work with challenging kids, one-on-one, you're getting paid like sixteen dollars an hour to be yelled at, you know. So, they're choosing not to work in the school anymore. And they're the ones that keep the school going, right? Because as a teacher, I have like two hundred fifty kids. But for educational assistants and teaching assistants, they work with students one-on-one, for kids who really need the support. But right now, we don't have enough of those because they're not being paid enough to do their job. And because of that, teachers can't do their jobs either. Because the kids who really need the most help are not getting the help. So, they're now just either wandering in the classroom or disrupting other kids. Or like acting out. So, it's not good.

Peter Chan Min Sang with a group of his students at their graduation.

Photo courtesy of Eleanor Elliott-Rude

The Propaganda of Postcards*

by Kylie Klassen

Kylie Klassen *is a second-year student at Grinnell College, where she is double majoring in English and Anthropology and concentrating in Peace and Conflict Studies. She grew up in Mesa, Arizona, with the help of her family of six and four pets. She plans to further her academic career in some sort of graduate program, ultimately ending up in a public service position.*

**All references appear in Endnotes in the back of the issue.*

The following is a criticism of three postcards from early 20th century Oklahoma that depict images of Native Americans. I recognize that my position as a white woman writing this piece is a privileged one, as people who have looked like me have historically been destructive to the livelihoods of people of color, especially those who are Natives of the land that is now known as the United States. The goal of my words is not to amplify my voice over others; it is instead to criticize specific postcards that stereotype Native Americans, explicitly the Pawnee as well as tribes that are left unlabeled on the cards.

To read more about the Pawnee Nation, visit their site: https://pawneenation.org/pawnee-history

The Oklahoma Department of Libraries' (https://oklahoma.gov/libraries.html) digital archive is home to a collection of a twentieth-century tourist staple: postcards. While postcards are often seen as promoting favorable feelings, some images from this archive cannot be seen in this same light. Of the 491 postcards in this collection, a handful of them portray images of Native Americans, and not in a positive manner. Three depictions of Native Americans in particular provide clear examples of exploitation. The pictures found on the three postcards present the stereotypical image of 'the Native', favoring the United States' historically dominant view of Native Americans. The use of exploitative images on postcards allows white society to continually benefit from these images through profits from stamps, their contribution to erasure, and their

enforcement of white society's stereotypes.

Postcards as an Entertainment Product

Postcards began their boom in the mid-1800's when the United States Postal Service introduced them into circulation. However, these weren't the same eye-catching pieces that you would expect; these early postcards did not feature a picture. This is because postcards were not originally intended for individual consumption, but instead were a means through which businesses could advertise themselves.[1*] Rather than being the entertainment product that postcard collectors seem to view them as today, postcards were seen as an avenue through which businesses could make a profit. Around the 1890's, these unique forms of communication would shift to the contemporary form of postcards: ones that have an image. These would become so popular that, in the year 1913 alone, the United States Postal Service documented that they had managed 968 million postcards.[2] This means that if each stamp was worth at least one cent during this time, then the government would have made over $9 million from mailing postcards alone.

Postcards and People

Nowadays, postcards have completely shifted away from the 1800's advertising medium, transforming into vacation-oriented tourist paraphernalia. During times when travelling was not commonplace, however, the United States Postal Service connected families and friends in ways vehicles could not. Postcards took on a variety of meanings, providing the flexibility needed to communicate messages of varying levels of importance. Cards predominantly offered well wishes, holiday greetings, baby announcements, or even news of a death. The addition of pictures raised the status of postcards above letters, establishing them as both a form of entertainment as well as a means of communication. In thinking of postcards as entertainment, though, it is important to note who was selling the pictures in these scenarios, and whose picture was being bought.

Postcard from 1910, with Seal of the Territory of Oklahoma

Depictions of Native Americans on Postcards

In trying to understand these three specific cards from Oklahoma, it helps to know how nations which were not native to this part of North America ended up in Oklahoma. This history of dispossession further illustrates postcards' promotions of the United States' stereotypes.

When Andrew Jackson signed the Indian Removal Act of 1830, "some 60,000 Native Americans were forced westward into 'Indian Territory'"[3]. This dispossession removed nations including the Chickasaw, Seminole, Cherokee, Choctaw, and Muscogee from their native lands, into land supposedly set aside for them by the government[4]. These nations—known colloquially as "the Five Tribes of Oklahoma"—were forcibly moved to what became Oklahoma, the "final destination of the trail of tears"[5]. Despite their forced displacement, Native Americans took steps to preserve their identities. One example of this can be seen through the Cherokee Nation's response to the Indian Removal Act. The Cherokee Nation established a newspaper as well as took their case to the Supreme Court where they eventually won. Unfortunately, Andrew Jackson disregarded the Supreme Court's decision and "Cherokee people were forcibly taken from their homes."[6] Knowing this history of exploitation it becomes possible to see the images on the Oklahoman postcards as an extension of that history. The following three images can be seen as exemplifying three types of exploitation, all of which endorse negative stereotypes.

> "[I]t is important to to note who was selling the pictures in these scenarios, and whose picture was being bought."

(Figure 1) 1910 postcard displaying a group of Native Americans

Financial Exploitation

The first postcard (Figure 1) shows a group of eight Native Americans in Oklahoma with the generic title: 'Indians on Miller Bros. 101 Ranch'. According to the Oklahoma Historical Society, this ranch was occupied by George Washington Miller and "earned most of its notoriety from the wild west shows that it staged."[7] Based on this information, as well as the clear staging of this image, it can be inferred that the people on this postcard were actors in these pageants. Moreover, the postcards were used as advertisements for such shows. This use harkens back to postcards' original purpose in promoting different businesses, in this case, a wild west show. In these pageants, Native Americans were costumed to fit a certain generic look, one that affirmed the dominant stereotypes of the United States.

White people in power have historically profited by taking Native American's land, and this postcard demonstrates that the exploitation extends to Native American images as well. Not only were white people directly profiting from the success of these wild west shows and the generic depictions of Native people in them, the government was indirectly profiting as well through the postage paid to mail the postcards. These varying levels of financial exploitation fostered negative stereotypes of Native Americans which upheld the United States' dominant view.

Exploitation by Erasure

The second postcard (Figure 2) also displays this same type of United States stereotype, this time promoting erasure. On this postcard, the picture shows a Native American woman carrying a child photographed at the same ranch as the previous postcards' image. The title at the bottom of this specific postcard reads, "Indian Squaw and Papoose" on Miller Bros 101 Ranch". The inclusion of such derogatory terms to describe a Native American mother and child are not only demeaning and inappropriate, but also a generalization. This is akin to the prior postcard which grouped eight individuals as 'Indians', as opposed to sharing any information about which tribe or nation they belonged to. Similarly, the second postcard also has no defining words in the title which describe who these people were or which nation they belonged to. This postcard contributes to the erasure of specific tribes in favor of universalizing

(Figure 2) Circa 1920 postcard Featuring a Native American mother and child

the term "Indian" or, in this case, slurs for a Native American woman and her child. Since this woman was probably an actor on this ranch as well, it is important to note that these shows often perpetuated marginalizing depictions by casting them as showdowns between 'cowboys vs Indians'. This theme seen throughout wild west films further subscribes to the erasure of individual groups and encourages this false idea of Native Americans not only being one group of people, but also being the enemy. Such enforcement of stereotypes endorsed white society's views through postcards' images, while at the same time aiding in erasure.

(Figure 3). 1941 postcard depicting members of the Pawnee Nation

Exploitation through the White Gaze

In the third and final postcard (Figure 3), a group of Pawnee people are showcased. While their affiliation is included in the title, they are depicted in a way that conforms to white society and United States' stereotypes. Despite this postcard not being set on the same ranch as the other two, it still looks staged in the way that people are posing. Presumably, the primary audience for this image would be white, as they would be the ones buying these postcards, and the images they bought would affirm white culture's stereotypes concerning what a group of Native Americans should look like. Those encountering the photo would see the image postcard sellers know will make a profit: a group of stereotypically staged Native Americans. The commodification of images of the 'generic Native' through postcards endorsed United States' stereotypes of Native American people, all while profiling one tribe or nation to be the same as all others. Despite the inclusion of the name Pawnee in the title, the commercialization of images of the Pawnee after they had been relocated from Nebraska displays the inherent exploitation of Native people, affirming the United States' dominant stereotypes through the lens of white society on a postcard.

These three postcards depict Native Americans living in Oklahoma both as physically and literally one-dimensional, enforcing the stereotypes held by United States society. Postcards' exploitative intentions to perpetuate these stereotypes contribute to erasure and enforce looking at Native Americans through a white perspective. For these reasons, these postcards exist as a specific form of propaganda, as they publicize damaging stereotypes of Native Americans through an entertainment beloved by United States' society.

In contrast to the harmful ways in which these Oklahoman postcards depict Native Americans, the Pawnee Nation's website includes galleries of their own images, which they deem to be representative of themselves. These pictures feature images from Pawnee Homecomings and community gatherings, as well as Pawnee City Council meetings. While the Oklahoma postcard's supported white society's stereotyping of Native American people, the Pawnee Nation's website represents the nation's lived reality.

Even now, the first sentence of the Oklahoma Historical Society page titled American Indians reads, "American Indians living in Oklahoma have a complicated, interesting, and unique history"[8]. These adjectives trivialize the plight of nations that were dispossessed of the places they had called home and forced to move to Oklahoma. Further, these three extremely vague adjectives do not mention that Native Americans persevere despite everything that has been wrongfully taken from them, including the control over their own images.

Resilience in motion. members of the Meskwaki Nation keep their culture alive--and authentic--at their Pow-Wow in 2020. Photograph by Jon Andelson

Photo by Katie Kriegel

Associate Editor Marty Allen '23 *is a native Grinnellian. He is a graduate of Grinnell College, where he earned his degree in Computer Science. Outside of school, Marty enjoys making and listening to rap music, playing jazz alto saxophone, and skateboarding. He is a black first-generation student and was the only Grinnell high school student in the '19 class year to attend Grinnell College.*

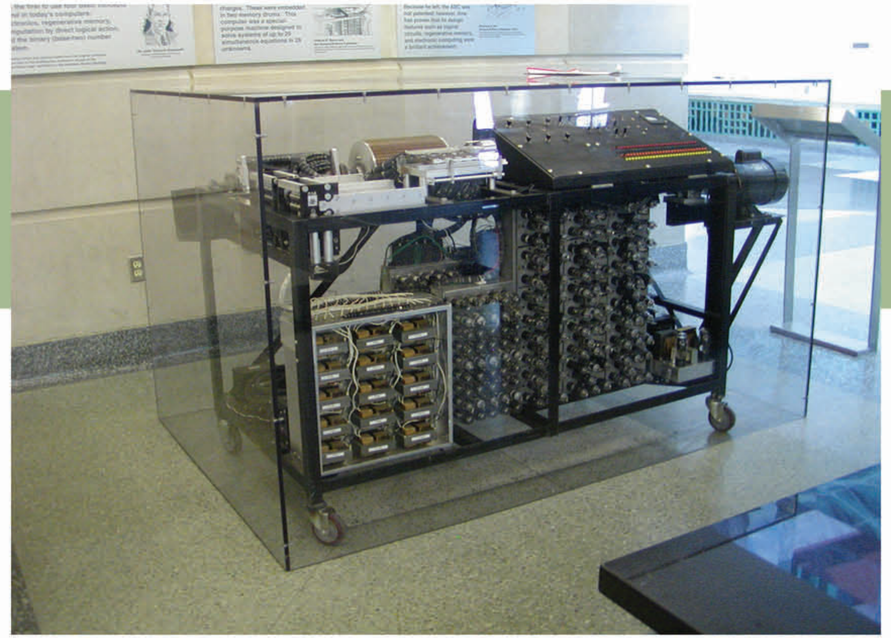
**All sources for the information in this issue's "...of the Prairie" feature appear in Endnotes in the back of the issue. Other entries in this issue's "Technology on the Prairie" feature appear on pages 49, 62, 71, 86 & 104 .*

Technology on the Prairie*

by Marty Allen

The Midwest, which is often referred to as the "Heartland," is celebrated for its scenic rolling prairies, rich farmland, and storied agricultural history. But beyond its pastoral charm, the Midwest has also been a cradle of innovation and a source of game-changing inventions that have transformed American and global society. From the steamboat to the telephone, the Midwest has long been a fertile ground for ingenuity and creativity.

This feature will showcase some of the most notable inventions that originated in the Midwest, but it's important to note that this is just a small sampling of the technological contributions made by people living in this region. I was inspired to explore these inventions by a fascinating article on onlyinyourstate.com, which offers intriguing facts and insights about the diverse states that make up the U.S. By examining the impact of these inventions on society, we can gain a greater appreciation for the pivotal role the Midwest has played in shaping American culture and technology.



A replica of the Atanasoff-Berry Computer at Iowa State University. Photo courtesy of Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Atanasoff-Berry_Computer.jpg)

Technology on the Prairie

The First Electronic Digital Computer

Invented in 1941, the Atanasoff-Berry Computer (ABC), named after its inventors John Vincent Atanasoff (https://en.wikipedia.org/wiki/John_Vincent_Atanasoff) and Clifford Berry (https://en.wikipedia.org/wiki/Clifford_Berry), is considered the first of its kind. Although some people believed the ENIAC computer (https://en.wikipedia.org/wiki/ENIAC) to be the first, it was later found that ENIAC used ideas that were originated by the creators of ABC. The ABC was designed for solving systems of linear equations. To do this, it used binary numbers, storing them as data through use of capacitors, which are devices used to store electrical energy. This concept of storing data in capacitors paved the way for modern computers.

The ABC was a bulky machine that weighed around 700 pounds and measured roughly six by three by three feet. The ABC could perform about 30 operations per second. In conrast, highlighting the vast difference in computational power between the ABC and modern computers, today's machines are capable of performing billions, or even trillions of operations per second, making them able to handle complex tasks such as data analysis, machine learning, and artificial intelligence.

Photo courtesy of Saul Chan Htoo Sang

Emma Walsh *recently graduated from Grinnell College with a Bachlor's degree in Biology. She dreams of attending medical school to make a difference in people's lives through medicine, art, and empathy. In her free time, she enjoys writing and reading creative poetry, playing with watercolors, and visiting animals at the local shelter.*

**All references appear in Endnotes in the back of the issue.*

Four-Legged People: Five Poems*

by Emma Walsh

Let a man decide upon his favorite animal and make a study of it...let him learn to understand its sounds and motions. The animals want to communicate with man, but Wakan-Tanka does not intend they shall do so directly —man must do the greater part in securing an understanding.

—Brave Buffalo of Standing Rock Reservation (Lakota)[1]

Recently, I learned about the Oglala Lakota tribe's history and relationship with bison, the largest land mammal in North America. In the mid-sixteenth century, the North American prairie was home to an estimated 40 million bison and tens of thousands of Lakota people. By the mid-nineteenth century, the bison had all but been eradicated and the Lakota population, greatly reduced, forced into reservations. For the Oglala and Lakota, bison are incredibly meaningful culturally and spiritually.[2] To them, the bison are one with the Earth and represent all growing and living beings.[3] In myth, the "White Buffalo Cow Woman"[4] presented the Oglala with a sacred pipe and seven sacred rites, providing the Oglala with wisdom, survival, and power.[5] While the buffalo, otherwise known as *Wakan-Tanka,* represent all beings, they are also equated specifically with women. I was inspired by the bison's central role in Oglala Lakota understandings of the natural world and social relationships, and as a poet I wanted to express my thoughts and feelings about the bison in verse. In the poetry that follows, I combine my recent encounters with bison in central Iowa at the Neal Smith National Wildlife Refuge with what I've learned about the Oglala Lakota. I have learned about the Oglala Lakota's relationship with bison from a mix of primary and secondary sources which I've included below. I have only begun to learn about the bison and the Oglala Lakota, and recognize how much I do not know. My learning and application of it is shaped by my experiences, which are not indigenous.

Photo courtesy of Jon Andelson

watching the bison

do not come too close to me, he says, with strong brown eyes that contain the world.

She stands atop
packed black dirt,
Facing me
as I forget my self, forget my name, feel my breath, feel hers too

Shadows cast by the afternoon sun. reflecting their sacred bodies,
moral behavior power survival entangled within their woolly dense fur

the tatanka,"buffalo," are four-legged people, [6]

who hold a mystery of sacred life,
which travels
  in dust
formed playfully wallowing, rubbing their backs
  with packs
of Earth's colorful skin.

the prairie is a privilege

A friend's water bottle sticker reads, *the prairie is a privilege*, and I ask what that means to him.

The prairie is a privilege, he says, with its mixed grasses, one of the most endangered
ecosystems in the world.

The prairie is a privilege, home to sixty million bison for ten thousand years, until mass killing
committed first by white hunters, who sold hides and meat,
then by travelers, shooting from trains for greed.

In eighteen eighty-three the
United States Army forced starving Native people deprived of their food and way of life
to live on reservations, *bringing Native Americans under U.S. government (white men's) control*
"minimizing
conflict"
between Native Americans and foreign settlers
"encouraging"
Native Americans to
"take on the
ways of
white men"[7]

The prairie is a privilege,
holding within its rich roots the bleached white bones of sacred beings,
once one of the most abundant large animals of all time.

herds were stampeded by American military men
for land and for freedom. maimed masses at the bottom of cliffs for the
repression
and
death
of fellow human beings.

"That animal was like a part of ourselves, a part of our souls."

-Lakota medicine man Lame Deer[8]

---

becoming a woman

red smoke
escapes into the sky from the buffalo cow
as a calf is born,

chokecherries and water are placed in a wooden bowl,
a new woman and medicine man drink the red liquid like buffalo.
She is painted red, sacred like her first menstrual flow.

She is now a buffalo Woman, one with the White Buffalo Cow Woman, who brought sacred ceremonies so the Oglalas may live.

Bison are one with the universe, naturally containing the
totality
of all manifest
forms of
life.[9]

Photo courtesy of Joan Van Gorp

excerpts and notes from *Where Have All the Bison Gone?*[10]

without regular fire,
woody plants
invade
the meadows, displacing
the grass.
more firearms than fire sent
eastern bison on a
long
slow
slide to

oblivion.

the bison do not run once hunters begin killing the herd. They do not flee the unknown cloud of black smoke from Sharps rifles, *boom!*

Why does the herd stand for slaughter?

was it because the *boom* sounded like a thunderclap?

or maybe, the bison were not scared of man.

Bison are powerful animals, with
hooves sinking deep
into Earth.
they turn directly to face
harsh winter winds,
shake their heads in snow to find buried grass.

the Bison do not fear the human, but teach them to live well.

Photo by Jun Taek Lee

Maka Ina, 'Mother Earth'

Unšike, 'the pitiable,'[11]

some traditional Ogalala women believe in the pipe and the sacred rites.

they pray to Wakantanka. Smoke the pipe and wait.

they are concerned with unšike, the common people of the world.

the white man is nothing more than a visitor to their world, one day destined to pass into oblivion.

The buffalo and old Indigenous people will be born again.

They look longingly
out at the prairie,
and wake
from sleep with visions and
premonitions,
sometimes visited by loved ones long passed.
these Women are believed to be powerful because they are close to the spirit world.

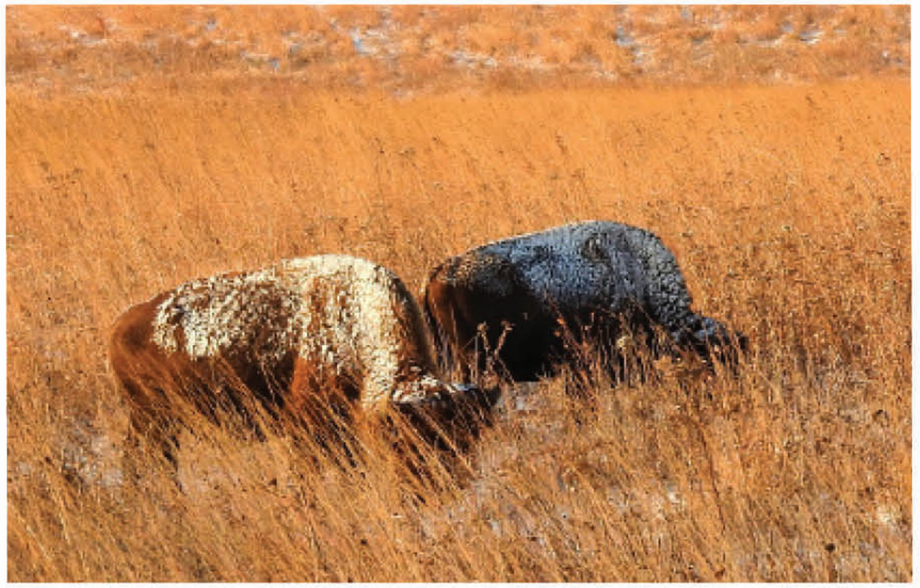


Photo courtesy of Joan Van Gorp

Photo courtesy of Lucien Akira DeJule

Lucien Akira DeJule *(he/him) graduated from Grinnell College in May of 2023 with a degree in English. His passion lies in writing, specifically fiction writing. He loves to craft and create engaging stories and hopes to continue this journey post-grad. While he has no specific plans after college, he'll be living in Colorado with his partner, excited to start reading for fun again.*

**All references appear in Endnotes in the back of the issue.*

Wolves Under Threat: A Deep Dive into the Endangered Species Act*

by Lucien Akira DeJule

In early December 2020, the Wisconsin Department of Natural Resources (DNR; https://dnr.wisconsin.gov) announced a wolf hunt to take place in November of 2021, marking its first wolf hunting season in seven years.[1] Under Wisconsin state law, the state is annually required to allow a wolf "harvest," the official name of the hunts, from the first Saturday of November to the end of February.[2] Mere weeks before this hunt, the American gray wolf (*Canis lupis*) was stripped of the protections it had enjoyed for 40 years under the Endangered Species Act (ESA; https://www.fws.gov/law/endangered-species-act). The removal of federal protections of the gray wolf enacted this law, which required the state to hold a hunt. However, the decision to remove gray wolves happened in the middle of its hunting season and some saw not holding a hunt while the state could hold one as a violation of its requirement. In response, Hunter Nation Inc., a Kansas based hunter-advocacy group, sued the Wisconsin DNR to expedite the season from beginning in November of 2021, to starting in February of 2021, only lasting until the end of that month[3] The Courts found that the Wisconsin DNR failed its requirement as a state agency by refusing to establish an open hunting season until the end of February. Thus, the season began February 22nd at midnight and lasted until the end of the month. Wolf advocates and conservation groups opposed this hasty harvest, mainly due to the breeding season for the gray wolf, happening only once a year from late January to early March, beginning during this hunt. "[K]illing pregnant wolves generally eliminates any spring pup production in their respective packs," and the risk of doing so was unreasonably high during this hunt.[4] But they could do nothing as a quota of 200 wolves was set (119 for the state and 81 for the Ojibwa).[5] From February 16th to the 20th, 18,503 people applied for a harvest license.[6] And based on the 119 non-native hunter quota, 2,380 were approved, and 1,584 licenses (65 percent of those awarded) were sold.[7]

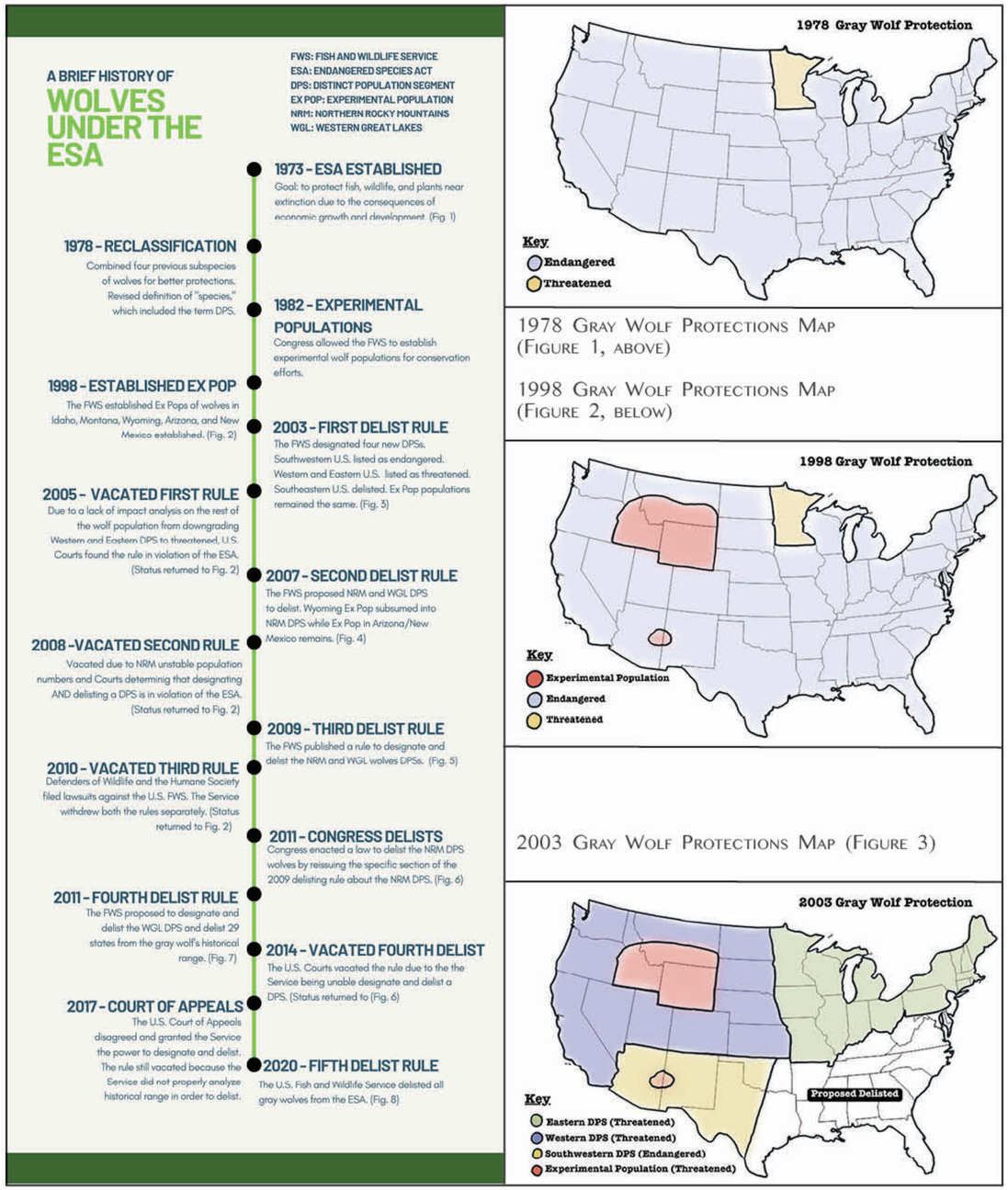
On February 24, 72 hours after the season started, the hunting season ended early due to the quota already being surpassed. Two-hundred-eighteen wolves were "harvested" over three days, exceeding the set quota.[8] The number of wolves hunted over these three days, while similar to previous years, was normally reached over the course of four months. Moreover, these were all non-native hunter kills, since the Ojibwa chose not to participate in the late winter "harvest," saying it was "especially wasteful and disrespectful."[9] That means that non-native hunters killed 99 more wolves than authorized. Sources also say that the quota was surpassed before the hunt even ended, as non-native hunters checked-in 182 wolves on February 19, 2021.[10] Before the hunt, Wisconsin reportedly had around 1,195 wolves. However, Wisconsin's wolf management goal is 350 wolves on non-reservation land, one-third of the estimated number. Even though the season was contentious, the Wisconsin DNR still saw it as successful, as it decreased the number of wolves, bringing it closer to the department's preferred level.[11]

Gray Wolf (Canis Lupus). Image by Wikiimages from *Pixabay*

The American gray wolf was listed under the ESA for nearly 45 years before its removal. Only 54 species have ever been removed from the list successfully and 56 species downgraded from "endangered" to "threatened" status since the Act's inception.[12] The process is difficult, reflected in the small number of successful removals. However, this was not the first time the United States Fish and Wildlife Service (USFWS; https://www.fws.gov) has attempted to strip the protections on gray wolves. After four failures and one small win, most of the gray wolf population remains protected under the ESA. On every attempt, the Service claims that some part of the wolf population has recovered enough to be delisted. On this most recent attempt, the USFWS decided to delist all wolves across the United States, sparking major controversy due to the scale of its attempt. In response, national conservation groups sued the agency for, primarily, not adequately analyzing the remaining threat against wolves that still warrants their federal protections. As you will see, this attempt appeared hasty, seemingly skipping over many steps in the delisting (removing from a list, specifically when stripping security or protections) process. By inspecting the events closely, they illuminate ulterior motives that are potentially political, separate from the official listing process, which could be detrimental to the future of the American gray wolf and its status under the ESA.

The Endangered Species Act

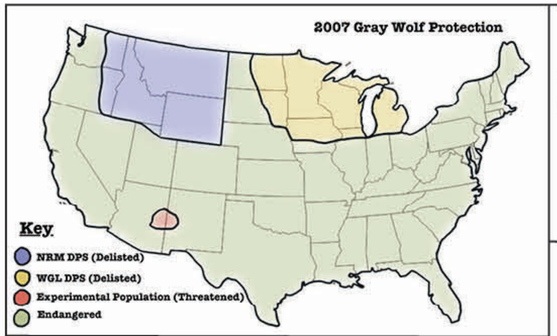
In 1973, the Endangered Species Act (ESA) became law, providing legal protections for many plant and animal species, including the American Gray Wolf. There has never been an accurate count of gray wolves in the United States. At the beginning of European



1978 Gray Wolf Protections Map (Figure 1, above)

1998 Gray Wolf Protections Map (Figure 2, below)

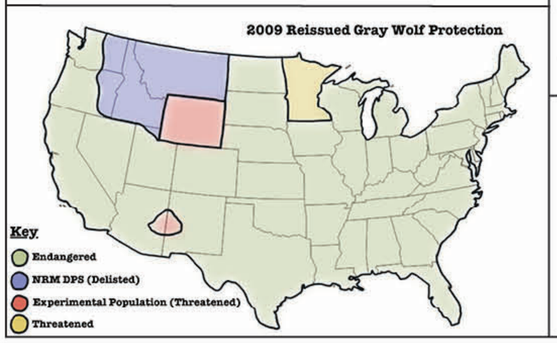
2003 Gray Wolf Protections Map (Figure 3)



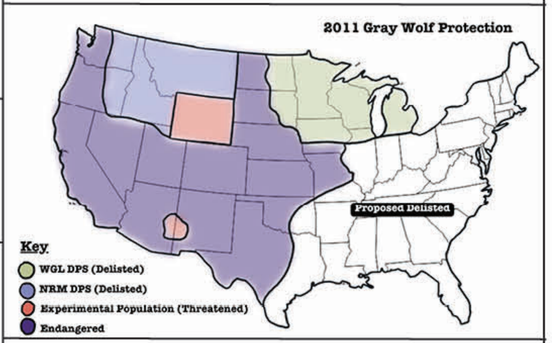
2007 Gray Wolf Protections Map (Figure 4)

2009 Proposed Gray Wolf Protections Map (Figure 5)

2009 Reissued Gray Wolf Protections Map (Figure 6)

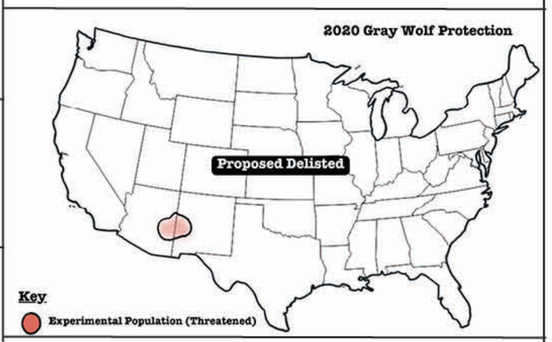


"A Brief History of Wolves Under the Endangered Species Act" Inforgraphic Created by Lucien Akira DeJule



2011 Gray Wolf Protection Map (Figure 7)

2020 Gray Wolf Protection Map (Figure 8)



All Wolf Protection Maps created by Lucien Akira DeJule

settlement of the future United States, estimates varied between 250,000 and two million wolves.[13] By 1960, hunting, poisoning, shooting, and government-funded wolf-extermination efforts had caused gray wolf numbers to plummet as they were extirpated from nearly 90 percent of their original range.[14] And by 1974, aside from a few scattered individuals and a larger population in Alaska, wolf numbers had dwindled to a shocking 1,000 total, far less than even one percent of their estimated original population, residing in northern parts of Minnesota and Isle Royal, Michigan.[15] Following the listing of the gray wolf under the ESA, efforts were made to support an increase in their numbers through protections, sanctions for wolf hunting, and reintroduction programs. Over the next 40 years, their population rebounded to nearly 6,000 in the lower 48 United States and continues to grow.[16] To help explain the history of the status of gray wolves under the ESA, this article includes a timeline of that information. It also includes maps that visualize the changing protections of wolves over the course of the listing.

> "[B]y 1974, aside from a few scattered individuals and a larger population in Alaska, wolf numbers had dwindled to a shocking 1,000 total, far less than even one percent of their estimated original population..."

This resurgence has not pleased everyone. During the decades since their listing, the USFWS has made five attempts to delist the gray wolf. According to the ESA, there are five requirements for a species to be listed: "(A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence."[17] Of these five factors, a species can be listed based on one, more than one, or the cumulative effect of one or more of these factors.[18] But, if a species does not or no longer meets these requirements, the Service "must remove the species from the Lists of Endangered and Threatened Wildlife and Plants".[19] Even though the USFWS claims its decisions are neutral and based on scientific evidence, continual USFWS attempts at delisting gray wolves raise suspicions about political influence. In 2015, a year before Donald Trump was elected president, a survey done by the Union of Concerned Scientists (https://www.ucsusa.org) found that 74 percent of the scientists working at the USFWS thought that "political interests" were considered too heavily in making policy and regulation decisions.[20] Even though Congress managed to delist a population segment of gray wolves in the Northern Rocky Mountains in 2011, almost every other attempt at delisting failed due to lawsuits filed by various conservation groups like the Defenders of Wildlife (https://defenders.org) and the Humane Society of the United States (https://www.humanesociety.org). However, in 2020, the USFWS published a proposed rule that would return the wolf to peril.

Delisting the Gray Wolf

On November 3, 2020, USFWS wrote a proposal to delist the American gray wolf entirely from the ESA. On January 4, 2021, the USFWS acted on this proposal, removing all gray wolves listed as a threatened or endangered species in the lower 48 United States. Before this "Final Rule" came into law, gray wolves were listed as two entities: "*C. lupus* in Minnesota, listed as threatened; and *C. lupus* in all or portions of 44 U.S. States and Mexico, listed as endangered."[21] Originally, these two groups were listed as distinct and separate species due to the constraints on the statutory definition of "species" under the ESA in 1973. At the time they were listed, though, in order to better manage the dangerously low population in the lower 47 United States (sans Minnesota and before the Northern Rocky Mountain DPS was delisted), the USFWS had listed the two species together.[22]

However, due to this hasty listing, the Service attempted to argue that gray wolves could be delisted solely because they did not meet the statutory definition of "species." Prior to 1978, the Endangered Species Act defined "species" as an overarching term that includes all subspecies of fish, wildlife, or plant and "any other group of fish and wildlife of the same species or smaller taxa in common spatial arrangement that interbreed when mature."[23] For clarity, "taxa" is a term that is used in the science of biological classification which, in this case, denotes variations of a species sharing a common ancestor. Then, in 1978, Congress amended the latter half of this definition, changing it from "any other group" to, "any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature."[24] This revision restricted the application of this definition specifically to vertebrate populations, but because of this change, listing a certain group of a "species" is now not restricted to just formal taxonomic terms, but includes subspecies, and for vertebrates, distinct population segments.

A distinct population segment (DPS) is a statutory, jargonized phrase used only by the ESA to constitute a "species." In essence, "this term allows population segments that are sufficiently discrete and significant to be considered their own 'species' within the context of the ESA, despite belonging to a larger taxonomical species."[25] In the case of the gray wolf, the only distinction between the two groups was their location (Minnesota versus the rest of the lower 48 United States). Because of that, if wolves were listed after Congress revised the definition of "species," these two 'species' would be considered DPSs. In its argument, the USFWS conducted genetic research that illuminated the genetic similarity among the two groups of wolves due to their interbreeding.[26] Specifically, the Service highlighted wolves in Michigan and Wisconsin as being genetically similar to those in Minnesota because of their proximity. Through that point, the USFWS concluded that under the current ESA, the two entities were unlikely to be listed as species. Thus, through an error that was never revised, the USFWS wanted to delist these two entities based on it. This was made possible by a 2019 revision of the ESA's implementation policy. This revision states the Service must "distinguish between a 'listed entity' and a 'species,'" and concluding that "an entity that is not a 'species' as defined under the Act" should be removed from the List."[27] However, this was not the only argument for delisting. And instead of just basing its argument on a technicality, the Service also provided more science-based evidence for the decision.

To accomplish this, the Service engaged in a bit of creative accounting. Since legally, gray wolves were listed as two entities (Minnesota and the lower 48 United States), the USFWS decided to use three different methods of assessment to determine the status of the American gray wolf. It assessed the gray wolf population in three ways: as separate groups (Minnesota and the other lower 48 United States), as combined into a single entity (without the Northern Rocky Mountain (NRM) wolves, which had already been delisted), and as a single gray wolf entity that includes all the gray wolves in the lower 48 states (including the NRM wolves).[28] Based on its genetic analysis of

Image by OpenClipart-Vectors from Pixabay

all the wolf populations covered under the ESA, the USFWS concluded that the DPS designation wasn't meaningful and that all gray wolves in the lower 48 United States should be combined into one entity. This method differed starkly from the USFWS's previous attempts to delist the gray wolf. In previous attempts, the agency designated a certain DPS of the population in order to delist that group. Because this effort failed many times, the Service decided instead to lump all gray wolves into one big population whose numbers, it could then claim, were large enough to indicate that the wolf could safely be delisted.

The Service connected many dots in order to coalesce the population. The Service already genetically connected wolves from Minnesota to wolves from Michigan and Wisconsin—more commonly known as the Western Great Lakes (WGL) DPS. However, it provided similar evidence to support connections made between the West Coast States wolves and the North Rocky Mountains (NRM) wolves. Since the NRM DPS was previously removed from the List in 2011, through genetic analysis, the USFWS linked wolves in western Washington, western Oregon, and northern California with the NRM DPS to argue for their delisting.[29] If the West Coast wolves and the NRM wolves were not distinct from each other, then their proximity would warrant their combination. Because of these genetic interrelations, the USFWS proposed that all these wolves be seen as one entity: the wolves of the lower 48 United States and Mexico which includes wolves from the NRM DPS even though they are already delisted.

Image by Mostafa Eltturkey from Pixabay

> "[H]ow does someone determine if a species is 'recovered?'"

The "Final Rule" from the Service concludes that the existence and recovery of the two largest meta-populations (spatially separate populations of species that interact, on some level, with the rest of the population) of wolves—the Western Great Lakes and the Northern Rocky Mountains—is proof that gray wolf populations can now sustain themselves.[30] However, this analysis does not take into account all protected gray wolves across the entirety of their listed range—Minnesota and the other lower 48 United States and Mexico. Specifically, the Service's determination highlights the WGL DPS and the NRM DPS as the basis for claiming their recovery. Although the WGL DPS contains over 4,000 wolves (two-thirds of the protected population), it does not account for every wolf protected under the ESA.[31] The lack of research and analysis done on the rest of those states sparks suspicion, as it raises the question: how does someone determine if a species is "recovered?" The sheer scale of this delisting caused mixed reactions in the wider American community. On one hand, hunting, farming, and more rural communities, like the ones in Wisconsin, rejoiced at the opportunity to cull wolf populations to manageable levels for the safety of their livestock and families. However, this ruling did not last for long as conservation groups felt this "Final Rule" was unlawful and brought legal action to protect the wolves once again.

Re-listing the Gray Wolf

In the aftermath of the Wisconsin wolf "harvests," in 2021, the Defenders of Wildlife, Wildearth Guardians, and the Natural Resources Defense Council, conservation groups dedicated to the preservation of the Earth's ecological resources, sued the U.S. Fish and Wildlife Service and the U.S. Department of the Interior over the "Final Rule" delisting the gray wolf. While not the primary motivator for this lawsuit, the premature hunting season shocked many Americans. Most of the news media at the time came out against the cull, highlighting the threat of extinction if such hunts continued. In line with most media, one argument made by the plaintiffs claimed that the USFWS "improperly relied on inadequate and outdated state plans for gray wolf management" when deciding to delist gray wolves both in and out of the Western Great Lakes DPS.[32] However, the Court found the Service's management plans to be sufficient and denied these claims. Thus, the threat of extinction after delisting was not the primary focus of the lawsuit. Rather, the suit highlighted both how the Service inadequately accounted for the loss of the gray wolf 's historical range and how it based a delisting argument on an insufficient statutory definition. Thus, the battle did not concern a determination of whether the gray wolf species would survive without protections, instead focusing on how the Service failed to provide sufficient reasoning to delist the species in the first place. The suit claimed the agency skipped steps and blindly jumped into loopholes instead of performing suitable analysis to back these claims. The Service's claims appeared rushed, and many groups of wolf-advocates suggested ulterior motives due to this observation.

The District Court of the Northern District of California found that the USFWS's use of statutory definitions of "species" to delist was dangerous, as Congress did not intend for these amendments "to remove protections for already-listed entities."[33] After reviewing that section of the "Final Rule," the Court concluded that the argument was a type of "statutory dodge."[34] The USFWS had already made similar attempts before, trying to designate and delist distinct population segments of gray wolves in 2007 and 2014. This conclusion highlights the Service's underhanded methods of delisting species, illuminating the ulterior

Image by Rain Carnation from Pixabay

political motives that may have driven this effort. The Service even tried to "ask the Court to disregard this analysis as unnecessary to its determination," urging the court to redress this mistake.[35] The request was denied.

The plaintiffs' next argument focused on the USFWS's failure to analyze gray wolves across the entire lower 48 states. They contended that the USFWS based its decision on "the purported recovery of wolves in the [Western] Great Lakes and Northern Rocky Mountains."[36] Plaintiffs stated that the actions of the Service here were no different from previous attempts to delist the gray wolf. Each time, the USFWS's attempts failed because it focused solely on the larger meta-population of wolves, claiming their recovery reflected the entirety of the species. Specifically, the Courts looked closely at the West Coast wolves, previously listed as endangered, to determine whether there was adequate reasonable explanation for removal of protections. The 2020 rule claimed the genetic similarities between the West Coast and NRM wolves warranted their delisting, as the NRM wolves could support their population. However, the studies that the USFWS relied on to make its claims of genetic similarity also noted that "wolves with coastal ancestry 'should be considered a priority for conservation given their unique evolutionary heritage and adaptations.'"[37] Despite these genetic similarities, the USFWS decided to ignore this statement when writing its Final Rule, further illuminating its hasty and messy claims. The Court said the USFWS's decision to combine these DPSs was "arbitrary and capricious," granting victory to the defenders of the wolves.

Furthermore, the plaintiffs challenged the USFWS's interpretation of the phrase "significant portion of its range"[38] in reference to the gray wolf's historical range. In order to delist a species, the Service must determine if it is "no longer threatened or endangered throughout all or a significant portion of its range."[39] The Endangered Species Act still does not define this phrase, keeping it "inherently ambiguous."[40] The USFWS tried to define it in 2014 but failed to do so. In that light, the Service explains in the Proposed Rule, the public draft before the Final Rule delisting wolves, how it has not officially determined the meaning of the phrase, but it "assessed 'significant' based on whether portions of the range contribute meaningfully to resiliency, redundancy, or representation of the gray wolf entity being evaluated without prescribing a specific 'threshold.'"[41] Basically, the decision to determine whether the population was significant was at the discretion of the Service, with the Service permitted to argue for "any reasonable definition of 'significant.'"[42] With a standard this flexible, there is no objective measure that can be used to define what is a "significant portion" of the wolves' former range. For example, the Final Rule states that the NRM and West Coast states' wolves could add to the resiliency, redundancy, and representation of the species.[43] But in another part of the Rule, it concludes that wolves in these portions of the range are not significant to the redundancy or resiliency of the species as they occur in small numbers, having relatively few breeding pairs.[44] Since it could not be defined, the Court found the phrase superfluous, which helped poke more holes in the validity of the "Final Rule."

> "[T]he battle was not concerned with whether the gray wolf species would survive without protections, rather it criticized how the Service failed to provide sufficient reasoning to delist the species in the first place, as if the agency skipped steps and blindly jumped into loopholes instead of performing suitable analysis to back these claims."

The plaintiff's last objection noted the USFWS's failure to evaluate the impact of the loss of the gray wolf's historical range. Plainly, the Court stated, "the Final Rule fails to adequately grapple with the causes and effects of historical range loss."[45] The Service argued that analyzing "the threat of human-caused mortality" was sufficient enough to wrestle with the loss of historical range, since human-threat was the primary cause for it.[46] Moreover, the Service supported its argument by adding that since there are state laws already in place to protect wolves and that no active "eradication" program exists in their "current" range, "lost historical range does not threaten the species with extinction."[47] However, the Courts found that the analysis the USFWS referenced only accounted for the human-threat in the gray wolf's "current" range, which covers only 15 percent of the historical range.[48] Primarily, the Service didn't adequately address the impact of this significant loss in historical range and its "possible enduring consequences" for the gray wolf.[49] Thus, for all these reasons, the Court found this rule unlawful and vacated it. On February 10, 2022, wolves won again, gaining back their previous protections.

Image by 942784 from Pixabay

Conclusion

Seventy-four percent of scientists working for the USFWS believed that political interests were too influential in the making of policy and regulation decisions.[50] The numerous failed attempts by the USFWS to delist wolves suggests political rather than scientific motives, especially considering the Service's consistent failure to adequately analyze the gray wolf's historical range. In addition, public opinion around wolf conservation has been favorable. A 2014 survey study found 61 percent of respondents had a positive attitude towards wolf conservation.[51] Another recent study found that Colorado residents felt positively about wolf reintroduction and conservation.[52] To further these findings, a 2021 study about politics and attitudes toward wolves noted that political affiliation strongly impacted opinions about wolf conservation and management.[53] They found that Democrats consistently held positive views of wolf conservation while all other political categories had no notable positive or negative views.[54] Another study found that in some specific areas of the country, political affiliation can actually determine perceptions on wolves, specifically identifying the Pacific Northwest as one of these areas.[55] In

aggregate, these studies suggest that wolf management has become a partisan issue. Because USFWS scientists believe the agency is heavily influenced by politics, and considering the aforementioned studies, these findings suggest connections between political affiliation and perceptions towards wolves. Whether these affiliations influence the USFWS decision is unclear.

Rural communities and ranchers directly impacted by wolf management policies are more likely to hold negative attitudes toward wolves.[56] Concerns about the potential danger to people and pets posed by wolves, the loss of hunting opportunities due to wolf predation, and potential wolf predation on livestock, all mean that wolf management legislation can directly impact rural communities.[57] Opponents of wolf protection frequently cite livestock losses in media reports concerning wolf management. The economic threat to rural livelihood through these losses motivates much legislation against wolf conservation. However, these concerns may be anecdotal, as research show wolves have little impact on livestock loss.

In 2019, for instance, the Humane Society investigated the reported numbers of cattle and sheep deaths due to wolves in the United States. Interestingly, the Society found stark differences between the statistics published by the U.S. Department of Agriculture-Animal and Plant Health Inspection Service (USDA-APHIS; https://www.aphis.usda.gov) and the USFWS. For instance, the USDA claims wolves killed 4,360 cattle in 2015, while the USFWS verified only 161 losses.[58] According to the Humane Society, the USDA collected its data from a few, mostly unverified sources, "which the USDA then extrapolated statewide without calculating standard errors or using models to test relationships among various mortality factors."[59] USDA's methods suggest it exaggerated livestock losses due to wolves, folding losses to all "native carnivores and dogs" into the total and inflating statistics far beyond predation solely due to wolves.[60] Such misinformation informs public policy, "including helping to fuel countless legislative attacks on wolves… and the Endangered Species Act by Congress."[61]

"Astoundingly, even if the USDA's wolf-predation statistics are given credence, the numbers pale in comparison to other causes of livestock loss. The USDA reported that in 2017 cattle and sheep killed by wolves only made up one percent of unwanted livestock deaths per state ."

Astoundingly, even if the USDA's wolf-predation statistics are given credence, the numbers pale in comparison to other causes of livestock loss. The USDA reported that in 2017 cattle and sheep killed by wolves only make up one percent of unwanted livestock deaths per state.[62] Most unwanted livestock losses are due to "health, weather, theft and birthing problems."[63] Moreover, it also reported that domestic dogs kill "100 percent more cattle than wolves and 1,924 percent more sheep."[64] Thus, at best, even if the USDA's statistics were correct, predation due specifically to wolves has a negligible impact on livestock.

As the proposal for delisting all wolves from the ESA was published on election day, it was one of the last regulatory measures the Trump administration enacted before the end of his term. However, even before this rule, the administration rolled back numerous environmental regulations, including making many changes to the ESA to weaken it, making delisting easier. One of these changes removed the phrase "without reference to possible economic or other impacts of such determination," in reference to any decision made under the ESA.[65] This introduced economic and "other impacts" in determining whether a species qualified to be listed. Moreover, the Service removed the practice of providing a future "threatened" species with the same protections as endangered species automatically,

requiring that the protections to be determined by the species' conservation needs.[66] Due to the ESA defining "threatened" status as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range," this would require the USFWS to explain the extent of these threats in the "foreseeable future" as probable.[67] In essence, these changes would make it more difficult to list future species, allow them to keep their protections, and make delisting easier by drawing more attention to the economic impacts of protecting a species. All the while, the Trump administration argued its incentive to "loosen regulations" was to reduce "the regulatory burden on the American people" while "providing the best conservation results."[68] The administration saw these changes as positive, while many critics and conservation groups said these revisions would "make it harder for the US government to safeguard a species that is found across a wide range of the country" and, furthermore, "handcuff regulators from protecting wildlife from the climate crisis."[69] While not concrete evidence, the trend in legislation on environmental policies predating the delisting of the gray wolf illuminates possible political influence threatening wolves' protections.

Following the re-listing of the American gray wolf, multiple unhappy parties filed appeals which were in mediation until February 26, 2023. On that day, the Circuit Mediator of the Appeals Court ordered a temporary stay on appeals until February 2, 2024, for administrative purposes. The U.S. Fish and Wildlife Service intends to submit another proposed rule concerning the listing status of the gray wolf in the lower 48 states when the stay lifts.[70] If history repeats itself, most likely another effort will be made to delist the gray wolf. Only time will tell whether the next ruling will favor them.

Image by Angela from Pixabay

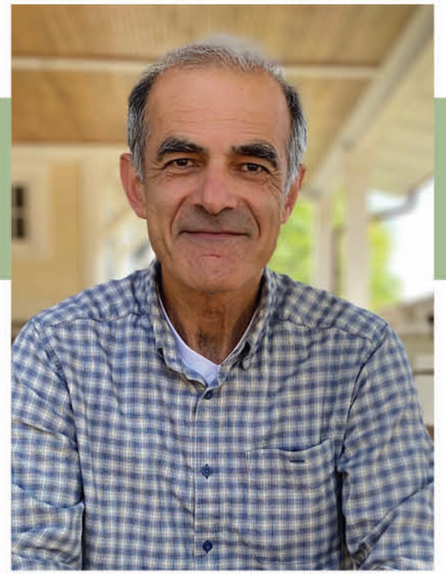
The Home Insurance Building, first skyscraper in the world. Photo courtesy of Wikimedia Commons (https://en.wikipedia.org/wiki/Home_Insurance_Building#/media/File:Home_Insurance_Building.JPG)

Technology on the Prairie

The First Skyscraper

When we think of skyscrapers, we often imagine towering structures in bustling cities like New York. However, the first skyscraper, the Home Insurance Building, was built in the Midwest, specifically in Chicago, Illinois, in 1885. The 10-story (138 feet tall) building was designed by William Le Baron Jenney (https://en.wikipedia.org/wiki/William_Le_Baron_Jenney), who is credited with being the "father of the skyscraper." In 1891, two more floors were added to the building, bringing it to 180 feet in height. What made this building unique was that it was constructed using a steel frame, which allowed it to be much taller and stronger than traditional masonry buildings. Its design featured a base that was wider than the top, which helped to evenly distribute the weight of the building. The exterior was made of brick and terra cotta, with large windows that provided ample natural light and ventilation.

Inside, the open floor plans were made possible by the steel frame. The building was also one of the first to use elevators. It was an instant success, setting the standard for future skyscraper designs. Its construction marked the beginning of a new era of tall buildings around the world, with many cities following in Chicago's footsteps and adding other innovative construction techniques to the use of steel frames. Although the Home Insurance Building was demolished in 1931 to make way for another, larger skyscraper called the Field Building (https://en.wikipedia.org/wiki/Field_Building_(Chicago)), its legacy as the first true "skyscraper" lives on.



Photos courtesy of Kamyar Enshayan

Kamyar Enshayan *works at the University of Northern Iowa's Center for Energy & Environmental Education* (https://ceee.uni.edu)*, and is involved in building a thriving food system as well as community energy initiatives. He has also served on the Cedar Falls City Council. His latest initiative at UNI involves what he calls a Homecoming education, where the students focus on addressing seemingly intractable local problems through research, planning, collaboration and action.*

**All references appear in Endnotes in the back of the issue.*

Is Renewable Energy Enough?*

by Kamyar Enshayan

In our current energy culture, we feel entitled to unlimited and wasteful energy use, whenever and wherever we want it, and that it ought to be cheap too. A fantasy of limitlessness. We assume that we can have a 100 percent "clean" energy economy without making any changes in the way we live, do business, or conduct our daily lives.

A few years ago, when attending a conference on clean energy for climate stability, I heard presentations on plans for 100 percent renewable energy for each state, mostly through wind and solar electricity. Clearly, we do need to rapidly discontinue the use of oil, coal, and natural gas, and invest in renewable energy. The question, "What about the need for significant energy conservation?" yielded the response from the prominent engineer who was presenting: "With 100 percent of our energy needs met with wind and solar, there is no need to conserve energy!"

Discussions of the future of energy are often framed in terms of supply; what energy sources will we use to keep our economy going? The fossil fuel industry has an on-going and vigorous smoke-and-mirrors show offering numerous false energy solutions—algae, ethanol, carbon capture, nuclear, clean coal, clean gas—all of which involve more fossil energy, more toxic materials generated, and land degradation. The narrative of the environmental movement is that solar and wind energy will meet our unlimited energy demand without any fundamental changes in the way we live or use energy and materials.

As a nation, and as local communities, we need to frame our discussion of the future of energy (and climate) in terms of habits, community processes, and policies that lead to significant reduction in energy

demand and material use for a livable future. It is not enough to "decarbonize," but also necessary to detoxify (i.e., alternatives to daily materials in our lives that are derivates of fossil fuels) and use less material. How do we build a social movement that offers practical alternatives to a culture of extreme consumption?

> "Community scale innovations and cultural approaches that result in energy and material down-sizing are going to be key to a livable future"

In *Our Land, Ourselves*, a book by the Trust for Public Land[1], the authors ask a provocative question: "The conservation movement succeeds brilliantly in saving hundreds of thousands of acres of land each year, but somehow provides no broadly recognizable cultural counterpoint to America's otherwise materialistic society. The conservation movement is largely silent on choices Americans make about how one should live. Is there no dissonance in saying that a movement is devoted to saving land but not devoted to fighting the consumption that destroys the land?" I keep thinking about this foundational question and what "a recognizable cultural counterpoint" might look like in practice. What are the key elements of such a culture, and what are some of its recognizable features?

Sky in Cedar Falls, Iowa. January 23, 2023

In *Our Only World,*[2] Wendell Berry offers insights related to these questions: "The long-term or permanent damage inflicted upon all life, by the extraction, transportation, and use of fossil fuels is certainly one of the most urgent public issues of our time, and of course it must be addressed politically. But responsibility for the better economy, better life, belongs to us individually and in our communities." Berry suggests that we not only need renewable energy, but also less energy and material when he writes, "The unlimited use of any energy would be as destructive as unlimited economic growth, or any unlimited force. If we had a limitless supply of free, nonpolluting energy, we would use the world up even faster than we are using it up now."

We need guidance! If you have a ton of credit card debt and need help addressing the situation, you go to a consumer credit counselor. Their advice: cut up your credit cards and develop a strict plan to get you back on track towards living within your means. Similarly, our continued and ruinous dependence on fossil energy and extreme material consumption are proving to be like the credit cards that we need to put aside.

The consensus is that human activities are at the root of the climate crisis, and yet there is so little said about what exact human activities we are going to change in our households, communities, and regions! We need to urgently develop a robust plan to use less, to live within our means, in this case, within the energy and material limits of our region and the planet. What might such plans look like? Well worth a community conversation.

Where might we draw inspiration that we are capable of impactful collective action to address a crisis? Naomi Klein (https://naomiklein.org) discusses this in *This Changes Everything* when she writes, "...we humans have shown ourselves willing to collectively sacrifice in the face of threats many times, most famously in the embrace of rationing, victory gardens, and victory bonds during WWI and WWII. Indeed, to support fuel conservation between 1938 and 1944, the use of public transit went up by 87 percent in the U.S. and 95 percent in Canada. Twenty million U.S. households–representing three fifth of the population–were growing victory gardens in 1943, and their yields accounted for 43 percent of the fresh vegetables consumed that year."

Trolley system on East 4th St. Waterloo, Iowa, 1957

And of course, back then, there was robust public transportation in place to depend on. I often share with my students an image of an electric trolley in operation in my neighborhood in Cedar Falls in 1890. Clearly, we have regressed in public transportation! As late as 1959, there were daily passenger trains all over Iowa in addition to electric trolleys in so many Iowa communities, taking away the need for car ownership, which is very costly and requires a vast quantity of materials.

Same with clotheslines! It is not that hard to estimate the length of a train carrying coal needed to dry clothes in a community if every household used a clothes dryer, and pretty much everyone does in the U.S. (For Cedar Falls, Iowa, the coal train would be roughly a mile long). Are we not even willing to start using less energy by doing the simplest of all carbon emission reduction, by simply hanging our clothes on clothes racks or clotheslines? We can do similar estimates of when the lights are left on unnecessarily, when spaces are air-conditioned unnecessarily, and the list of system-wide wasteful energy practices go on and on. It is much cheaper to cut energy waste than put up solar panels (which require energy and material to manufacture) to keep on wasting energy!

Trolley tracks on the street with overhead electical lines at College Hill in Cedar Falls, Iowa.

Public transportation, a local and regional food system, fresh-air clothes drying, and gardening are all very achievable; a lot less traveling is doable and not catastrophic like destructive storms, floods, or droughts. The sooner we adopt these personally and communally, the more options we will have as we make more significant progress towards less energy and more community.

Renewable energy, while necessary, is not enough, and is not the whole story. Community scale innovations and cultural approaches that result in energy and material down-sizing are going to be key to a livable future. Institutions of higher learning can be a force in clarifying the confusing false energy solutions, technological fundamentalism, and injustices of an extractive economy. They can also help greatly by demonstrating the multitude of ways people of a region can develop their cultural capacity to live within the limits of their region without inflicting damage to other regions. Furthermore, they can create opportunities for their students to be involved in turning what we already know into action at the community scale in their region.

PHOTO COURTESY OF SAUL CHAN HTOO SANG

Joanie Fieser *(she/her) graduated from Grinnell College in May 2023 with a degree in biology. She aims to restore ecosystems, connect people and nature, and pursue interesting stories-- especially through documentary film. Tommy Fieser, featured in this article, is one of Joanie's two older brothers. Both of them inspire her in big ways.*

This article uses vocabulary that may be unfamiliar to those not versed in natural building. For reference, a glossary of terms is provided at the end of the article. An asterisk (*) indicates inclusion in the glossary. Interviews have been edited for brevity and clarity.

**All references appear in Endnotes in the back of the issue.*

Tight, Insulated, and Thermally Massive*

Rethinking Residential Architecture in Columbia, Missouri

BY JOANIE FIESER

A group of mid-Missourians are rethinking residential architecture for a more natural, affordable kind of urban home. Their favored building material? Straw. Now, this is not the easily huffed-puffed-and blown-down straw house of the three little pigs. Rather, these straw bale houses are exceptionally airtight, well-insulated, and thermally massive (see "Ask Tommy" sidebar), making them particularly energy efficient as well as carbon-sequestering*. Columbia, Missouri, changemakers Adrienne Stolywk and Tommy Fieser (the author's brother) are among this group of passionate people embarking on a journey to build these houses within city limits, though they are most often found in rural areas without building codes. Now that their first in-town natural building* project (an accessory dwelling unit* in Adrienne's backyard) is operational, Adrienne and Tommy spoke with me about their natural building inspirations, experiences, and plans for the future.

Meet the Builders

Adrienne Stolwyk (https://monarch-architecture.com/about-us/) is a licensed architect in Columbia, Missouri, who is at the forefront of natural building compliant with city code. She is especially interested in net zero* buildings—that is, those built with carbon-sequestering materials and designed to consume minimal energy throughout their lifespans. Adrienne got her start with straw bale construction*, a type of natural, carbon-sequestering architecture, during a summer internship with the Lama Foundation (www.lamafoundation.org) near Taos, New Mexico, overlooking the hazy bluish Sangre de Cristo Mountains. While she plastered rustic houses with the same reddish clay on which they stood, Adrienne began to wonder how the natural building techniques practiced at the remote Foundation could be applied in a city, where building codes must be followed.

That experience at the Lama Foundation sparked something in Adrienne that she carried into the final semesters of her 5-year architecture degree and beyond. During the conversation excerpted in this article, Adrienne remarked that, while straw bale is a legitimate building methodology, "it's happening on the fringes and is going to stay on the fringes unless people try to construct these buildings in cities... If no one in a suburb ever sees [a straw bale house], then how will they ever know that it's a possibility?" Also in her last year of study, Adrienne started researching accessory dwelling units (ADUs) as a method of increasing affordable housing units in cities. Carrying her creativity and inspiration with her, she graduated from Kansas State University with a Master of Architecture, moved to Columbia, and began working at a commercial architectural firm.

> "It's happening on the fringes and is going to stay on the fringes unless people try to construct these buildings in cities."

All the while, Adrienne's interests in straw bale and ADUs persisted. In 2012, she quit her job and traveled across the U.S. for inspiration. Along the way, she was delighted to meet other people already doing the things she aspired to do. In Santa Cruz, California, Adrienne met David Foster, who lobbied his city government to pass an ADU ordinance and built a straw bale ADU in his backyard. In La Plata, Missouri, Adrienne honed her interior plastering skills alongside artistic builders at the Possibility Alliance (https://www.youtube.com/watch?v=RNal2GyIH_g). In Moab, Utah, she worked with Community Rebuilds (www.communityrebuilds.org), a nonprofit motivated to "build [affordable] energy-efficient housing, provide education on sustainability, and improve the housing conditions of the workforce."

After her travels, Adrienne returned to Columbia, got married, had a couple of kids, got her architect license, and started her firm, Monarch Architecture (https://monarch-architecture.com/). Along with her husband, Adam, and some friends, Adrienne formed

ADRIENNE AND ADAM'S ACCESSORY DWELLING UNIT (ADU) IN COLUMBIA, MISSOURI. THE MORE CONVENTIONAL AESTHETIC OF THE ADU HELPS IT BLENDS INTO THE NEIGHBORHOOD. JUST LOOKING AT IT, YOU WOULDN'T GUESS WHAT LIES WITHIN! PHOTO COURTESY OF ADRIENNE STOLWYK.

a group called Enhancing Columbia's Housing Options (ECHO), which successfully lobbied the City of Columbia to adopt an accessory dwelling unit ordinance in 2014. The ordinance was passed as a pilot program, making just two or three thousand lots in the city of Columbia eligible for backyard ADUs. Adrienne hopes this will be a first step towards a more widespread acceptance of ADUs. At last, in 2020, Adrienne and Adam broke ground on a straw cell* ADU in their backyard.

Tommy Fieser (https://www.youtube.com/playlist?list=PLdWn1dZEGhFnxD6KPYt2fppMhpZefUIWX) is a natural builder in Columbia, Missouri. He was hired as the subcontractor for Adrienne's ADU. Tommy was first introduced to natural building in an Expanding Environmental Consciousness course he took during his undergraduate studies at Truman State University. His class visited the Possibility Alliance, the same intentional community that Adrienne visited, then located near La Plata, Missouri. During his visit and subsequent volunteering in the community, Tommy began to ponder how natural architecture varied across the nation. Earthships* and Pueblo-style homes populate the drier climates of the Southwest, while straw bale houses are more common in the Midwest, where cold winters and humid conditions demand robust insulation and breathable materials. He researched the varied building traditions of Native Americans. Like Adrienne, he traveled to various communities in the US known for their natural buildings. He marveled that, in every place he visited or read about, natural building styles differed according to climate and availability of resources. It happens that in Missouri, the place Tommy calls home, straw bale seems to be the most popular method, so that is what he has pursued most.

Progress over time. After the ADU's exterior was complete, work began inside on straw bale installation and plastering. Photos courtesy of Adrienne Stolwyk.

JF: How does the ADU compare to other energy efficient architecture?

AS: In my commercial design experience, there was emphasis on air tightness, exterior insulation, different mechanical systems, building orientation, and other energy-efficient techniques. However, there was never much thought put into the types of materials selected. I have come to value safer, carbon-sequestering building materials that will some day decompose, in place of the carbon-demanding materials used in conventional buildings, like steel and cement.

JF: How has regulation regarding straw bale construction changed over the past several years?

AS: Ten years ago, people would have to find an architect or structural engineer who knew something about straw bale and prove to their city's building department that straw bale construction was legitimate. However, as of 2015, the International Residential Code (https://codes.iccsafe.org/content/IRC2021P2/appendix-as-straw-bale-construction) has included an appendix—Appendix AS—that says if you want to build with straw bale, here's how you have to do it. In other words, if you meet all the criteria in the appendix, you're good. That appendix was born of decades of research and legitimizing straw bale construction. Now, because of Appendix AS, anybody can lobby their local authorities to adopt its standards, making it easier than before to build a straw bale house within city limits.

JF: What kind of obstacles would a homeowner likely encounter in building a straw cell ADU?

AS: First of all, the financing is tricky. Banks lend money for single family homes all the time, but are more hesitant to do so for atypical constructions like straw cell ADUs. We did a lot of the work ourselves, and the total cost of our ADU with solar panels came out to be about $115,000. Even though it can be tricky, it isn't impossible to finance this type of project. Second, in most cases, the homeowner essentially must become a general contractor for their ADU, and that is a huge undertaking. Sometimes, even if the homeowner has realized that their lot is eligible for an ADU, they might not be in a position to apply for financing. Between those two things –the difficulty of financing and the scale of the project—I'm not surprised that not that many ADUs have been constructed.

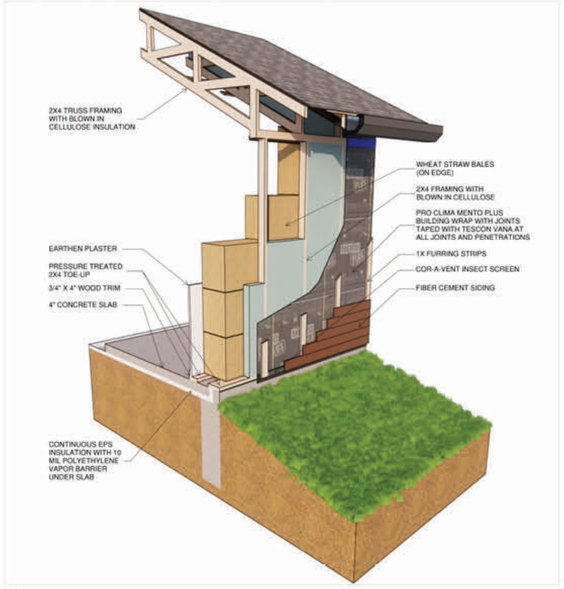
A look inside: the interior of Adrienne and Adam's straw cell ADU. The house consists of a bathroom, open kitchen/dining room/office space, bedroom, and storage loft. Photo courtesy of Adrienne Stolwyk.

JF: How could your straw cell house be improved?

AS: I'm trying to figure out how to more easily maintain natural structures. In my backyard house, sometimes little bits of sand slough off. Better plastering methods could minimize this, but it's not really a problem for me. Still, I imagine a situation in which young kids are hard on the walls, maybe coloring on them with crayon. In a conventional house, you can just spackle and paint over such damage and it's fine. With a natural building, you can certainly fill gaps and holes, but finishing isn't as easy as putting a coat of latex paint on it. Latex paint messes with the vapor profile, potentially trapping moisture in the wall and creating conditions prone to rot. Thus, I'm figuring out a way to combine straw cell construction with gypsum board or some other conventional interior material that is easier to repair and paint.

JF: Why are you interested in net zero straw bale housing?

TF: The two main ways we impact and interact with our environment are our food and housing systems. I enjoy gardening, but I'm more drawn to the latter. I know a lot of people who farm and garden, so I feel



Cross-sectional diagram of the exterior of the straw cell ADU. The pressure-treated toe-up protects the straw bales from moisture and rot. Courtesy of Monarch Architecture.

as though natural housing is the least emphasized, at least in my community. There is a lot of work to be done to get natural buildings to a state fit for our urban Missouri environment. Specifically, more straw bale sample houses need to be built to increase awareness that they are a viable option for in-town building.

JF: Why build net zero straw bale houses?

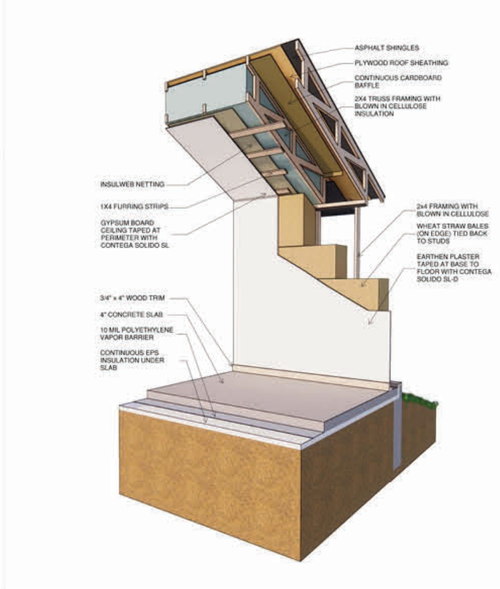
TF: The net zero straw bale housing modelled in Adrienne's ADU is desirable because it is tight, insulated, and thermally massive. These three characteristics work together to use energy very efficiently. If you have a good thermal shell from the outside environment, like you get when you combine airtightness, insulation, and thermal mass, then you don't need to use your air conditioner or heater as much to maintain a comfortable living environment. (See the "Ask Tommy" sidebar for a deeper dive into these terms.)

JF: What is an energy recovery unit and how does it work?

TF: An energy recovery unit provides fresh air while making the most of energy used for heating and cooling. In Adrienne's house, there are two energy recovery units, controlled by electricity and located in opposite walls. One brings air into the house while the other pushes air out, and they switch directions every five minutes. In essence, an energy recovery unit consists of a fan surrounded by rock. As the air that is conditioned inside (i.e., warmed or cooled by a heater, stove, or AC) moves outside, the rocks take on the temperature of the outgoing air. When the fans switch directions, fresh air from outside passes over these rocks that are conditioned to the house's internal temperature. Thus, the house is filled with fresh air from outside that is conditioned by the air that was inside. In other words, the unit recovers the energy used by your heater or AC from outgoing air and uses it to condition incoming air. This cuts down on overall energy use.

JF: Why build an ADU?

A close-up of the dining area. Note the insulative, thermally massive straw bale walls, most apparent in the window well. Photo courtesy of Adrienne Stolwyk.



Cross-sectional diagram of the interior of the straw cell ADU. Courtesy of Monarch Architecture.

AS: ADUs aren't the only solution for affordable/workforce housing, and they certainly aren't the quickest solution, at least not yet. However, they are more of a grassroots solution. Compared to big housing complexes that people typically don't like in their neighborhoods, ADUs are necessarily smaller, less conspicuous, and don't drastically change the character of the neighborhood. Relatedly, ADUs create affordable housing in the areas it is needed most. While it's easier to build on the periphery of a city—fewer constraints, fewer neighbors to complain—affordable housing on the outskirts of a city is not very helpful unless you have a car. If the housing isn't accessible via public transit or within walking distance of an employer, then it's not that useful for the people who really need workforce housing.

Additionally, ADUs better enable intergenerational living. Nursing homes and childcare are not affordable for many families in the US. As the "silver tsunami" of baby boomers reaches retirement age, backyard houses may become homes for elderly family members, and those elderly members may offer childcare

Ask Tommy: What Does "Tight, Insulated and Thermallly Massive" Mean?

By tight, I mean airtight. Imagine you build an igloo with plenty of insulation and thermal mass, but you don't fill in the cracks. It will be drafty, not airtight. All that insulation is worth little if cold air can seep in through the cracks. In a straw bale house, airtightness must be balanced with the necessity of the straw bales in the wall to "breathe". If you cover a straw bale in a vapor impermeable material, like plastic or concrete, it will mold and ruin the wall. Rather, you must cover the bales in a breathable material like clay plaster. Moisture can still go in, but it can also go out. If a bale gets wet, it's okay because it can dry. Airtightness saves energy because unconditioned outside air is forced through the thermally massive insulation or energy recovery unit instead of just seeping through the cracks.

Insulation is important for obvious reasons, especially here in the Midwest where the temperature swings can be large. For example, 30 degrees to 70 degrees over the course of a day is fairly common. Insulation creates an internal environment that is buffered from the outside, making it so the temperature inside remains stable despite changes outside. The building code requires walls with an R-value* of 13 or 15. For reference, a blow-up camping mattress is typically around R-4. If you put three or four of those camping mattresses together, you would get the equivalent insulation of a conventional wall. By contrast, straw bale walls are often at least 17 inches thick and have an R-value of around 30. Furthermore, straw bales serve as a natural insulator that stores carbon in the form of organic matter. Thermally broken* slabs are also useful.

Thermal mass has to do with the heat capacity* of a material. In a variable environment like the Midwest, you want high heat capacity insulation. Dense materials like clay, rock, and water have high heat capacities and thermal mass, maintaining their temperature even as conditions change. If you open the door of your cozy house in winter, you'll let all your warm air escape. But, if you build with thermally massive materials, your walls and floor will store heat, which will diffuse into the room even after you open the door and thus rebalance the internal temperature of the house without extra energy use.

The ADU features a full kitchen with storage. Photo courtesy of Adrienne Stolwyk.

to busy parents. This system of intergenerational living could offer refreshing social dynamics, especially given the social isolation often experienced in retirement homes. To that end, ADUs lend themselves to ADA accessibility. It is often easier to build a new house than to retrofit an old house to be accessible.

Lastly, ADUs allow more opportunity to experiment with different types of architecture, like straw bale or other forms of natural building. It's less of a commitment and financial challenge to build a small straw bale house in your backyard than to build a full-sized straw bale house and have it be the only structure on your property.

JF: What other ideas do you have on increasing housing accessibility and limiting environmental impact?

AS: I think we need to build more houses, but I don't think that's the only solution. In the US, we have a lot of land that's already been developed, and lots of houses with lots of bedrooms, but we are not using them efficiently, or sometimes even at all. To address the housing shortage, we could better distribute people into the housing stock that already exists.

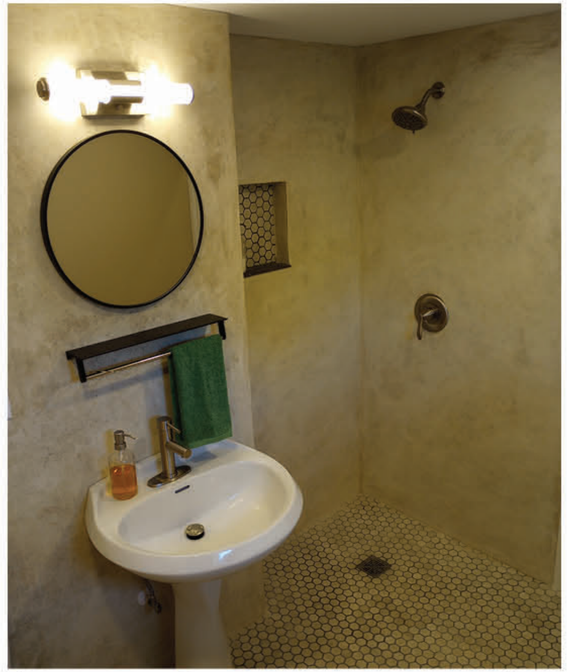
JF: What are your plans for the future?

AS: Oregon-based ADU expert Kol Peterson (https://www.buildinganadu.com/about) said that the next step after constructing some ADUs in your town is to show that ADUs can be a good thing: Parking isn't creating all sorts of problems, and the character of the neighborhood isn't ruined by a couple of little backyard houses that aren't even visible from the street. After you get some good press, then you can push the regulations a bit more. With this advice in mind, I'm hosting an open house next month. It will include my house and four other ADUs in the area. In the long term, I would like to advocate for a Missouri state law allowing accessory dwelling units to be built in any residential zone. In 2020, California passed a similar law. I think that that could be a really powerful thing in Missouri.

> "I think we need to build more houses, but I don't think that's the only solution."

I think the key to getting more naturally built accessory dwelling units installed on the face of the planet is prefabrication. To my knowledge, few people have attempted straw bale prefabrication on a large scale.

The bathroom in the ADU. Photo courtesy of Adrienne Stolwyk.



Note the tadelakt* shower wall in the bathroom.Photo courtesy of Adrienne Stolwyk.

I'm excited about prefabrication, but as of now, I can't see an investor being convinced that I could do ten straw bale houses in a given time frame. We'll have to start with one prefabricated house, just to show that it is possible. Then, hopefully that will convince people to support more prefabricated straw bale houses.

Another obstacle in prefabrication is labor. Straw bale construction is very time-consuming and requires many hands. I'm brainstorming ways to hire people for short periods of time to prepare prefabricated walls—maybe we could rent a large, climate-controlled indoor space and hire seasonal workers for a few weeks in the winter, when other work is hard to come by.

> "Straw bale is something worth talking about!"

TF: Right now, I am focused on another building project with my dad and on running my handyman business. Nonetheless, I continue preparation for my own straw bale house. I've been preparing for about four years now, but each year has brought a lot of helpful knowledge. I have a lot in Columbia that I plan to build on, and have already planted some pawpaws, elderberries, and persimmons there. I want to use as many repurposed materials as possible, so that is an ongoing collection. I'll be documenting the whole process on my YouTube channel, Tommy Tommy Fieser (www.youtube.com/@tommytommyfieser), because I think it is important to share my knowledge and process with people. Straw bale is something worth talking about!

Glossary

Accessory Dwelling Unit (ADU): Independent housing units created within single-family homes or on their lots. Also referred to as a mother-in-law house or backyard house[1]

Carbon-sequestering: A term to describe materials (such as plant tissue) that store carbon captured from the atmosphere. Carbon dioxide in the atmosphere is a major culprit of the greenhouse effect and climate change. Like all plants, members of the grass family assimilate carbon as they grow. Therefore, when that straw made from grasses is used in straw bale construction, the carbon is stored within the walls for the lifetime of the building. In this way, straw bale construction sequesters carbon and thereby helps to reduce the amount of carbon in the atmosphere that contributes to climate change.[2]

Earthship: Any of several passive solar* houses based on the designs of New Mexican architect Michael Reynolds[3]

Heat capacity: The amount of energy it takes to raise the temperature of a substance by 1°C . In other words, heat capacity is the substance's ability to resist change in temperature upon exposure to a heat source. A substance with a small heat capacity cannot hold much heat energy and thus warms up quickly. On the other hand, a substance with a high heat capacity can absorb much more heat without its temperature drastically increasing.[4]

Natural building: Alternative building methodology that uses natural materials in place of conventional man-made materials like cement and steel

Net zero home: A residential structure with an annual net-energy consumption of zero; a home that produces (e.g. with solar panels) as much energy as it uses annually[5]

Passive solar: An architectural design that uses the sun's energy for heating and light without energy[6]

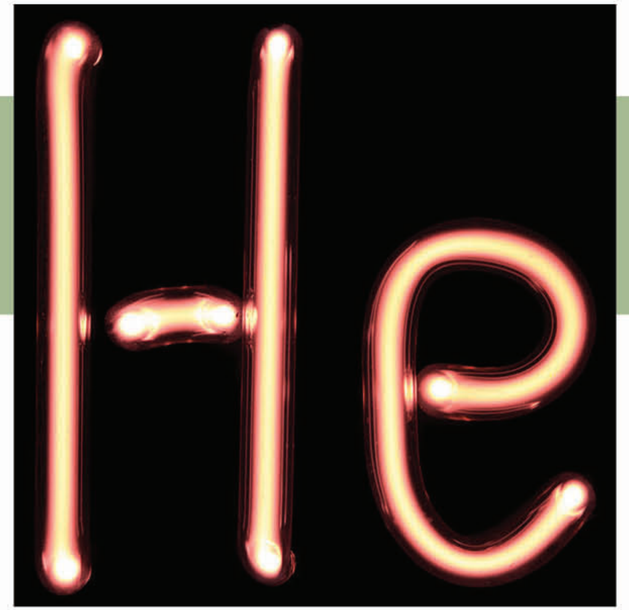
R-value: A unit of thermal resistance used for comparing insulating values of different materials; the higher the R-value, the greater its insulating properties[2]

Straw-bale construction: Natural building method featuring bales of straw in place of standard construction materials for structural elements and/or insulation[7]

Straw cell: A type of straw bale construction featuring conventionally framed walls with cellulose insulation in the stud cavity and plastered straw bales on the interior[8]

Tadelakt: A decorative, seamless, waterproof, lime-based plastering surface used as an alternative to tile and often used in bathrooms. Sometimes called Moroccan plaster, this is a traditional technique in the Marrakesh region of Morocco.[9]

Thermally broken: A construction featuring thermal breaks; that is, materials that conduct energy poorly, thereby reducing the flow of thermal energy between conductive materials. Thermal breaks help prevent heat from escaping a building.[10]



A helium-filled tube shaped like the element's atomic symbol Photo courtesy of Wikimedia Commons (https://upload.wikimedia.org/wikipedia/commons/thumb/1/1f/HeTube.jpg/640px-HeTube.jpg)

Technology on the Prairie

The Discovery of Helium in America

Helium is an important gas for a wide range of applications, useful in nuclear reactors, MRI machines, welding, and scientific research. It was first observed in 1868 by French astronomer Pierre Janssen and English astronomer Joseph Norman Lockyer when they noticed a particular yellow light being emitted from the sun's atmosphere during a solar eclipse. Lockyer decided to call this new element helium, named after the Greek word for sun, "helios".

However, it was believed to be rare on Earth and wasn't extracted in the United States until 1905 when a geologist named Hamilton Cady and a mining engineer named David McFarland were drilling for natural gas in Dexter, Kansas. They noticed that some of the gas samples contained an unknown gas that did not behave like any of the other gases they were familiar with. After many months of careful experimentation and analysis, Cady and McFarland were able to determine that the unknown gas was, in fact, helium. By 1907, Cady stated that helium was in fact quite common. To illustrate the significance of this fact: before Cady's discovery, the amount of helium sufficient to fill a small blimp (roughly 40,000 cubic feet of the gas) would have cost $100 million. After Cady's discovery that amount only cost $1,200.

Photo courtesy of Beryl Clotfelter

Tornadoes in Kansas

by Beryl Clotfelter

Each year, tornadoes cause billions of dollars in damage in the U.S.[1], cause 1,500 injuries, and claim 80 lives[2]. Though tornadoes have been recorded in all fifty U.S. states, some states definitely have more than others. When I was a boy, my family lived for eight years in "Tornado Alley," that part of the Great Plains that experiences frequent tornadoes. Our home was on the west edge of Coats, Kansas, in the central part of the state. According to the National Weather Service, Kansas averages 96 tornadoes per year.[3] The most was in 2008, when over 180 tornadoes struck.[4]

Where my family lived the land was sufficiently flat that we could stand in our yard and see farmhouses two or three miles away. In tornado season, we could see tornadoes even farther away—rotating funnels hanging from clouds, with their lower tip in the air or on the ground. Whenever we'd spot one, we had to decide whether it threatened us. If it didn't, we watched the show. If it did, immediate precautions were in order.

The drama would begin on a warm afternoon in the spring or summer when thunderclouds began to form. At first, they would be mostly white, but as they grew and rose upward their color darkened to a point that we had to turn the lights on in the house. Within a few minutes the clouds moved over us and soon rain began to fall and drove us inside. Rain began falling in sheets, lightning flashed, and thunder crashed and rumbled. Someone in the family began to scan the roiling and churning clouds for signs of tornadic activity.

There was no television to tell us that tornadoes were in the area, and there was no radar to let a meteorologist see a tornado from afar. It was every man for himself, and one estimated the danger from the appearance of the sky and the sounds that the storm made. It was generally understood that there would be a roaring sound before a tornado struck, but that might be a very short-time warning. More important was the intensity of the rain and the appearance of the sky, whether it was boiling with strong winds within the clouds. A decision to take the family to the storm cellar had to be based almost entirely on what one could see, and at night, we had to depend on observations made possible when lightning flashes provided glimpses of the night sky.

Usually, of course, there were no tornadoes to be seen, but occasionally one could spot what appeared to be a funnel hanging down from the cloud and possibly, eventually, reaching the ground. If it touched the ground, it began to pick up dust and small debris and lift them into the air. The tornado might be so small as to be almost insignificant, but it could also develop into something large enough to be highly destructive.

Like many Kansans, we had a storm cellar at our home. It was about 20 feet to the northeast of the house, a fact that worried my mother because she feared that a tornado, which was most likely to come from the southwest, might blow the house over onto the storm cellar and block the door so that we would be trapped inside. The cellar was of a traditional design, with a slanted door that hid a set of steps going down into a small room. I think the walls and floor were concrete, and I suppose that the slightly domed roof was concrete with dirt over it. Grass grew on top of the storm cellar. The room was not large, and it certainly was not equipped to be a comfortable place to spend the night. The walls were lined with shelves that were loaded with glass jars of canned food, and whenever we were down there, we were sharing the space with various critters that like a damp and cool environment. I suspect that anyone interested in studying varieties of spiders and other animals with more than four legs, could have had a field day there.

I remember several nights when I was roused from a sound sleep and told that we were going to the storm cellar. I put on shoes, pulled a raincoat over my pajamas, and dashed from the house to the cellar through the rain. The way was illuminated by lightning flashes and a flashlight. I think we had a kerosene lamp in the cellar itself so that we had some light there, but I do not remember whether we had anything to sit on or whether we simply stood. After everyone was safely inside, my father stood at the door, holding it open enough to see the sky and perhaps spot a tornado if one approached, although the house blocked much of his view of the relevant part of the sky. After the storm had lightened, or at least he thought that the danger had passed, we returned to the house and went back to bed. I do not remember how difficult it was to get back to sleep after such excitement.

All the tornadoes that I remember seeing were relatively narrow, and their path of destruction when they were on the ground was on the order of 100 yards wide. I knew nothing of the tornadoes that we read about today, which are half a mile or even a mile wide, and which

Photo from Wikimedia Commons

Born in Oklahoma in 1926, Beryl Clotfelter *moved to Kansas at the age of two and lived in southern Kansas until he en-tered college in 1944. After college, he did graduate work in and received a PhD in physics. After two years as a research physcist for Phillips Petroleum company, Beryl chose to return to academia, and he taugh in universities in Idaho and Oklahoma. In 1963, he moved to Grinnell College, where he is now Professor Emeritus of Physics.*

devastate large areas. I saw farmhouses and barns that had been struck by tornadoes and completely destroyed, but the tips of the funnels that touched the ground were usually slender enough that some buildings on a farm might be destroyed while others remained relatively untouched. Surprisingly, we never experienced any tornado damage to our own place, but I saw enough destroyed buildings and farmsteads in our neighborhood to develop great respect for tornadoes' power. Tornadoes can do freakish things, but many of the seemingly improbable stories that are told are truly incredible – more fiction than fact. For example, a resident of Tornado Alley is likely to hear that the wind can drive straws into tree trunks or fence posts, but attempts to verify that in the laboratory have been unsuccessful, and it almost certainly is not true.

Photo from Wikimedia Commons

One Sunday afternoon we had a severe thunderstorm with rain, wind, thunder and lightning. Sometimes the rain came down in buckets, but whenever it became lighter my family stood in the yard and watched multiple tornadoes moving around to the west of us. They were enough to make anyone nervous. However, as evening approached, the storm cell moved away, the rain almost stopped, and the sky grew much lighter.

The church that my father pastored always had a Sunday evening service, but on that particular afternoon he said he was sure that no one would come after such a stormy day, so we did not go to the church. Shortly after the time when the service would normally have begun, someone came looking for us and reported that the church was full! The congregation had spent the afternoon poised to go into their storm cellars, like prairie dogs sitting beside their burrows ready to dive underground at first sign of immediate danger; once the threat had passed people turned their thoughts to the church, and more than the usual number came for the Sunday evening service.

I can only speculate about the thought processes that caused so many people to come to the church that evening. I doubt that any of them believed that going to church would protect them from storms. But a sense of thankfulness that they had been spared during a time when danger was visible in the air may have motivated them. Perhaps seeing a severe thunderstorm and so many tornadoes simply made people feel that it was appropriate to acknowledge that we are part of something larger than ourselves that we do not control. The church building is a place dedicated to proclaiming that fact and wrestling with its implications.

Photo courtesy of Benjamin Schrager

Benjamin Schrager *is from Olympia, Washington. He graduated from Grinnell College in 2008. With a PhD in Geography from the University of Hawai'i at Mānoa (https://manoa.hawaii.edu), he researches food systems with an emphasis on corn and livestock. He's currently working as an Assistant Professor in Utsunomiya University's Department of Agriculture (https://agri.mine.utsunomiya-u.ac.jp/hpe/index.html).*

Researching Corn in Iowa and Beyond

by Benjamin Schrager

Before my third-year at Grinnell College, I spent the summer of 2006 studying everything I could about corn in Iowa. After two years of living in Iowa, I was familiar with its rolling fields. This familiarity, however, did not mean that I understood corn any better than when I first arrived from the Pacific Northwest. I knew corn like I'd known the Columbia River – as a nearby thing that changed with the seasons. In the bustle of daily life, we know lots of things through proximity without ever digging into their complex ecologies and economies.

As economies grow increasingly interconnected and reliant on each other, the connections also grow so complex that they prove harder to understand. Iowa's cornfields fit into global industrial food systems like a heart that circulates corn and capital upstream and downstream to disparate locations around the world. Corn's prominence within global food systems also attracts outside investors to Iowa's cornfields.

When I think about food systems on such a massive scale, I'm inclined to turn towards similarly massive concepts and categories. Into my head pops ideas like the Anthropocene, the corporate food regime, food sovereignty, alternative food networks, political ecology, sustainability, resilience, and justice. These ideas help me to make sense of the tumult that I encounter in food systems. But for those who are privileged enough to spend time researching about agriculture and food,

we also have so much to learn by talking to people, listening to them with care, and getting to know a place.

My first significant encounter with researching food took place in Grinnell over the summer of 2006, a chance that provided the foundation for my career as a critical food scholar. The sprawling 50-page output from that research, "The Failure of Economic Authority," (https://www.grinnell.edu/sites/default/files/documents/schrager_ben.pdf) is still hosted on grinnell.edu servers. Over that summer, my mentor was Dr. Jonathan Andelson, the long-serving Director of the Center for Prairie Studies and Publisher of Rootstalk. In this essay, I'll share about my experiences of researching aspects of corn in Iowa and beyond to Hawai'i and Japan.

Researching Corn in Iowa

I'm embarrassed to go back and listen to my initial interviews with Iowa corn farmers. I had a list of questions and bulldozed through them. "What brought you to farming?" "When did your family acquire the land you farm?" "How old are you?" The corn farmers whom I spoke with generously answered these questions, but their answers begged for follow-up questions and more space to talk. Instead, I marched on like a miner bent on mapping a cave but oblivious to the half-revealed gems I hurried past.

Despite its flaws, my reliance on a set of questions to compare between farms provided an anchor for me as I naively waded out into the bewildering world of corn. At times, I sounded like a farmer fanboy excited to speak with someone who wakes up early, drives a tractor, and handles large animals. In interviews, I exclaimed "Wow!" so often that I eventually stopped transcribing it.

Here's part of an early interview with a corn farmer from June 2006:

Ben: So once you harvested your corn what did you do with it?

Farmer: Well, I generally store it and then sell it later. Lots of times I have my grains sold before I plant it. It'll be for December or January or March delivery, and I have always had enough storage for my crop because I don't like to wait in line to go to the elevator. And once you have it in the elevator your options are limited. You almost have to sell it through them. You don't have the flexibility of selling to some other processor. See, when you sell crops early you still have the option of buying that contract back and doing something different with it. If you have the grain stored at an elevator you don't have that option without it costing you a lot of money.

Ben: Wow. I've never heard that about grain elevators.

Farmer: The board of trade, are you familiar with that?

Ben: No.

Farmer: So the commodities, any of your grains or livestock, can be sold two years in advance.

Ben: Wow.

As much as I cringe to read this transcript, a lot

Photo courtesy of Benjamin Schrager. View from inside an industrial broiler chicken structure, Miyazaki Prefecture, Japan

of good things were happening. Foremost, I was honest about my ignorance, and the farmer graciously responded by heaping bushels of knowledge on me. As a result, I learned a lot. Once I became more familiar with the basics of corn farming, I could fumble my way towards better questions like, "How do you decide what type of seeds to use?" By the end of the summer, I could hold a decent conversation with a corn farmer. No small feat.

Some aspects of corn farming are boring. For example, subsidies are akin to taxes, but I still persisted in asking farmers about subsidies. Rather than trying to explain this tedious paperwork to me, one farmer provided the mental shortcut he uses: subsidies basically provide him with an additional $20 per acre of corn. Little by little, I gained an incomplete but working understanding of the key forces shaping Iowa's cornfields.

Photo Courtesy of Benjamin Schrager, 2006. Picture of a lone corn plant, possibly Round-up resistant, in a field of soybeans in Iowa

The number of corn farmers in Iowa continues to decrease as the remaining farms grow in size. This trend is generally true not just for Iowa corn farmers but for all conventional agricultural industries in capitalist economies. Farms decrease and the remaining farms grow increasingly massive. Scholars often explain these trends as aspects of larger concepts such as neoliberalism, financialization, and the corporate food regime.

Today, most Americans accept tenets of "productionism," the idea that farmers should increase production to feed the world, but this idea was anything but commonsense in 1930. Back during the Great Depression, poverty was of far greater concern. If farmers produced too much then they undermined the value of their products. These fears of overproduction abated in 1933 when the Roosevelt administration enacted price support subsidies for grains like corn and soybeans. Under this new policy, Iowa emerged as a proving ground for unrestrained production, and hybrid corn starred as a key catalyst.

Iowa corn farmers have a special connection to capital-intensive agriculture, because hybrid corn first took hold in Iowa. Before hybrid corn, most farmers saved seed from their "open-pollinated" corn to replant the following year. Although some companies sold open-pollinated corn seeds, it wasn't a big business. In the mid-1930s, crop scientists in Iowa made "hybrid" corn available to the state's farmers for a nominal fee. Compared to open-pollinated corn, hybrid corn is uniform, higher-yielding, and more receptive to synthetic fertilizer. By 1940, most farmers in Iowa used hybrid corn. From Iowa, hybrid corn spread to the rest of the US and eventually the world. Hybrid corn proved to be the key that enabled some corn farms to grow massive and gobble up surrounding farmland.

Statistics from the agricultural census reflect these trends. In 1935, Iowa had 200,000 corn farmers cultivating nearly 10 million acres. Four decades later in 1978, the number of farms halved to 104,000, but the area cultivated increased by 3.4 million acres (34 percent). Tack on another four decades to reach 2007, and the number of Iowa corn farms halved again, dropping to 50,000. Between 1935 and 2017, the average acreage harvested by a corn farm in Iowa increased six times over from 49 acres to 295 acres.

Perhaps no agricultural technology has been as divisive as genetically modified (GM) seeds. In the late

1990s, seed corporations introduced genetically modified corn, and when I researched Iowa corn farmers in 2006, stacked trait GM corn had recently become available. By stacking traits, GM corn could be modified not just to produce its own Bacillus thuringiensis (Bt) insecticide but also to resist Monsanto's glyphosate herbicide, otherwise known as Round-up. Seed corporations like Monsanto and Pioneer acquired smaller competitors and launched an arms race for a competitive advantage that continues to this day. Eventually, Monsanto and Pioneer were subsumed by still larger corporations. Regardless of the controversy, 95% of the corn grown in Iowa is genetically modified.

My research in the summer of 2006 occurred amidst a steady trend towards more industrial-style corn and soybean production. As much as corn and soybeans saturate Iowa, the number of people who toil in these fields continues to dwindle. With corn and soybean production occurring increasingly on a massive scale, a divide deepens between those who are too familiar with corn economies and consumers who grow increasingly alienated from food. Thanks to the generosity of corn farmers with whom I spoke during the summer of 2006, I gained insights into the dynamics they face. Thorny questions about corn farming, rural communities, and Grinnell College's role in this mix — all without easy answers — still needle me to this day.

"Although seed corporations control a staggering share of the global market, I encountered glimmers of resistance from people who understood the idea of productionism but stood firmly for other approaches."

Although seed corporations control a staggering share of the global market, I encountered glimmers of resistance from people who understood the idea of productionism but stood firmly for other approaches. Practical Farmers of Iowa remains an organization that seeks to balance farm incomes with better social and environmental outcomes. In Wisconsin, the Mandaamin Institute endeavors to introduce corn varieties better suited to sustainable farming. Many of the farmers I interviewed rejected the industrial model and developed their own practices based on local knowledge and experiences.

Upstream to Hawai'i, then downstream to Japan

My research on Iowa corn farmers gave me an abiding interest in seeds that enabled my next forays into the dizzying labyrinth of corn's economies to take me upstream of Iowa's cornfields to Hawai'i's seed corn industries and downstream to Japan's livestock industries. Despite having never taken a geography course at Grinnell College, human geography emerged as the best fit for me to continue exploring the intersections between place, ecology, and culture. In Fall 2011, I enrolled in the University of Hawai'i at Mānoa's graduate program in geography.

As a budding researcher, I serendipitously transitioned from Iowa, the epicenter of global corn production, to Hawai'i, the epicenter of global seed corn production. Heeding the advice of prescient mentors, I adapted to this opportunity and studied Hawai'i's seed corn industry for my MA thesis. At the time, the seed corn industry was one of the most controversial issues in the state. Much of this controversy centered on disputes over the safety of GM seeds and agrochemicals. Instead of focusing on these scientific disputes, I explored the economic and geographic factors that caused the seed corn industry to grow in Hawai'i. Doing so required me to delve into crop breeding by interviewing industry insiders. This research enabled me to explain the process of seed corn improvement and how innovations such as Marker Assisted Selection changed Hawaii's role within seed corporation's R&D strategies.

After my MA thesis, which explored corn-breeding upstream of Iowa corn farmers, I turned downstream to Japan. I know that in this essay Japan seems a surprising transition, but among other experiences I lived in Kobe with my family when I was twelve, studied abroad at Sophia University in Tokyo while enrolled at Grinnell, and attended a Japanese language school called IUC in Yokohama as a part of my UH Mānoa graduate program. For my PhD, I received funding from the Crown Prince Akihito Scholarship Foundation that supported two years of ethnographic research based in Miyazaki Prefecture in Southern Kyushu, a major producer of both industrial broiler chicken and artisan "jidori" chicken.

For Japan's agricultural industries, rice generates the most revenue, but the next five top sources of agricultural revenue come from animal industries that rely on imported grains: dairy, beef, pork, chicken eggs, and chicken meat. The precise route through which corn might travel upstream from Hawai'i to Iowa and then downstream to Japan is fuzzy. It's hard to know how much corn from Iowa is directly exported to Japan. That fuzziness is characteristic of international agricultural commodity markets, but even if we are limiting our focus to markets, Iowa still influences animal industries in Japan, because Iowa is such an important part of global corn markets.

Large grain barge in Shibushi harbor, Kagoshima Prefecture, Japan. Photo Courtesy of Benjamin Schrager.

My PhD dissertation explored the industrialization of Japan's chicken production, the emergence of a category of artisan heirloom chicken called jidori, the role of avian influenza in tightening biosecurity restrictions, and the high-risk practice of eating raw chicken. I also created a YouTube video series that shared stories about jidori farms and restaurants from Miyazaki Prefecture with the broader public. Drawing insights from these different aspects of chicken meat, my dissertation considered how social trust and anxiety respond to the growing chasm between upstream conditions of production and downstream consumer practices.

After completing my PhD, I received a postdoctoral fellowship from the Japanese Society for the Promotion of Science to research local food and rural revitalization initiatives while based at Kyoto University. Even though Covid-19 upended my research plans, I could still work on whipping my data into article-shape and then cajoling the proto-articles through the peer-review process.

I've shared links to some of my published work here – my happy successes – but I've endured far more letters of rejection than acceptance. This is typical, especially for early-career academics. Key ingredients for my publication record include that I learned to persist through the peer-review process, conducted original research, and engaged with ongoing scholarly debates. I was also lucky that I received funding for my graduate and post-graduate positions and enjoyed supportive communities along the way, communities like the East-West Center in Hawai'i. This support allowed me to focus on the journey of research and learning while mostly avoiding the ominous maw of the academic job market.

Even with my language ability and research experience, I count myself very fortunate to have landed an academic position in Japan. I became an Assistant Professor at Utsunomiya University in the School of Agriculture's Department of Agricultural Economics in October 2021. This position should provide me with a long-term base to teach and research about food systems in Japan and beyond. I hope that before too long I have a chance to return to Grinnell and share some of what I've learned and see how the school, farmers, and cornfields continue to change.

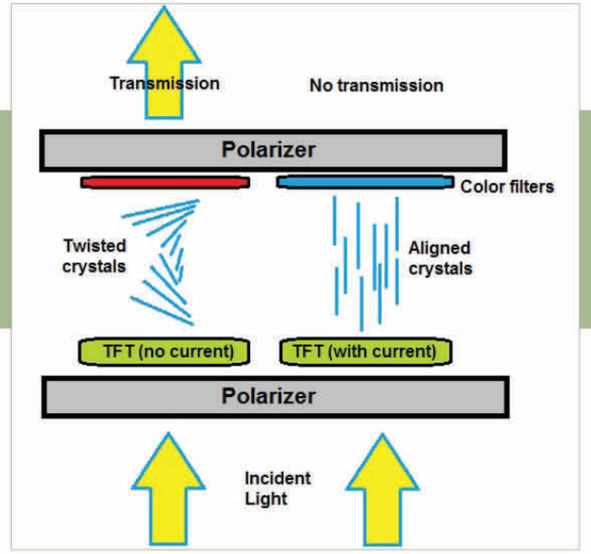


Diagram of a liquid-crystal display. When current is applied, the crystals align and are stopped at the second polarizer, creating a dark pixel. Photo courtesy of Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Liquid-crystal_display.jpg)

Technology on the Prairie

The Liquid-Crystal Display

James Fergason (https://en.wikipedia.org/wiki/James_Fergason), an American inventor born in Wakenda, Missouri, is credited with the groundbreaking invention of liquid-crystal display (LCD) technology in the late 1960s. Fergason's breakthrough came when he joined the Liquid Crystal Institute (https://www.kent.edu/amlci) at Kent State University and discovered that liquid crystals could be manipulated to control the passage of light, using the twisted nematic effect. This finding paved the way for this revolutionary display technology that would later become ubiquitous in many electronic devices.

Fergason's idea was to leverage the unique properties of liquid crystals, a state of matter that exhibits characteristics of both liquids and crystals, to create a controllable medium for modulating light. He developed a device called the "Twisted Nematic Field Effect" (TNFE) that held a layer of liquid crystals sandwiched between two glass plates, with electrodes applied to the surfaces. By applying electrical voltage to the electrodes, Fergason was able to manipulate the orientation of the liquid crystals, causing them to twist and control the passage of light.

Fergason's invention of LCD technology revolutionized the display industry, leading to the development of flat panel displays that are now commonly used in devices such as televisions, computer monitors, smartphones, and tablets. LCD displays offer numerous advantages, including high image quality, low power consumption, and compact size, making them an integral part of modern consumer electronics. James Fergason's pioneering work in developing LCD technology has had a profound impact on the way we view and interact with digital information, and his invention continues to shape the world of displays today.

Photo courtesy of Dan Weeks

Dan Weeks *is a freelance writer, photographer, and magazine and nonfiction book editor. He has a BA in American Studies from Grinnell College, an MA in creative nonfiction writing from the Graduate Writing Program at the University of Iowa. His memoir "What I Learned at the White Horse Ranch" appeared in Volume II, Issue 2 (https://rootstalk.grinnell.edu/past-issues/volume-ii-issue-2/weeks) of ROOTSTALK. He lives in Des Moines.*

The Emptying of Rural Iowa

BY Dan Weeks

The prairie has already lost many of its small farms. Now it's losing its small towns as well. Sparsely staffed Confined Animal Feeding Operations (CAFOs) and ethanol refineries are taking their places. Dan Weeks, an occasional contributor and friend-of-the-journal, accompanies a fifth-generation rural Iowan who gives an elegiac tour.

"We used to have two grocery stores, one on each corner here," says my host—let's call him John—as we cross the central intersection in his town in north central Iowa. Both buildings were boarded up, their sidewalks cracked and grassy. We idle the six-block length of Main Street in his mud-spattered pickup. He points out more former storefronts: barber shop, hardware store, feed store, newspaper, law office. All empty.

We pass a big Lutheran church. "Barely enough of us left to pay the utilities," John says. "And we need a new roof. Not going to happen."

The high school gets the longest obituary. "Graduated here in '64. Won state. We consolidated four years ago." The building—massive, brick, built in the nineteen-teens, with additions after the Second World War and again in the sixties—is abandoned. John crosses the parking lot's faded stripes, weaves around vintage playground equipment. We end up on the cinder track that circles the former football field. The bleachers have been dismantled; the announcing box is absent, now a shed

on someone's farm. We round the track at three miles per hour. The headlights sweep the sagging backstop of a baseless ball field like a searchlight.

Field of Dreams this isn't.

Generations ago, John's family immigrated from Germany. They homesteaded when "the county was so wet you could canoe it from one end to the other." His great-great grandfather tiled his fields with a spade and a strong back. When John took over the farm in the nineteen-seventies it was a huge operation. Hulks of nearly fifty-year-old equipment—a Deere combine, a big Steiger all-wheel drive articulated tractor, towering Harvestore silos—attest to that. The farm crisis finished him. He was lucky to get on as a rural mail contractor for the United States Postal Service. Driving his own pickup, he makes 515 stops a day, six days a week.

The Postal Service pays well enough to afford a remodel of the kitchen and to indulge his wife's elaborate, country-themed landscaping schemes. Opening the house as a B & B helped. The couple lives in considerable material comfort: granite countertops, the latest appliances, new flooring. But everything else they had was gone. Land. Livestock. Independence. Calling. Community.

John seems taciturn, uncomplaining, pragmatic. My wife, Randi, and I, staying at their Bed & Breakfast, hadn't asked for the tour of what was left of the town. Conducted at a dirge's pace, it proved steeped in almost unbearable loss, all related in a slow, flat monolog: The neighbors had not only lost their farms, but their houses too—now bulldozed into more corn and bean ground and owned by the few big grain operations that had survived.

John's son will inherit John's farmhouse and barnyard, but not a farm. The son works for an international meat processing company, feeding thousands of confined hogs on John's property in a massive shed with attached feed bins. Such arrangements are called CAFOs—Confined Animal Feeding Operations. The son is paid an hourly wage. No benefits, no equity, no profit share.

"I told him he could use this site for the confinement shed," John says. "He needed a job and he didn't want to leave. But I wasn't going to work with him for that outfit. That ain't farming." He says it matter-of-factly but spit out the final three words with the banked rage of a serf who'd once been a lord.

The terms of his son's contract prohibited John from showing us inside the shed. ("Too many animal activists," he said.) There, he told us, hogs lay on a steel grid over a lagoon of their own manure. The lagoon is emptied once a year.

> "'That ain't farming.' He spit out the words with the banked rage of a serf who'd once been a lord."

John speaks with a mixture of pride and resentment about the only new business in town, and perhaps the largest in the county: the corn ethanol plant. From his front yard, its bright lights, steaming stacks, and oil-refinery-like array of tanks and pipes were just barely visible, a bright glow on the dusky horizon. It covered as much ground as a good-sized, 1970s Iowa farm and towered higher than a grain elevator. "It kind of puts us on the map again," he says.

The ethanol plant was enabled by subsidies and tax breaks introduced into national policy as the Renewable Fuels Standard (RFS) in 2005. Big agricultural lobbies seeking more markets for the country's largest grain commodity had a lot to do with RFS's enactment. The ethanol is blended with gasoline and sold at subsidized, below-market rates. The result is slightly cheaper auto fuel, but at the cost of billions of taxpayer dollars in tax revenue and more expensive groceries, as food producers now have to compete with ethanol plants for corn.

The plant "ate corn and pissed alcohol," says John. The ethanol company had promised to bring high-paying local jobs to the area. But the refinery was built mostly by national and international construction firms specializing in such plants. These firms employ crews of highly skilled, highly paid workers who travel the continent building ethanol refineries. Many of the workers camped on the abandoned football field in 5th-wheel

Photo by David Ottenstein

RVs nearly as big as semitrailers. They left when the plant was complete. We saw the ruts their rigs had made in the turf. Circumnavigating the field, John's resentment of these transients squatting on his school's patch of glory with their big fancy rigs was palpable.

"Now," he says of the plant, "they can man the whole outfit with three, four guys a shift. They're not from here either, most of 'em."

The refinery promised a market for corn stover—the corn shucks, leaves, and stalks that remain after harvesting—as well as the grain itself. That would have turned field waste into a paying crop for local farmers. "But they wanted everything harvested just so. You had to have a so-many-row combine head, a special type of baler," John says. "You had to bale it to spec, transport it and deliver it to schedule. A fella would buy the equipment—huge investment—and then they'd change the rules. Not worth it. Some guys lost their shirts."

Compared to them, John considers himself lucky. But the occupation and community his family had helped to create in Iowa for generations was gone, along with any semblance of a sustainable local economy.

A Wisconsin dairy farmer—quoted in "The Last Stand," an article in the August 17, 2020 issue of *The New Yorker*—sums up the situation: "It's not the farming that I was brought up with," says Jerry Volence. "It's not really even farming anymore. It's mining. We're extracting resources and shipping them away, and they're not coming back. There's no cyclical nature to it. It's a straight line out."

At the end of our tour, we returned to John's house and sat with him and his wife on his porch as the sun set. We tried to think of an appreciative and encouraging response to what we'd just seen and heard, but there was an awkward silence while I pondered what that might be. Eventually I just thanked him for showing us around. Randi added that the town and his farm clearly had a proud history. That was the best we could do, and it didn't feel good enough.

John just nodded, and looked down the highway leading south, past the ethanol plant and its rail rail siding. There a long line of tank cars waited to haul the ethanol to St. Louis, perhaps, or Chicago, where it would help fuel the urban commute. None of it will end up in John's mail truck. It runs on diesel.

All photos courtesy of Kate Edwards

Kate Edwards *owns Wild Woods Farm (https://wildwoodscsa.com), a Community Supported Agriculture vegetable operation. She started farming a dozen years ago on rented land, and now owns the ground she farms. Kate is involved in farm policy, particularly pertaining to beginning farmers and land access. She lives with her husband and two-year-old on their 100-year-old farmstead in rural Iowa.*

Finding A Home: A Young Farmer's Journey

by Kate Edwards

I was covered in dirt from the field, wearing an old pair of shorts and a tank top, and I smelled like a mixture of dirt, sweat, and onions. It was a vegetable delivery day in July, and we had just run out of potato sacks. Looking for more bags, I drove my old gray pickup to town and walked through the sliding doors of our local grocery store. The cold air enveloped my sweaty body, hydrocooling me, causing me to shiver. I looked past the entry way to the produce section and saw an old neighbor who lived across the road from the first farm I had rented. He was holding an onion and examining it intently. I was a little embarrassed to be seen in field clothes and was in a hurry to get brown paper bags, a few aisles away.

My old neighbor lived on a 16-acre, 100-year-old farmstead, beautifully preserved, but no longer used for farming. He traveled a lot for his job, and his land and home stood empty the majority of the time. I had asked him a few times, years before, if he would sell me his land. I didn't even know if I could afford it, so I inquired in a half-joking yet wishfully serious way. But his answer had always been no. I still dreamed of owning land someday, but finding land appropriately priced and sized was difficult. Land access is a perennial issue for farmers, one that has been a defining part of my life. By this time, I had been farming for nine years and was now on my second rental property. I was debating if I should stop and speak with him. I hadn't seen him in four years, but then I heard his booming jovial voice from across the store.

"Kate! Haven't seen you in forever!" He grinned at me with a boy-like, endearing smile.

"You should buy my farm," he added, a little extra spark in his eyes.

He was in his early 40's and wore a cut-off t-shirt and jeans so ripped through with holes that they scarcely resembled their original form. The loudspeaker in the rafters above us boomed, "Checker to aisle five for price-check." Square cardboard boxes mounded high with potatoes, bananas, tomatoes, garlic, squash, and sweet potatoes surrounded us. A cooler case full of greens and cucurbits and pre-cut vegetables faced us on the wall. With all this available food, I was reminded that convenience was everywhere. I really didn't have time to chat, but I walked closer.

> "[W]alking one day to my engineering job from my apartment just outside the Twin Cities, I realized I'd rather be walking to a barn than to an office."

"So, you've finally decided to sell your place?" I asked.

"Yeah, my parents are getting older so I'm moving back home to be with them," he replied.

The blast of air-conditioning gave my tired body a boost of confidence. "How much are you asking?"

He shifted back and forth with anxious energy, rhythmically moving side to side. He named a figure for his farm.

"Too high for me." I said, and jokingly gave him a ridiculously lowball counteroffer.

He chuckled at my response. His shaggy, jet-black woodsman beard set off the twinkle in his eye. He grabbed an onion from beside him and tossed it in the air a few inches. I left the store and hurried back to the farm to finish preparing for the vegetable delivery. The importance of the moment eluded me at the time, but soon, it would prove to be life changing.

Ten years before this, walking one day to my engineering job from my apartment just outside the Twin Cities, I realized I'd rather be walking to a barn than to an office. Both my parents grew up on farms but, because of the 1980's farm crisis that swept through the Midwest, they weren't able to farm in their adult lives. Despite knowing the challenges involved, I made what felt like a radical decision to change my career and pursue my passion.

I called my Grandma right after I decided to leave my job. A familiar voice said, "He-llo."

I knew Grandma was sitting in her mauve, rolling chair at the kitchen table, looking out over her farm, the fields and big hill at the top covered in a blanket of snow. She had short, curly brown hair, quarterly permed at the beauty parlor, and weekly re-rolled in curlers at home. Not a wisp of gray hair was noticeable, though she was well into her 70's. She was a strong-but-short woman, her back slightly bent from

years of farm work.

I cared a lot about my grandparents and was worried about their disapproval. I knew how hard farm life had been for them. I knew she'd be disappointed with my decision, but I was determined to tell her anyway. After talking about the weather—it was snowing in Minnesota, icy in Iowa. I finally worked up my nerve and told her the real reason I was calling.

"I am going to leave my engineering job. I want to farm." I nervously announced.

She was silent. And after a breath, she spoke.

"Katherine, are you sure? You'll never make the money farming you can make now." Her voice came through in a static, echoey tone, indicating she'd placed me on the speaker phone. I knew she'd be looking over to Grandpa for assurance. He'd be telling her with his eyes, "Now, Ma, it's all right. It's her life." Quietly, in a disappointed and resolute tone, Grandma replied to me.

"We farmed so our children and grandchildren didn't have to."

Farming is an incredibly hard life. Many people, including my Grandma, believed their children deserved better. In 1935, a year before my grandmother was born, there were 6.8 million farms in the United States. But by the early 1950's, when she started farming, the number decreased to 5.3 million. Ten years later when my mother was five years old, it continued to dwindle to 3.7 million farms. And when I started farming in 2010, there were only 2.1 million farms. The US continues to lose farmers, and in 2022, there were only 2 million farms left. Fewer farms, means fewer farmers and I wanted to help change that trend.

Growing up, I lived with my parents in the suburbs, but spent every moment I could during my childhood summers at my Grandparents' farm. Almost twenty years before this conversation, I had sat in the passenger seat of the farm truck we called Old Red and worn bib overalls to match my grandpa's. Didn't she realize, it was because of her and Grandpa that I wanted to farm?

Two months after I called Grandma, I went to the office for the last day. And just under a year later I had found a place to farm. I rented a hayfield from a family friend near Iowa City. At 24 years old, in the fall of 2010, I shook hands with my first landlord and went from a young professional thinking about career advancement to a farmer wondering if I knew enough to grow food.

My newly rented field was nestled between a manicured lawn next to an event barn and a grand driveway, a gravel road, and a large, wooded area. I stood at the edge of the field on my first day on the farm and traced the outline of the potential plot with my gaze. Then, I walked the perimeter, counting my steps to calculate its size—one acre. I envisioned plowing up the rich green grass, turning it over and finding fertile soil underneath. With a nod to the woods that stood on the edge of my field, I named my farm Wild Woods Farm.

I grew 30 different types of vegetables my first year. I didn't know what I was doing, but I sought advice from established farmers. I fed 11 families through my Community Supported Agriculture (CSA) initiative and had a stall at the local farmer's market. I grew vegetables because I couldn't afford to grow corn. I couldn't compete with the low profit margins and high land investments of Iowa's current traditional crops: corn and soybeans.

I planted potatoes, trellised tomatoes, dug carrots, and completed a zillion other tasks to keep the small farm running. It was a lot of work, more than I thought it would be.

I was a tenant farmer with dreams of owning my own place—like my grandparents. They were tenant farmers for 15 years before they purchased a farm.

On this first rental farm, I operated with a year-to-year informal handshake agreement. My family friend, and now first landlord, also grew up on a farm and he delighted in having crops grown on his land. He connected me with the local-business community and built a deer fence around my field. His wife made delicious food from the produce, and for the first two years of the farm they let me live with them. I eventually found an apartment in town, commuting to the farm instead.

I learned a lot from trial and error, but more importantly I became involved in the local farming community and found a mentor who taught me how to grow better vegetables and grow the CSA membership.

In my fifth year of farming, we wrote and signed a one-year written lease. I was farming three acres and feeding over 150 families through a weekly veggie subscription.

I was trying to be proactive about longer-term land access, but in July of 2015, sixth months into our written lease period, my landlord came by the packing shed where I was working on bagging vegetables, and nonchalantly asked,

"Do you have a minute for a chat?"

We sat down at a white picnic table behind the barn.

"This isn't working Kate. I need you to be done farming here by the end of the year." he said.

I looked at him stone faced, not twitching, but internally gasping for air. My thoughts raced. Wasn't he just a few months before talking to me about selling me land? What had I missed? What had happened?

"Is there anything I can say to change your mind?" I asked.

"No, my decision is final." He replied.

Suddenly, it felt hotter than the 85-degree temperature. I had known this man almost my entire life. I had learned to skate on the pond below where we sat. His wife was always so kind to me. I had learned so much from them both. What had I missed?

I wanted to fight but froze.

After the longest awkward silence of my life, he turned and left without another word. Flight took over and I stood up from the picnic table, walked over to the new pack shed he had built for me to use, and conversed with one of my farm workers about the tasks that needed done that day.

I had not left Iowa during the farming season in five years. I was so shocked that I hopped in my truck barefoot and drove to my parents' place a few states away. They had recently moved to Ohio for my dad's job. I was in Indiana before I even realized I didn't have shoes on. I spent two days regrouping at my parents' home and then drove back to the farm to face my future.

On my return trip home, my pickup truck began

to shake. I heard a pop and smelled burning rubber. I swerved to the shoulder and realized my tire had blown. Two hours later, I found myself signing up for a Sam's Club membership, the only tire store open on a Sunday.

As I waited for four new tires to be put on my truck so I could continue the trek home, I roamed the Sam's Club. I felt culture shock walking the aisles of the temperature-controlled building. The farm had been my life, every waking minute paying attention to it: what my crops might need, thinking about irrigation, payroll, employee management, the effects of rain, cold, heat. I didn't go into box stores often. I was overwhelmed with the pallet displays of fruit roll ups, socks, headphones and as Nancy Griffith says in one of my favorite songs, ``unnecessary plastic items." Yeast and caramelized sugar from the bakery mixed with savory smells from the rotisserie chicken display wafted through the air inside. Country music blared on the loudspeakers. The singer's words rung with a nostalgia for farming, a life that always consisted of male farmers with 'pretty little ladies' to come home to.

The reality of farming and the nostalgia for it are completely different. The singers crooned about fried chicken, mudding on backroads, and guys whose girlfriends thought their tractors were sexy. Meanwhile I wondered if I'd have a place to park my tractor by the end of the year. How would I find land? My garlic needed to be planted in just a few short months! I had built up my CSA to serve hundreds of families over the years. I felt immense pressure not to let them down.

I later learned that after I left my first rental farm, the land was rented to another grower. After another few years, the land was sold. Landowners often change their minds about wanting beginner farmers on their land. Small farming is labor intensive, smelly from manure applications, potentially weedy in a wet year, and takes a lot of people to succeed. But sometimes landowners don't realize what it takes for a young farmer to succeed.

After returning, I spent the next month farming during the day and looking at every farm for sale in the area at night. I followed every lead on rental properties during the evening. We live in a hilly county with pricy land, and the farmers here have to compete with development prices. Vegetables don't require a lot of land compared to row crops, but they do require flat land. Everything I looked at for sale was too hilly or too costly.

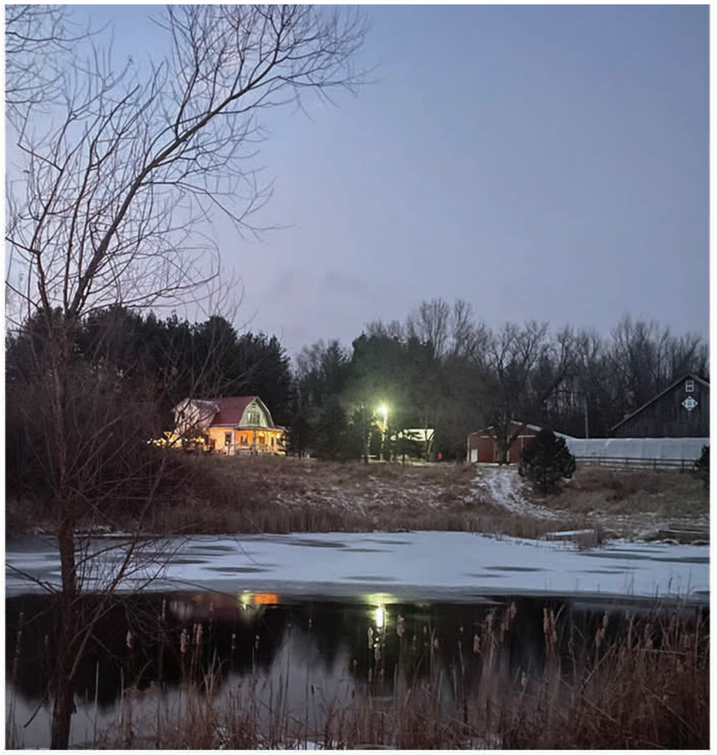
In August of 2015, a month after I received the news that my lease would be terminated by the end of the year, I stood in a convenience store on the edge of town. I was grabbing a snack after touring rental farms with a man who farmed lots of land around the area. Nothing we looked at would work. All he could find were small plots, which were basically big gardens. The larger fields were used for industrial row crop operations, and the homesteads were occupied by folks that worked in town. He was kind and offered what he could, but I needed more acres.

I walked the aisles of the small store looking for a snack that wasn't too egregious. I settled on a pack of peanuts and a bottle of water but continued to browse to give myself time to think. All the land I looked at that afternoon wasn't quite right, either too vulnerable to spray drift, had no water access, or was only available for a short-term lease. I was stuck again. It was late summer, and time was running out. I'd already come to realize that I couldn't plant a garlic crop that fall. Another loss, five years of seed saving wasted.

I racked my brain as I looked at the rows of processed food, listened to the chatter of old men drinking coffee by the windows in the background. The smell of popcorn wafted through the air. Who else did I know who had land?

As I picked out a granola bar to add to my snacks, I realized I had one more option. I called an acquaintance who owned land nearby and asked if I could come talk with her. Amazingly, she said yes. Ten minutes later, we sat at a yellow picnic table next to her garden on the land she'd grown up on and recently purchased from her mother. The entrance to the land was off the main road, following a short makeshift driveway of wood chips. White electrified netting surrounded her garden, protecting it from deer. North of the garden, a small section of trees hid a nearby subdivision of land. To the west was a large field of alfalfa bordered by trees.

As we sat on the yellow wood, she offered her land to me. She offered me hope. She assured me we'd create a lease quickly enough so I could plant the garlic I'd been thinking I'd lose. I looked around, the land was full of green, luscious fields, surrounded by mature woods with tall, dense verdant canopies. A perfect place for Wild Woods Farm, I thought to myself. Most of the farms I visited earlier in the day didn't even have a tree



in sight. It was an unusually pleasant summer day, my tired shoulders relaxed, maybe there would be a solution after all.

Beginner farmers often don't get everything they need in a lease, either because they don't know what they need or because they're scared of losing access, even if these things are required for success. Sometimes, if a farmer asks for what they need after the lease begins, they can lose long term access. But the lessons I learned from my first farm emboldened me.

So, I told her, "there are a few things I need in order to rent this land. I need fencing, water, barn space and ideally, a place to live." There were no structures on the site, no water access, and no substantial fencing. I knew my request was a tall order.

We met every week until October, talking through what I would need. By fall, we decided that I would take out a loan to construct a building on the property and the landowners would buy the building back from me at the end of a five-year lease term. And to cut my expenses, I would build an apartment into the building. Owning it would help me build equity, so that in five years I could hopefully buy a farm. She agreed to pay for a water well and hydrants, and to provide some fencing, for an additional fee added on to the rent. Three months after I first approached her, we had a lease signed. I finally had a place to farm again! It was bare ground with nothing on it but a promise that together, we would rebuild a farm.

In November of 2015, I sat in the field of alfalfa on my new rental farm, its green tendrils soft against my skin. It overlooked the pole barn building site, and seeing it all filled me with a sense of calm. It was the place of my future home, machine shed, and pack shed, in one carefully designed, rectangular red barn. The blue sky enveloped me. I felt reconnected to my passion. It was a healing moment. My dreams renewed, confidence restored, and my ambition restarted. Pop. Pop. Pop. The sound of the construction workers swiftly attaching boards together with their air-driven nail guns. Like children with tinker toys, their shouts volleyed back and forth, some good-natured teasing, and others, instructions for the next job.

I sat back on the hill to think and watch the building crew for a while longer. I knew the ground I sat on was Kickapoo, Sac and Fox, Ioway, and Sioux land. No one really owns the land, I thought, we are all but temporary caretakers.

I was investing extensive labor on rental farms, building infrastructure, and improving soil health. In the long term, I knew I needed to buy land so I could have stable land access. But at the time, I couldn't find a farm to buy. At least this second rental farm was a solution that moved me forward.

Farming as a tenant involves a lot of emotional labor. No matter how wonderful a landlord is, there is always a power dynamic. The fear of losing land access looms over the relationship, and a farmer longs to have secure tenancy on the land they tend and have come to love so much. But at the end of the day, it's still someone else's land. Even if you can find a farm to purchase, you still have to make it work economically. Farming requires long hours, little time off, and is one of the lowest paying jobs.

At the end of my eighth year of farming alone, I got married. Derek, my husband, was not a farmer, but I enjoyed teaching him to drive a tractor and he'd help me occasionally on nights and weekends. He moved into my barn apartment and was only mildly shocked by the furnace room full of sweet potatoes, the living room filled with winter squash, and the garage area filled with onions. My operation was quickly outgrowing the rental property. We needed to buy a farm.

It felt impossible. I had already been looking on my own before Derek and I got together. Now that we were married and knew we wanted to have kids, the stakes felt even higher. We wanted to find a place we could make our forever home. The equity that I had built in the barn would help us with a down payment. But we still had a small budget compared to the casual homesteaders with town jobs and the developers encroaching on our area.

> "It was bare ground with nothing on it but a promise that together, we would rebuild a farm."

In the summer of 2019, Derek and I looked at every single farm that came up for sale in our area, a full-time project after the farm work was done. It was a long journey of looking at farms that were either too big, too small, too old, too expensive, or with soil too poor to grow vegetables. I searched everywhere—land sites online, rural grocery store bulletin boards, auctions, realtors—and talked to everyone I knew. I hunted within a 30-mile radius of my market, scouring ads in three counties. We looked at a farmhouse with cinder blocks and old chains in the basement, smoke so thick on the walls of the house, it would have to be peeled off. I considered the property, but it came with more land than I could afford. Another farmhouse had been overrun by various animals that used to be pets, something I could potentially deal with, but it came with too little land—not enough to make a living with vegetables. Then, there were the farms with the fields that were too hilly, too rocky, too sandy, or too expensive.

I searched for funding options and determined the USDA Direct Farm Loans (https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index) would be my best option for purchasing a farm. I asked my loan officer if I could purchase an open field and build a house and barns but was told the program was only set up for purchasing land with existing infrastructure. Yet, all the farm infrastructure we found was aging, some even falling apart.

One evening, two months after the impromptu meeting in the produce department with my old neighbor in the grocery store, my husband and I had just finished looking at yet another farm that didn't fit our needs. Like many others, this one was not going to work. It only had five acres of land, not enough to make a living on, and a house too expensive for us. Fancy acreage, more suited to a nonfarmer.

Derek said, "Isn't your old neighbor's farm near here? The one who tried to sell it to you in the grocery store?"

I replied, "Yes, it is, just over that way a mile. But it's too expensive; my loan officer would never go for it."

"Let's just drive by," Derek replied.

We drove our red pickup truck slowly down the gravel lane in front of the farm. The setting sun basked the 100-year-old farmstead in a golden hue. The farm was a small, only 16 acres—all that was left of the 160-acre farm platted in the 1800's. The infrastructure was well-kept, having been owned for 30 years by non-farmers who had money to keep up the house and buildings. It was admittedly smaller than ideal, but on the way home I looked up the soil maps on my phone and determined the soil was better than the land I was renting. Through careful crop planning and building soil health, I determined I could make it work.

The farm was not listed with a realtor but was for sale "by owner." I called my old neighbor, and he was eager to talk. We set up a time to see the place, and one evening a few days later Derek and I drove over to the farm to discuss the property with him.

We parked between a 100-year-old haymow-barn and a newer, red-pole building. We walked the circle drive towards the house, passing a century-old granary on our left.

I thought about the many uses of the buildings. The granary would have held oats during the Great Depression but some time in the past twenty years it had been retrofitted to be a chicken coop. Currently, no feathers remained, and it now served as a dog kennel. The progression of the farming world, summed up in one building.

Kate Edwards, husband Derek, and their daughter

We approached the house, a tall two-story structure, with a gabled, red metal roof. The house was painted white with intricate red trim. We stepped up on the porch, a large, covered area with wide floorboards and a swing. I squeezed Derek's hand and then knocked on the door.

The door opened.

"Kate, great to see you! Come inside." My old neighbor said.

I introduced Derek and we toured the house, through the living room with diagonal wooden floorboards, past the woodstove in the parlor, and into the bright kitchen, sitting down at the table. Out of the south window, I saw my first rental farm across the road and momentarily relived the heartache of losing it.

Eventually, we began to negotiate. He was delighted to possibly be selling his place to a farmer, since all the other prospective buyers had been developers. Negotiations began and in classic rural fashion, my old neighbor looked at my husband instead of me, despite having just met him.

Derek, who worked at a job in town, redirected his look back to me. "She's the farmer," he said. When we left, we had the beginnings of a deal.

I called my USDA Loan Officer later that week while weeding fall cabbage. She was delighted I had found a potential farm to purchase. But the budget she set for me was $100,000 less than the listing price of the farm.

It was difficult, but I negotiated a lower price for the farm and a higher loan amount. And in September of 2019, on our first wedding anniversary, a month after we sat at the kitchen table negotiating, Derek and I electronically signed a purchase agreement for the farm, in the field, on my phone. We were on a break from digging potatoes in some ground I'd recently expanded to, on a neighboring farm. A year later, that potato field became a housing development.

The story of land access is an ancient one. We stand in the gap between the indigenous peoples—the original famers who cared for this land—the early settlers who cleared it for agriculture, and the developers encroaching on our area.

Today, after two tenant farms, I finally own the ground that I cultivate. I also rent a few acres from a neighbor. Last summer, we fed over 300 families through our CSA. Derek and I have a two-year-old. She learned to walk on the hardwood floors of our 100-year-old house, and now she runs out the door to the farm with me each morning. Grandpa passed away a few years ago, but I knew how proud he was of me before he died, another generation farming. I miss him every day. He would have delighted in watching my daughter in her pin-striped blue overalls just like he wore. My Grandma comes to play with our little farm girl while I work in the field. She gets it now, I think. Although, she still believes I don't make enough money to work this hard.

Land access continues to be part of my story, a journey that has challenged me mentally and physically, but I stand in the center of my passion. And I get to share that joy with my husband and my daughter. For now, we farm this ground and grow food for our community, one harvest at time.

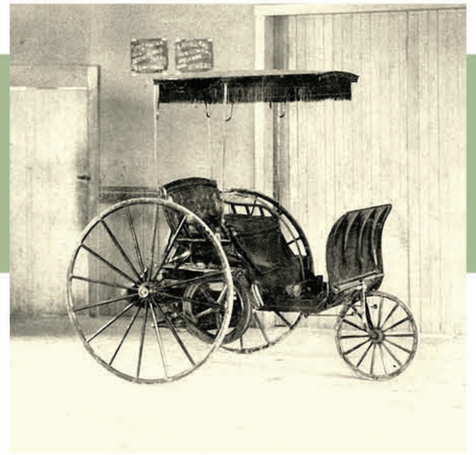
Photo courtesy of Charles Connerly

RootsTalk! Podcast #7:

Sustainability in Iowa: An Interview with Charles Connerly

Chuck Connerly *is a professor emeritus of planning and public affairs (https://sppa.uiowa.edu) at the University of Iowa. Prior to arriving at Iowa in 2008, he was a professor of urban and regional planning at Florida State University for 27 years. He is founder of the Iowa Initiative for Sustainable Communities (https://iisc.uiowa.edu), which has partnered with over 50 Iowa communities to complete over 320 community-based projects involving students and faculty across the University of Iowa. His most recent book (reviewed in Jon Andelson's Publisher's Note in this issue) is* Green, Fair, and Prosperous: Paths to a Sustainable Iowa (https://uipress.uiowa.edu/books/green-fair-and-prosperous), *published in 2020.*

To listen to Professor Connerly's conversation with Rootstalk associate editors Dechen Kangkyil and Alexandra Natalie, go to the Spring 2023 issue of Rootstalk at https://rootstalk.grinnell.edu/ and click on the article link or enter "podcast" in the search bar, then navigate to RootsTalk! Episode #7. Past *Rootstalk* Associate Editor Emma Kieran composed and played the intro and outro music for this episode



Above left: the first working American gasoline car, 1891. (https://en.wikipedia.org/wiki/John_William_Lambert#/media/File:First_American_Gasoline_Automobile.jpg) Above right: The new and improved four-wheel car produced by the Lambert Automobile Company in1908 (https://en.wikipedia.org/wiki/File:Lambert_Automobile_Company_1908.png) Photos courtesy of Wikimedia Commons

Technology on the Prairie

First American Gasoline Automobile

John William Lambert, a renowned American inventor and engineer, is widely recognized as the mastermind behind the first successful gasoline-powered automobile in the United States. Hailing from Mechanicsburg, Ohio, Lambert constructed this groundbreaking vehicle in 1890 and has since been revered as the "Father of the American Automobile."

Lambert's gasoline-powered three-wheeled buggy featured a single-cylinder, two-stroke engine. He eventually opted to discontinue the original design in favor of the more dependable and widely adopted four-wheel configuration that remains in use to this day. With a modest 3/4 horsepower, it could reach a top speed of around 5 miles per hour. The engine featured a carburetor, a device that created a combustible mixture of air and fuel that powered the engine. Additionally, Lambert's automobile incorporated a mechanical transmission system and a chain-drive to rotate the wheels.

A distinct feature of Lambert's invention was its innovative fuel system. Unlike conventional gravity-fed fuel tanks, Lambert's vehicle boasted a pressurized fuel tank that utilized air pressure to force gasoline into the carburetor. This pressurized fuel system ensured a consistent and reliable supply of fuel to the engine, which greatly improved its performance.

In early 1891, Lambert's gasoline automobile made history as it hit the roads of Ohio City, becoming the first successful gasoline-powered automobile to be built and driven in the United States. Lambert continued to refine his designs and build more automobiles, making significant contributions to the fast-growing American automobile industry. His revolutionary invention laid the foundation for the rapid growth and advancement of the automobile industry in the United States in the years to come.

Photo courtesy of Rustin Larson

Three Poems

by Rustin Larson

Beethoven

Beethoven dances in my living room and knocks
over towers of cardboard boxes full
of shoes, mixing bowls, and silver-
ware. He pounds on the walls with
fists covered in blood and the
juice of tomatoes and cherries.
He collapses into a heap
of dirty laundry and sobs like a
lonely young woman with blue cumulus hair.
I take to the streets, friendless.
The clerk at the hardware store
says it ain't gonna happen when
I try to buy a can of white
fence paint. All the cafes are closed.
Where did the world go when I wasn't
looking? A surrealist ballet called
"Bull on the Roof." No plot. What
does Charlie Chaplin know, anyway?
Beethoven has recovered and has
made himself a BLT. The wall-
paper still holds his splattered
hand prints, but they, the hand prints,
have transformed into
full-blown peonies complete with
curious black ants wandering in the petals.

Anniversary

Monarchs and Viceroys
fluttering over
the zinnias
air molecules swimming
gray tuxedo kitten sleeping
on the kitchen floor

the tunnel of the moonlight
only a memory
take this object
and grip it really tightly
with your hand
turn everything upside down
laugh often

I remember Nickerson's Farms
don't you
I remember when gas was 25 cents a gallon
Gas War! the signs would say
my bicycle required no gasoline
but I did take advantage
of the free tire pump

white gray pigeons flying overhead
like in a commercial for canned spaghetti
they served in school lunches

could I allow myself this memory
the tomatoes growing in the garden
don't know about sauce

in this moment are my shoes walking away
the smell of hot tar is everywhere
let's do this one more time
everything is reversed inside my head

the lasagna the chicken
the woman who strolled room to room
playing flute when my life opened up
I saw that my thoughts weren't mine

anyway if everyone sitting at the lunch table
was Edgar Allan Poe
would it make any difference

Finnegan strolled into the next room
if you have in you have out

broadcast this on the crystal radio
a lawnmower or a boat is flying over the house
like a whirling piece of cardboard

we will celebrate tonight
the anniversary of our wedding

did we run away
I was content
I had no clues
water seeks its own level

we have flowed together
down many streams
in the sky blue country

Photo taken at the Conard Environmental Research Area in September 2016 by Jun Taek Lee

Rustin Larson's *writing appears in the anthologies* Wild Gods *(New Rivers Press, 2021; https://www.newriverspress.com/shop/anthologies/wild-gods) and* Wapsipinicon Almanac: Selections from Thirty Years *(University of Iowa Press, 2023; https://uipress.uiowa.edu/books/wapsipinicon-almanac). Recent poems have appeared in* London Grip *(https://londongrip.co.uk)*, Poetry East *(https://www.poetryeast.org)*, The Lake *(http://www.thelakepoetry.co.uk)*, Poetryspace *(https://www.poetryspace.co.uk)*, Pirene's Fountain *(http://glasslyrepress.com/pf.html), and* Lothlorien Poetry Journal *(https://lothlorienpoetryjournal.blogspot.com). His chapbook* The Cottage on the Hill *(https://rustinlarson.wordpress.com/2022/04/20/the-cottage-on-the-hill) was published by Cyberwit.net in April of 2022. He is on faculty in Maharishi International University's MFA in Creative Writing program (https://www.miu.edu/mfa-in-creative-writing).*

The Light

through the blinds
slashes across the page
like stripes
of a shadow flag

this is the elfin art camp
with liberty and justice
for owls

meanwhile that ocean
that ocean
how about that ocean

my friends from California
used to stare at me
like amazed gophers
I can't explain this

I rode home on a Boeing
but that was a billion years ago
when the birds were chirping
so now we have failed to make every place America
although we sure gave it a go

I can barely remember eating pancakes at Sambo's
before the Michigan-Iowa game
in 1969

landslide people walked to get an armload
of medicine
in the park
it was an animal planet
and I'm not saying I was in favor of any of it
though you can develop a nostalgia
for macaroni and cheese

and that it is just super weird
by the way
none of this is factual okay
stay calm
they are not coming to arrest you
yet

gold roaster and goldfish
and I have bad news
the house didn't sell
and what do I have to say
that isn't another windmill to attack
with a jousting lance
on horseback

volunteer mulberries weld their shadows
to the side of the next hovel

we made a Mount Rushmore of mud
complete with our tired faces

Photo taken at the Conard Environmental Research Area in September 2016 by Jun Taek Lee

Photo courtesy of James Colbert

Jim Colbert *grew up in Cedar Rapids, Iowa, and graduated in Biology from Iowa State University. After graduate school at the University of Wisconsin-Madison and a three-year stint on the faculty at Colorado State University, he returned to Iowa State University. Dr. Colbert did research on various aspects of plant and fungal biology and taught introductory biology to thousands of students over his 33 years as a faculty member at Iowa State. During his many wilderness canoe trips to the Boundary Waters Canoe Area Wilderness (https://www.fs.usda.gov/visit/destination/boundary-waters-canoe-area-wilderness) Dr. Colbert became fascinated by lichens, which are more prominent in the boreal forest than in Iowa, leading to research projects on the lichens of Iowa over the past 15 years.*

**All references appear in Endnotes in the back of the issue.*

Iowa's Lichens: Found and Lost*

BY JAMES COLBERT

Lichens are a lovely part of Iowa's native biodiversity, but are easily overlooked and often misunderstood. When noticed by the casual observer, lichens are often thought be a type of "moss." True mosses are actually a type of plant, but lichens are not plants at all. Lichens are fungi that have an intimate symbiotic relationship with a photosynthetic organism, either a green alga or a cyanobacterium[1]. The fungus is almost always an "ascomycete" ("sac fungus") the same group of fungi to which morels and truffles belong. Recently, we have learned that many lichens are more complex than had been previously understood. and they can have additional fungal components.[2] Lichens play various roles in ecosystems. Many lichens are used for food and shelter by numerous species of smaller insects and other arthropods. Some birds use lichens as nest material. Those lichens with cyanobacteria can fix nitrogen from the air, thereby increasing the amount of nitrogen available to plants in their local ecosystem.

Lichens in Iowa can be found on a wide range of substrates, including soil, rocks, wood, and even human-made materials such as concrete, plastic, rubber, and metal. The most common substrate for Iowa lichens is probably bark (Fig. 1). Taking a close look at the bark of virtually any tree in Iowa is likely to reveal the pres-

ence of one type—and usually more—of lichen. *Physcia stellaris* (Fig. 1), and the very similar *Physcia aipolia* are amongst the most common "foliose" (i.e., leaf-like) bark lichens in Iowa. *Candelaria concolor* (Fig. 1) is also commonly found on the bark of trees in Iowa. *Teloschistes chrysophthalmus* (Fig. 1) is a lovely, but much less common, "fruticose" (i.e., shrub-like) lichen found on the bark of Iowa trees. Overall, a surprising diversity of lichens has been recorded in the state. There have been 478 distinct lichens recorded in Iowa,[3] which is almost 10 times more than the number of mammal species currently found in the state and about the same as the number of bird species.

Although nearly 500 different types of lichens have been recorded here, at one time or another, it seems fair to ask whether all of these lichens are here now and whether settlement by Europeans had any effect. To put the answer to this question in its proper context, it is important to examine the effect of European settlement on Iowa's biodiversity as a whole. Two-hundred years ago, in 1823 prior to European settlement, Iowa was a very different place. The Lewis and Clark expedition had passed by the state's western border while headed upstream on the Missouri River only 19 years previously. The first official settlers of European descent wouldn't arrive for another decade, though indigenous peoples such as the Ioway and the Dakota had long been thriving in the region.

Iowa in 1823 was also very different from today with respect to its non-human biodiversity.[4] Most of the state was covered by millions of acres of fire-dependent tallgrass prairie. Large portions of eastern Iowa were part of the western border of the great eastern temperate deciduous forest. Much of north-central Iowa was dotted with pothole lakes and innumerable wetlands of every size. The land was teeming with animals.[5] There were herds of bison and elk. Large predators roamed the state, including mountain lions, gray wolves, and black bears. The rivers and streams were home to large populations of beavers, river otters, and many less obvious species, including a wide array of freshwater mussel species.[6] The deciduous forests of eastern Iowa had plentiful turkeys, ruffed grouse, and phenomenal numbers of passenger pigeons. Prairie chickens were found throughout the state, and during the fall and spring migrations many species of ducks and geese darkened the skies.

FIGURE 1. LICHENS GROWING ON THE BARK OF A WILD PLUM (*PRUNUS AMERICANA*) BRANCH. THE ORANGE LICHEN IS *TELOSCHISTES CHRYSOPHTHALMUS* ("GOLDEN EYE LICHEN"), THE GRAY LICHEN IS *PHYSCIA STELLARIS*, AND THE YELLOW LICHEN IS *CANDELARIA CONCOLOR*. IMAGE TAKEN IN ADAIR COUNTY, IOWA IN 2020. ALL PHOTOS COURTESY OF JAMES COLBERT

The populations of many species that were common in Iowa in 1823 have been dramatically reduced since then. Perhaps the most obvious would be any of the common tallgrass prairie plant species that once blanketed most of the state. These have been replaced in large part by corn, soybeans, and non-native pasture grasses. Remnant tallgrass prairie has been reduced to a tiny fraction of its former extent. Early on many of the larger and economically important animal species were extirpated from the state. There are no longer free-ranging reproducing populations of mountain lions, gray wolves, black bears, bison, or elk in Iowa. The last known wild elk in Iowa was seen in 1871—a mere 25 years after Iowa achieved statehood. Other species, including river otters and turkeys, were extirpated from the state, but subsequently reintroduced by the Iowa Department of Natural Resources, and currently these species have healthy populations throughout the state. The prairie chicken was also extirpated and has been reintroduced, but the lack of suitable habitat allows only a small resident population, primarily at Kellerton Grassland in Ringgold County. At least one native Iowa species, the passenger pigeon, will never return. It was driven to extinction by overharvesting and habitat loss due to the activities of settlers of European descent, with the last known individual dying in 1914.

> "The population of many species [of lichen] that were common in Iowa in 1823 have been dramatically reduced..."

Our knowledge of native Iowa species that have been dramatically reduced in population size, extirpated, or driven to extinction over the last two centuries depends on the historical records that allow us to know what species were present in, for example, 1823. Unfortunately, those records typically reflect only the most common, the largest, and/or the most economically important species. Smaller native species with no obvious economic importance were given very little attention. Consequently, little information is available from the early years of European settlement of Iowa, so we know very little about these native species and are dependent on records kept by early Iowa residents who were self-styled naturalists and who paid attention to some of the state's less obvious native species. Even with these sources taken into account, it wasn't until the latter half of the 1800s that these species began to be recorded and preserved. It's impossible to know what diversity might have been diminished or lost in these early years.

Lichens certainly fit into the category of "small species with no obvious economic importance," and it's highly unlikely they would have been considered noteworthy by early Iowa settlers. The first lichen recorded in Iowa was collected in 1870 by Dr. Charles Bessey who, at the time, was a faculty member at the institution destined to become Iowa State University. The lichen was *Parmotrema crinitum,* and the specimen currently resides in the University of Wisconsin-Madison Herbarium.[7] This lichen likely still persists in Iowa as a recent population was recorded in 2013.[8] That is not, however, necessarily the case for all of the other lichens recorded for Iowa. By our estimate, at least 33 of Iowa's recorded lichens are currently quite rare in— or

Figure 2: (left) *Lobaria pulmonaria* growing on the bark of a sugar maple (*Acer saccharum*) tree. Image taken in the state of Maine in 2011. The same species grows in Iowa.

Figure 3 (above): Specimen of *Lobaria pulmonaria* collected by Dr. Bruce Fink in 1894. From the Ada Hayden Herbarium Lichen Collection, Accession # 25303

potentially extirpated from—Iowa.[9] It is also possible, perhaps even likely, that there are other native lichens that may have been extirpated from Iowa—some having been lost before anyone recognized that they were ever present here.

It is impossible to know with certainty that a lichen has been extirpated from a region in which it was previously known. However, extensive searching of suitable habitat without finding a population of a particular lichen provides strong evidence for extirpation.

The best example of a native Iowa lichen that has likely been lost is *Lobaria pulmonaria* (Figure 2). This lichen is a rather large and prominent bright green foliose lichen that grows on tree bark. It is easy to find and identify. Still, it has been recorded only four times in Iowa, between 1894 and 1901, in three northeast Iowa counties (Clayton, Dubuque, and Fayette), where it was collected by two of Iowa's early naturalists—Dr. Bruce Fink and Dr. Bohumil Shimek. One of Fink's *Lobaria pulmonaria* specimens resides in the Iowa State University Ada Hayden Herbarium (Fig. 3). Without these scientists' efforts we might never have known *Lobaria pulmonaria* was native to Iowa. Given its size and prominence it seems likely that this lichen was rare in the late 1800s. Its abundance 200 years ago in 1823 is impossible to determine. An extensive search (a total of roughly 92 miles of search effort[10,11]) in suitable habitat was carried out in Dubuque and Clayton Counties, as well as in neighboring Allamakee, Delaware, and Winneshiek Counties between 2008 and 2017. No populations of this native Iowa lichen were discovered. *Lobaria pulmonaria* is very likely a lichen that is no longer part of Iowa's native biodiversity. *Lobaria pulmonaria* is known to be an old growth forest lichen that is also sensitive to air pollution.[12] Due to human activities, Iowa has very little, if any, remaining old growth forest, and the state has air quality issues of various kinds as well.

Some might argue that the extirpation of *Lobaria pulmonaria* from Iowa is no great loss. It is, after all, quite abundant in some other parts of the world, including northern Minnesota. One could get in a vehicle, drive about 500 miles north, find suitable habitat, and have a reasonable chance of seeing L*obaria pulmonaria* in the wild. Still, it is sad to have a lovely lichen that was formerly present in "our own backyard" disappear, very likely as a result of our own activities. Perhaps we should consider reintroducing *Lobaria pulmonaria* to Iowa. It worked for turkeys and river otters.

Photo courtesy of Zach Spindler-Krage

Zach Spindler-Krage '25 *is a native Minnesotan who feels an immense amount of state pride. He has always loved writing, history, and photography, and he enjoys finding ways to combine them to tell stories about people and places. Aside from studying political science and policy studies, Zach spends his time playing cello, singing in choir, advocating for environmental and political issues, camping, and enjoying time with family. At Grinnell College, he is involved in the Rosenfield Program and writes for the* Scarlet & Black *(https://thesandb.com) and* Grinnell Press (https://grinnellcollegepress.com/archive/index.html). *His freelance writing about the Boundary Waters has appeared in* MinnPost (https://www.minnpost.com), Minnesota Reformer (https://minnesotareformer.com), *the* Post Bulletin (https://www.postbulletin.com), *and* Duluth News Tribune (https://www.duluthnewstribune.com). *Zach published a book of nature photography and poetry entitled* Whispers from the Wilderness: Dictionary of Latent Contemplation *with Grinnell Press in the spring 2023.*

A Spirited Land: Indigenous Tribes' Fight to Protect the Boundary Waters*

By Zach Spindler-krage

The Boundary Waters Canoe Area Wilderness (BWCAW) and Superior National Forest are traditionally known as Anishinaabe land. The story of the Anishinaabe peoples—also known as Ojibwe or Chippewa—is one of resilience, persistence, and hope. The interconnected waterways winding across the Superior National Forest have been critical travel routes for the Anishinaabe for thousands of years, since long before fur traders from Europe began displacing Indigenous tribes. The fight to protect these lands has endured for centuries, and it continues in full force today in response to proposed sulfide-ore copper mining in the headwaters of the Wilderness. The preservation of this land is not only a matter of environmental preservation but also a matter of upholding Ojibwe treaty rights. The recent success of the Boundary Waters protection movement in mitigating mining threats is due in part to legal action and advocacy by the Minnesota Chippewa Tribe (MCT), and if permanent protection is achievable it will likely require continued Indigenous initiative. In order to fully appreciate the modern efforts of the MCT to protect the BWCAW, we must first consider the history of land treaties between the federal government and these tribes in some detail.

**All references appear in Endnotes in the back of the issue.*

Indigenous History in Northeastern Minnesota

The Boundary Waters Canoe Area Wilderness is a vast expanse of interconnected lakes, streams, and forests that spans 1.1 million acres of unspoiled natural landscape in northeastern Minnesota. It is the most-visited Wilderness in the country and holds 1,100 lakes within its boundary. Here, the air is crisp and the water is clear, reflecting the majestic sunrise each daybreak. Loon calls echo across the lakes, cutting through the meditative sound of waves lapping against the rocky shoreline. The dense forests of spruce and pine trees seem infinite, sheltering the swaths of wild blueberry patches and the wildlife that devour their fruit. At dusk, bald eagles are replaced in the sky by countless stars that shimmer off the glassy water. When Mother Nature is feeling generous, the northern lights illuminate the darkness with a flickering green light that dances behind the tree line.

This region, with its inexpressible beauty and abundant natural resources, has been home to Indigenous peoples for roughly 10,000 years. When Paleo-Indians first entered North America during the late glacial episodes of the Late Pleistocene period, Minnesota was still covered by glacial ice and large melt-water lakes. Areas of northern Minnesota did not become ice-free until 11,500 B.C.E, with lake formation beginning between10,000 and 9,500 B.C.E. By 9,200 B.C.E, archeologists estimate that northeastern Minnesota was likely habitable; the newly uncovered land was rapidly revegetated with spruce forest and tundra grassland, providing food for woodland animals like mastodon and grassland species like mammoth and caribou. However, the rugged terrain and thick vegetation make archeological surveying difficult, and archaeological evidence for Early Paleo-Indian occupation in this area is sparse. Most available evidence places the first significant growth in Indigenous inhabitants of the area in the Late Paleo-Indian period (8500 - 7900 B.C.E).[1]

Sunset over Ojibwe Lake, which rests on the edge of the Boundary Waters Canoe Area Wilderness (BWCAW). All photos courtesy of Zach Spindler-Krage unless otherwise noted.

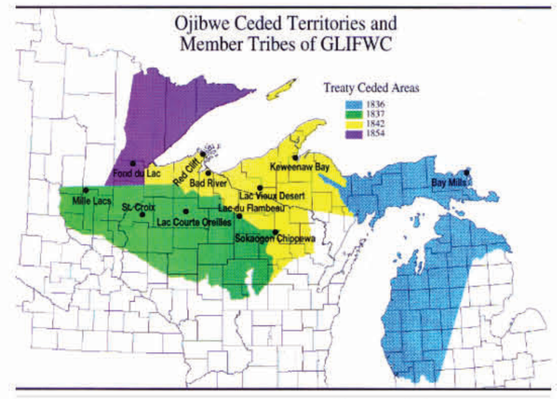
In roughly 1000 C.E., ancestors of the Anishinaabe people began to move into northeastern Minnesota from the northeast coast of North America. The migration was likely driven by the region's abundance of natural resources. The Anishinaabe are skilled hunters, fishers, and gatherers, and the Boundary Waters area provided a wealth of fish, game, wild rice, and medicinal plants.

Yet, the Boundary Waters are not just a source of physical sustenance for the Anishinaabe, but also of spiritual nourishment. The area is filled with sacred sites, including ancestral burial sites, rock formations, and islands believed to be inhabited by spirits.[2] Furthermore, the lakes, rivers, and forests of the region are seen as living entities, imbued with their own spirits and personalities. Anishinaabe stories charge members of the tribe with protecting the natural world and honoring the spirits of the land and waterways.

In the mid-17th century, French traders made first contact with Ojibwe tribes, a subgroup of Anishinaabe, along the west shore of Lake Superior. Between 1680 and 1761, French traders and Ojibwe engaged in a period of intricate fur trade. The Ojibwe provided animal pelts, winter food supplies, canoes, and snowshoes, while the French provided guns, cloth, clothing, copper kettles, and tobacco. Following the defeat of France in the Seven Years' War, ending with the Treaty of Paris in 1763, British companies began their own fur trade with the Ojibwe. Three prominent fur trade companies — the North West Company, the XY Company, and the Hudson's Bay Company — established their own presence in northern Minnesota and continued to trade manufactured items for animal pelts. The Ojibwe played a crucial intermediary role in connecting the British to other Indigenous tribes and transporting furs and other goods between European traders and those tribes. After the War of 1812, both American and British trading posts were present in the Border Lake region, which offers a canoe route from the Boundary Waters to Lake Superior along the Canadian border.[3]

The Ojibwe Treaties of 1837 and 1854

By the 1830s, in the midst of westward expansion, the United States government began forcibly removing Indigenous tribes from their lands in the upper Midwest. In 1837, with little choice but to move, Ojibwe and Dakota leaders ceded a massive swath of what is now east-central Minnesota and western Wisconsin to the U.S. government. The land ceded by the Ojibwe included Mille Lacs Lake, one of Minnesota's most famous fisheries; however, at this time, the government was pri-



Map of the territory ceded by Ojibwe Tribes in 1837 and 1854. Graphic courtesy of Great Lakes Indian Fish & Wildlife Commission.

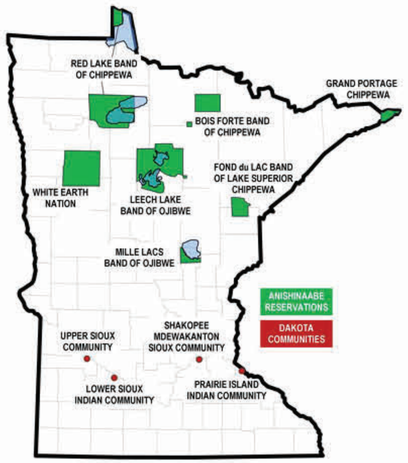
marily interested in logging the white pine forests east of the Mississippi River. In exchange for the millions of acres of land, the government promised payments to the Ojibwe of $35,000 each year for twenty years. The payments were completed in the form of cash, goods, and services that included food, blacksmith shops, and a yearly ration of $500 worth of tobacco.[4] The tribes were also granted the right to hunt, fish and gather on the ceded land, which became a pivotal provision of the treaty agreement in the following decades.

In 1848, surveyors discovered copper along the north shore of Lake Superior. Immediately, mining companies in Michigan began pressuring the federal government to open the area for mining, which required another land cession from the Ojibwe.[5] The 1854 Treaty of LaPointe, signed by eighty-five Ojibwe leaders, ceded 5.5 million acres of the Arrowhead Region of Minnesota, including what would become the entire BWCAW. In exchange, the tribes received annual pay-

Tribal officials signing the treaty of LaPointe in 1854. The treaty ceded all of the Lake Superior Ojibwe lands to the United States in the Arrowhead Region of Northeastern Minnesota, in exchange for reservations for the Lake Superior Ojibwe in Wisconsin, Michigan, and Minnesota.

ments of less than $20,000, split among cash, goods, agricultural supplies, and school funds. The Lake Superior Bands received an extra $90,000 to help pay their debts to traders.[6] As with the 1837 treaty, the Ojibwe agreed to sell their land only if they retained the right to hunt and fish on ceded territory. Despite the discovery of several extensive copper deposits, the expected rush of miners never developed at this time.

As a part of the 1854 treaty, the Ojibwe also received several one-time payments to help them resettle on reservation land. These reservations are still heavily populated. The Grand Portage Indian Reservation, east of the Boundary Waters, is home to the Grand Portage Band of Chippewa; the Bois Forte Reservation, to the west, belongs to the Bois Forte Band of Chippewa; to the southeast is the Fond du Lac Band of Lake Superior Chippewa. These three groups join the Leech Lake, Mille Lacs, and White Earth reservations as part of the Minnesota Chippewa Tribe, which has roughly



The eleven federally recognized Tribal governments in Minnesota, including the six members of the Minnesota Chippewa Tribe. Graphic courtesy of Minnesota Department of Transportation

41,000 members.[7]

Based on the legal interpretation of the prominent treaties of 1837 and 1854, the signatory Ojibwe Bands retain usufruct rights: the right to live off the land and make a modest living from hunting, fishing, and gathering from the ceded territory's resources. This interpretation results from the Reserved Rights Doctrine, which establishes that "any rights that are not specifically addressed in a treaty are reserved to the tribe." In other words, treaties outline the specific rights that the tribes ceded, not the rights that they retained.[8] Despite this legally-mandated interpretation of the rights granted to the Ojibwe Bands, the State of Minnesota applied its hunting and fishing laws in the ceded territory to both Indigenous and non-Indigenous people alike for over a century, violating the treaties.

The Battle Over Treaty Rights

In 1985, in an effort to reclaim long-denied treaty rights, the Grand Portage sued the State of Minnesota in federal court. The Fond du Lac and Bois Forte Bands subsequently joined the lawsuit to negotiate a satisfactory settlement.[9] The state and three bands came to an agreement in 1988 whereby the state makes an annual payment to the bands — $1.6 million to the Grant Portage and Bois Forte and $1.85 million to the Fond du Lac — and the bands establish their own regulations on Tribal members. Under the agreement, the Bands' regulations restrict commercial harvest, big game seasons, spearing, netting, and other activities that are "of concern to the state" for tribal members.[10] The Grand Portage and Bois Forte Bands remain in the agreement, which continues successfully to date.

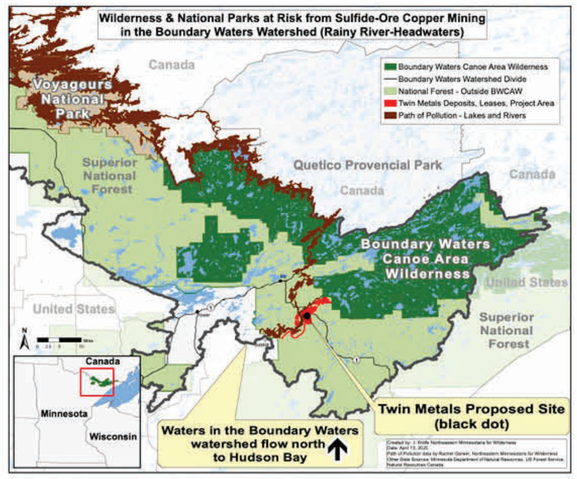
While this agreement was a positive step for the Minnesota Chippewa Tribe, it did not commit to a legal conclusion regarding the validity of the treaty rights. In fact, despite entering the agreement, the state argued in separate cases in 1988 and 1999 that the tribes' use rights had been dissolved, citing an 1850 Executive Order.[11] The order, signed by President Zachary Taylor on February 6, 1850, states that the "hunting, fishing, and gathering of wild rice upon the lands, the rivers,

View overlooking Lake Superior and the Superior National Forest

and lakes included in the territory ceded to the United States…are hereby revoked; and all of the said Indians remaining on the lands ceded as aforesaid, are required to remove to their unceded lands."[12] Additionally, the state argued that the entrance of Minnesota into the union in 1858 terminated the use rights.

However, in Grand Portage Band of Chippewa of Lake Superior v. Minnesota (1988), the U.S. District Court in Minnesota affirmed the Ojibwe Bands' authority to regulate the exercise of their enrolled members' hunting, fishing, and gathering rights in the ceded territory. Since 1989, the U.S. Department of Interior has encouraged the participating Bands to exercise these rights sustainably by granting funds to maintain natural resource programs.[13]Yet, the state continued to complicate — and in some cases prevent—the ability of the bands to exercise their treaty rights.

Consequently, in 1990, the Mille Lacs Band of Chippewa filed suit seeking a confirmation of their use rights and an injunction against the State of Minnesota to prevent it from interfering with those rights. In 1999, the U.S. Supreme Court affirmed the Ojibwe's rights to the ceded land, stating that the 1850 Executive Order had no source of authority because it did not "stem either from an act of Congress or from the Constitution itself."[14] The Court's affirmation of the treaty rights was not only important for the Ojibwe but for all tribes with treaty use rights; ultimately, the decision ensures that treaty rights are retained unless a treaty, statute, or executive order clearly expresses a future intention to abrogate those rights. In the case of the 1837 and 1854 treaties, no such stipulation or intention was included, which allows the bands to continue their hunting, fishing, and gathering with explicit legal protection.[15]



Map of the proposed sulfide-ore copper mine and the likely path of pollution. Graphic courtesy of Save the Boundary Waters Campaign

In 2017, the state and Fond du Lac Band agreed to a Memorandum of Understanding (MOU) that formalized collaborative efforts regarding the collection and sharing of data that informs annual hunting, fishing, and gathering regulations. The MOU solidifies acceptable harvesting methods, establishes wildlife surplus levels and moose population protections, and creates committees consisting of Tribal and state representatives where resource management issues and disputes can be discussed. The MOU includes a stipulation, signed by both parties, ensuring that the 1837 and 1854 treaty rights are interpreted consistently. At the signing of the agreement, former Fond du Lac Band Chairman Kevin Dupuis highlighted the gravity of this event: "The exercise of our hunting, fishing, and gathering rights under our 1854 treaty is central to the lives, culture, and traditions of the Fond du Lac people. Because of the critical importance of these rights, the Band has worked extensively to ensure proper management of the natural resources on which those rights depend."[16]

> On January 26, 2023, in the most significant action to date, Secretary of the Interior Deb Haaland effectively banned sulfide-ore copper mining on 225,504 acres in the watershed of the BWCAW.

Cherokee Lake in the BWCAW

Growing Threat of Mining Near the Boundary Waters

A significant portion of the 1854 treaty land is within the Superior National Forest, which comprises nearly 4 million acres in northeastern Minnesota. The BWCAW lies within the Superior National Forest, and much of the best hunting, fishing, and wild rice harvesting occurs in the area's watershed. This is critical because of a new threat: mining.

Historically, the Boundary Waters have been strictly protected. The one million acres that now make up the Wilderness were formally designated in 1964 by the Wilderness Act. However, the Wilderness Act allowed for unsustainable practices to continue within the area, including the use of motorboats, mining, and some logging. The 1978 Boundary Waters Canoe Area Wilderness Act restricted these activities, making the area one of the most heavily protected regions in the U.S.[17] Yet, while the Wilderness Area and federal buffer area are protected from mining, the surrounding area, including the headwaters, is not. The Boundary Waters — with its 165,000 annual visitors and $540 million ecotourism economy — is threatened by proposals for toxic sulfide-ore copper mines in its headwaters and watershed. This type of mining, never done before in Minnesota, has proven to be extremely damaging; a peer-reviewed report by Earthworks, an anti-mining advocacy group, studied fourteen sulfide-ore copper mines in the U.S. and found that thirteen had had significant impacts on water quality in their catchment areas.[18] The mining process is risky. First, rock is blasted from pit walls and sorted into metal-bearing ore and waste rock. Since less than one percent of the rock contains copper or nickel, ninety-nine percent of the rock has little economic value and will sit indefinitely in the waste storage facility or rock piles. No metal recovery method is fully effective, so metals, sulfides, and residue from explosives are commonly left behind in the waste. Acidic mine drainage develops

when these sulfide minerals are exposed to air or water. Chemical reactions can turn these otherwise benign minerals toxic.[19]

As soon as pollutants enter the interconnected waters, they are likely to spread throughout the entire ecosystem. Depending on whether the pollution occurs north or south of the Laurentian Divide, the toxic waste will either flow south into Lake Superior or north through Voyageurs National Park, emptying finally into Hudson Bay.

The mining proposal by Twin Metals Minnesota, a subsidiary of Chilean mining firm Antofagasta, would operate next to the headwaters of the Boundary Waters near Ely, Minnesota, for twenty years. The lease has been passed between mining companies since 1966, but the severity and imminence of the threat have grown rapidly in recent years. President Obama first proposed withdrawing the area from mining in 2016, but President Trump approved the leases for the project in 2019. When President Biden took office, he initiated a U.S. Forest Service environmental assessment of the potential damage of the mine, and a judge ordered a pause on any action until the legality of the Trump administration's decision to renew the leases was evaluated. Ultimately, the Biden administration canceled two leases required to build and operate the mine.[20]

On January 26, 2023, in the most significant action to date, Secretary of the Interior Deb Haaland, signed Public Land Order 7917, effectively banning sulfide-ore copper mining on 225,504 acres in the watershed of the BWCAW. In short, this federal step ensures the protection of the established acreage for the next twenty years.[21] It is the longest moratorium that the Department of Interior can issue; permanent protection would require Congressional action. This is a major step in the environmental protection movement, and the Minnesota Chippewa Tribe (MCT) has played an integral role in the ruling.

Advocacy for the Protection of Tribal Livelihood

In one example of the ruling's far-reaching effects, in January 2020, the MCT sent a letter to Congress announcing its support for the Boundary Waters Wilderness Protection and Pollution Prevention Act. The bill, authored by Minnesota Fourth District Congresswoman Betty McCollum, would expand the existing mining buffer zone around the Boundary Waters by an additional 234,000 acres.

In the letter, MCT president Cathy Chavers references the 1854 treaty that granted hunting, fishing, and gathering rights to the Fond du Lac, Grand Portage, and Bois Forte Bands. Because of these rights, Chavers explains that the Bands have a "legal interest in protecting natural resources, and all federal agencies share in the federal government's trust responsibility to the Bands to maintain those treaty resources."[22]

Chavers also emphasizes the historical significance of the region to the MCT and the likely effect of mining pollution on the surrounding reservations: "The fish in adjacent waters are subject to consumption advisories designated by the Minnesota Department of Health because of mercury in their flesh," Chavers says.

Ojibwe harvesting wild rice in 1939. Photo courtesy of Minnesota Historical Society

Much of the water in the BWCA is currently clean enough to drink without filtration

"Sulfide-ore copper mining will increase the amount of mercury in fish, a toxin of great concern to our members who depend on wild caught fish for their sustenance. Wild rice and terrestrial species will also be at risk, as pollution and habitat destruction will have wide reaching impacts."[23]

The letter concludes by expressing appreciation for the healthy environment and economy that offer sustenance to the MCT and warns that it is all at risk if any mining proposal moves forward. "It is unacceptable to trade this precious landscape and our way of life to enrich foreign mining companies that will leave a legacy of degradation that will last forever," says Chavers. "We need this protection before it is too late, and the future of this area is now in your hands."[24]

The MCT was also cited extensively in findings and recommendations from the U.S. Forest Service. In October 2021, the Forest Service submitted a withdrawal application to the Interior Department's Bureau of Land Management, which manages the subsurface mineral estate under the national forest. While collecting extensive public input regarding the withdrawal, the Forest Service conducted a science-based environmental assessment to evaluate the potential impacts of prohibiting new mineral and geothermal exploration and development within the Rainy River watershed for the next twenty years.[25] The analysis and decision were informed by 225,000 comments, three public meetings, and, notably, two Tribal consultations.

One of the predominant findings from the Tribal consultations was the potential impact on wild rice harvesting. To the Ojibwe, wild rice "was endowed with spiritual attributes, and its discovery was recounted in legends. It was used ceremonially as well as for food, and its harvest promoted social interaction in the late summer each year." This significance remains. Since wild rice is sensitive to fluctuations in water level and changes to alkalinity and water chemistry, mining would likely decrease yield, which has already been reduced by industrial development in the area.[26] According to the 1854 Tribal Authority, an Inter-Tribal resource management agency that is cited heavily in the assessment, there are 521 waters that support wild rice growth within the 1854 Ceded Territory. In the consultation, the Tribes also reference the subsistence value of uncontaminated fish and the cultural value of moose, sugar maple, white cedar, paper birch, and berries.[27]

The locations most used by Band members are

within the "area of highest potential for mine infrastructure," so degradation would be likely to occur on these lands. Overall, the amount of federal land within the 1854 Ceded Territory has already been reduced by nearly fifty percent since the treaty was signed, so the protection of the remaining land is of utmost importance for the Tribes. The assessment states that "wildlife habitat, plants, wetlands, and associated cultural resources of value to the tribes…may be permanently lost."[28]

Ultimately, the Forest Service concluded that mining activity in this area would disproportionately affect the Bands, breaking the federal government's legally mandated trust responsibility with tribes. Based on the strong evidence for the adverse effects of mining presented by the Bois Forte, Grand Portage, Fond du Lac, and White Earth Bands, the Forest Service recommended a mineral ban on 225,504 acres in the Wilderness watershed.[29] The Department of Interior implemented this recommendation in January 2023, protecting the Boundary Waters for the next twenty years.

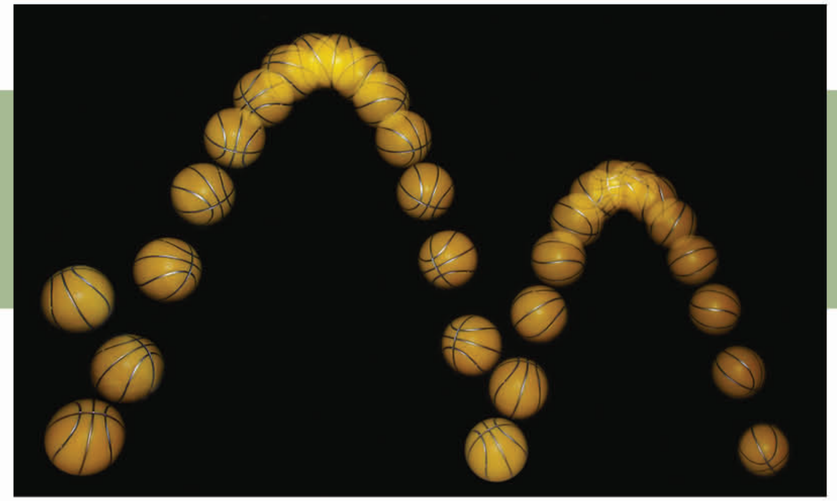
"The realization of [Chippewa] rights has taken decades of legal challenges, advocacy and persistence. Ultimately, the Chippewa Bands were successful in achieving legal protection of their treaty rights. "

The Ultimate Goal: Permanent Conservation

Despite the success, there is still potential for the government to reverse course when the administration or Congress changes hands. However, the Ojibwe Bands are actively fighting to proactively protect their land from economic extortion and environmental degradation. On July 14, 2022, the Fond du Lac and Grand Portage Bands filed a landmark Clean Water Act lawsuit against the Environmental Protection Agency Region in federal court. This is the first lawsuit any tribe in the U.S. has filed against the EPA over changes to water quality standards. The lawsuit aims to challenge the EPA's decision to approve the Minnesota Pollution Control Agency's overhaul of "Industrial Use" and "Agricultural Use" water quality measures. The Bands argue that the elimination of numeric standards is likely to exacerbate pollution in waters that flow through the Ojibwe reservations.[30]

In addition, on May 9, 2023, the Bois Forte, Fond du Lac, and Grant Portage Bands of Lake Superior Chippewa entered into an agreement with the U.S. Forest Service to work collaboratively to manage the Superior National Forest. The Memorandum of Understanding states that the Forest Service "recognizes the Bands as original stewards of lands now encompassing the Superior National Forest and outlines procedures to ensure that Tribal input is meaningfully incorporated into Forest Service decision-making." The MOU recognizes that tribes have already been playing a major role in studying wildlife, contributing traditional ecological knowledge, and advocating against development in the region, but they will now have a greater say in the protection of culturally-sensitive areas, coordination of forest management goals, and the selection of conservation projects. Cathy Chavers, MCT president, articulated the weight of this agreement: "We, as Tribal Leaders, are charged with caring for our natural resources. This includes our elders and youth. We also must think of the next seven generations by building partnerships and strengthening relationships to work together to achieve that common goal."[31]

The Boundary Waters Canoe Area Wilderness and Superior National Forest are Anishinaabe lands. When the Anishinaabe were forced to cede their land in 1837 and 1854, their use rights to the land remained. Yet, the realization of these rights has taken decades of legal challenges, advocacy, and persistence. Ultimately, the Chippewa Bands were successful in achieving legal protection of their treaty rights. But they are not inclined to stop here. As a primary current threat to their livelihood comes in the form of sulfide-ore copper mining proposals, the Bands will continue to fight for permanent federal protection of this land. They intend to fight until politicians recognize the value of a pristine, spiritually-rich Wilderness and choose to protect it from exploitation.



The motion of a bouncing basketball captured with stroboscopic photography. Photo courtesy of Wikimedia Commons (https://en.wikipedia.org/wiki/Stroboscope#/media/File:Bouncing_ball_strobe_edit.jpg)

Technology on the Prairie

Stroboscopic Photography

Stroboscopic photography involves using a flashing light source to capture pictures of a moving object at different points in its motion. It is credited to Harold E. "Doc" Edgerton of Nebraska ca. 1930-1940s and has a fascinating origin story. Edgerton's passion for photography was ignited during his teenage years when he learned the art from his uncle. Driven by his deep interest in photography, he even went on to create his own darkroom at home to process his film photographs.

As Edgerton continued in his academic pursuits, he went to MIT for postgraduate studies where he began experimenting with a stroboscope, which generates rapid, repeated bursts of light. This innovative technology allowed him to capture images in a way that had never been done before. By utilizing the stroboscope's ability to freeze motion, Edgerton was able to capture fleeting moments with extraordinary clarity and detail, revealing an exciting new world of visual possibilities.

The impact of Edgerton's invention was clear, revolutionizing the field of photography and opening new avenues for scientific, artistic, and industrial applications. His pioneering work in stroboscopic photography has left a permanent mark in the realm of visual imaging, and his legacy as a visionary inventor and photographer continues to inspire generations of innovators and artists today. The image above vividly exemplifies the remarkable effect achieved through stroboscopic photography, that is its ability to freeze motion with an unprecedented amount of clarity.

Photo courtesy of Karen Downing

Karen Downing *taught high school English for 34 years. She is the Special Projects Coordinator for CultureALL's Open Book program. These poems were inspired by time spent at Alan and Nancy Meyer's home outside Cedar Bluffs, Nebraska as part of the AgArts Residency program.*

Two Poems

By Karen Downing

At the North Bend Farmers Market in Late July

The girls are what I notice
not the first haul of corn spilling from the back of a
not the beachball watermelons flattening the dry grass
not the farmers who toiled in the fields
but their daughters in their track shorts and Adidas slides
hair still damp from the city swimming pool
the scent of chlorine layered with Bath and BodyWorks
"Enchanted Candy Potion" lotion

That trance of youth
like staring into the wavy heat lines on
I-80 as I drive to work and back
work and back
arriving in my driveway
without knowing how I made it home

The girls stretch their legs out long
resigned to sit in camping chairs
and wait this out
propped next to baskets of zucchini and onions,
the girls sell home-made earrings made in 4-H
$10 a pair
gas money so they can drive out and away
from the flatness of the land
the sight of their mothers disappearing in the rear view mirror
down dusty country roads
singing as if their lives depended on it
even if no one hears

The girls are dirt under nails and glitter on skin
ripe as blushing tomatoes on the folding card table
the girls are sleeker than cucumbers and brighter than carrots
they eat monkey bread from tin foil loaf pans
that spark in the sunshine
licking the sticky goodness off their hands

The girls can not contain their magic
in screw-top jam jars jeweled in the afternoon light
their spell holds my gaze as I offer any money I can find
to buy what they have
in the afternoon sunlight, I am a shadowy form they can barely see
their eyes squinting as they look ahead
to make out what is in front of them.

Photo by Jon Andelson

The Front

"We should engage with poetry as we do the weather."
–Ocean Vuong

In that case
I will skip the five day forecast
warning of high temperatures
The banter in the grocery store checkout line
about the heat
The urge to pack an umbrella
just in case
I will neglect to put on sunscreen
Forget to bring a hat
And not worry if I don't roll up the car windows.

Instead I will sit on the porch
on a swing rocking back and forth
betwixt and between
As the sky darkens and the winds pick up
I will settle in
even as the temperature drops
and the birds hush
The leaves of the trees will turn silver in the sharp light
I will greet this force with the awe it deserves
Tasting the metallic mystery of the rain
That can't help but touch me
no matter my cover.

You will join me
Waiting in the false cool of the air
for the weight of the clouds to lift
We hold turbulence
As a thing that can pass
Even as the pressure keeps us in place
The edge of the storm not quite gone

You will ask me if I plan
On mentioning the rainbow we saw
No, I will say
This is poetry we're talking about, after all
Instead I will compare the curl in my hair
To the rising steam on the pavement
I will
I will

Photo courtesy of Tayler Ulbrich

Tayler Chicoine Ulbrich *grew up near Des Moines, Iowa, graduated from Grinnell College in 2014, and subsequently received a PhD in soil microbiology from Michigan State University. Now, she lives with her husband and son in Hickory Corners, Michigan, working as the Associate Director for engagement for the Long-Term Agroecosystem Research (LTAR; https://www.canr.msu.edu/ltar) program at Michigan State University. In this role, Tayler serves as a bridge between academic and agricultural audiences and helps the project conduct participatory action research that will produce farmer-driven data collection. The ultimate goal of the project is to support the adoption of more sustainable and resilient agricultural systems throughout the Midwest. In her free time, Tayler enjoys the new adventures of motherhood, gardening, hiking, and traveling.*

Interview with Congressman Neal Smith

by Tayler Chicoine Ulbrich, with Jon Andelson

The following interview was inspired by a college student curious to learn how her great-grandfather's stories from 93 years of life could help explain the past and build hope and vision for the future.

My great-grandfather, Neal Smith, was a quiet man, but there were three topics that we could always ramble on about—Grinnell College, the prairie, and agriculture.These conversations were fueled by childhood memories growing up in Iowa and our shared comfort in and love for the tall grass prairie. Our connection to Grinnell was thanks to my great-grandmother, Bea Smith. She graduated from Grinnell in 1945. My great-grandfather loved to share the story of when he arrived by train to Grinnell after returning from military service. He made it just in time to surprise my great-grandmother for her senior dance. These shared Grinnell experiences brought me closer to my great-grandparents.

While at Grinnell, I continued learning about the beauty and paradox of the tallgrass prairie: Iowa has the richest soil in the Midwest, yet its agricultural system has nearly led to its demise. While monitoring water quality in nearby creeks and spraying invasive weeds at the Neal Smith National Wildlife Refuge (https://www.fws.gov/refuge/neal-smith), which supports one of the largest restored tallgrass prairies, I learned about the challenges of building a system where nature and agriculture can coexist. For instance, the existence of diverse lifeforms underpins both the natural balance and ecosystem services of nature, and while these services benefit agriculture, the principles of biodiversity are not often integrated into systems managed for production alone.

My great-grandfather also had an appreciation for these challenges and had a significant impact on conserving natural areas in Iowa during his years in Congress (1959-1995). I wanted to learn more about this, so I interviewed him while serving on the board of the Center for Prairie Studies (CPS) at Grinnell College. Along with Jon Andelson, the emeritus director of CPS, I interviewed my great-grandfather at the Neal Smith National Wildlife Refuge. It was strange to see everyone excited to see and learn from my great-grandfather. Normally Neal Smith was just my great-grandfather, but during the interview I saw that he was so much more. Going into the interview, I had a hard time fathoming the amount of change he had experienced in 93 years, but it was even more shocking to hear about how many things hadn't changed. For instance, he shared how, even after 93 years, some people still lack respect for one another and that we still struggle to live in balance with nature. But despite this, he shared that he still had hope for change, and that was inspiring to me—just a 21-year-old desperate to make a difference.

Now, ten years since the interview, I continue to see the threads of my great-grandfather's passions sewn into my own life and work. I recently received my PhD in soil microbiology from Michigan State University and am working at the intersection of science and engagement to help build a more resilient and regenerative agricultural system that works with, instead of against, nature. Editing my great-grandfather's words during this stage of my life helped remind me of the steady pace needed to make the changes he always believed in.

A brief recap of Neal Smith's life

My great-grandfather, Neal Smith, was born on March 23rd, 1920, near Packwood, Iowa. He was born in a house that his great-grandfather had built. His early years spanned from the stock market crash and the Great Depression to WWII. While it is apparent that those experiences influenced his values and views on the world, my great-grandfather did not share much about the hard times. Instead, the stories I heard most often—which often made him chuckle to himself—were about the mischief he got into with his horse, Topsie, and pet raccoon (see picture on page 110).

Neal opened up more in the last years of his life, writing a book of reflections and telling my dad

Congressman Neal Smith, Chairman of the House Small Business Committee, 1977-1980. Photo Courtesy of Tayler Ulbrich

many stories, which my dad has since shared with me. He talked about how he helped his family during the Depression by selling pelts, collecting bounty on crows, and doing various other jobs that he could find. While he was thankful that he could help his family earn money, he never enjoyed killing anything. He had respect for animals and appreciated what they gave him, whether it was a wild animal or the domestic pigs they raised for food and income.

He also shared how, in his teenage years, President Franklin D. Roosevelt gave people hope that their lives could be better, and that the government had the ability to accomplish what individuals could or would not do alone. He talked about how cooperation is the key to change. He rarely mentioned his time in the war, only sometimes reminiscing on the funny people he met and the impact that some of his missions had on others. He also talked of the disruptive impact war has on humanity. My great-grandfather told my dad that his time in the service changed how he thought about the world, that the world became small: a finite place where all humanity exists. I think these experiences probably contributed to great-grandfather's strong conservation ethic and belief in the need for connection and respect among people and all other species.

This belief and desire to help build connections among people may have fueled his desire to run for office. Neal served as a member of the Democratic Party for the United States House of Representatives from 1959 until 1995, which made him the longest-serving Iowan in the United States House of Representatives. He had two children, six grandchildren, and twelve great-grandchildren. He lived a long life, dying at 101 years of age on November 2, 2021.

I hope, as it did for me, this interview from my great-grandpa gives you a glimpse into the past and offers a bit of hope for the future. If someone that saw so much pain and tragedy, who also worked in the US government for 36 years, can end an interview with "It can be improved," I think we must have hope.

TU: You have already enjoyed a long life, which means you've seen a lot of changes in your lifetime—in the world, in the United States, and in Iowa. Of the changes you've seen in your home state, which ones stand out as the most significant changes?

NS: Well, I was raised during the Depression on a farm near Packwood, Iowa. Anybody who was raised during the Depression saw significant changes. The railroad was about a mile away from our house. And our place was on a steep grade, so the trains slowed down when they came close to us. People who didn't have a job and were riding the rails would jump off the train, come to our place, and ask for something to eat. The government began getting involved in programs to simply help lots of people survive. The other change that really impresses me, when I think back, is how much technology has changed life, especially in communication. In those days we got a weekly paper from Kansas City. And you didn't have television and radio and all these things that have come along since then. All these things changed a lot.

"I was raised during the Depression on a farm near Packwood, Iowa. Anybody who was raised during the Depression saw significant changes."

TU: Iowa has also seen a lot of changes in its landscape. It has long been known as the agricultural state, and I'm especially interested in how you view the extensive changes that you've witnessed in agriculture and the farming way of life in the course of your lifetime. Do you see these changes as positive or negative?

NS: Well, of course, the big change is in the amount of food—corn, beef, and so on—one person can produce. It is just a huge, huge change. So, for instance, when I was in my late teens, if a farmer had more than 40 acres of corn, they couldn't husk it all themselves. They had to hire somebody to help them. Today, with machinery, a farmer can harvest hundreds of acres of corn, even thousands. Yields are way up, too. So, technology's been a big difference.

Neal Smith at fourteen with his horse and pet raccoon at the family farm in Packwood, Iowa, in 1934. Photo Courtesy of Tayler Ulbrich

TU: The natural environment is suffering in many parts of the country and the world, and, in many cases, this is impacted by agriculture. Is it possible for natural areas like the [Neal Smith National Wildlife] Refuge and agriculture to coexist?

NS: Well, what I think many people don't appreciate enough is that different kinds of soil should be treated differently. For instance, some of the flat land north of Des Moines is heavy and solid and gummy. Near where I was raised, the soil was real black on top. But you get down about three feet and it's blue. But you dig that blue out and put it up on top and in a year or two, it's black. It was the same soil, but it didn't have oxygen. And so, in the same field you could have two different kinds [of soil]. Now here where we are at the Refuge, the soil drains deeply, fairly easily. Some places down south of here they have almost a hard pan just a foot down under the ground. So, these soils must be handled differently. Another example is that there's a place on this Refuge where they found that six feet of soil had been eroded away. It was very rich soil, but also highly erodible. But if you go south of here, if you get down two feet, there's no richness at all.

TU: So maybe just being more aware of the soil types would allow us to manage the land cover in a way that would be more efficient?

NS: I hear people say everybody ought to do a certain kind of farming. Well, you have different weather, different soil. So, there isn't just one type of farming [that's] appropriate, no one rule fits all.

TU: Many people would say that one of the most important developments in recent history has been the rise of the environmental movement generally. Why do you think the environmental move-

ment began and what triggered that change?

NS: We've always had some people that are sort of up-in-arms and others that are not. In some cases, people who lived in the city and have never been exposed to other species, or hardly at all, don't think much about the environment. Their environment is concrete and high buildings. For other people, who are closer to the environment, it's different. Here at the Refuge, they had 7,600 schoolchildren visit last year [2013], and some years they've had more. Even more would like to come, but it's hard to handle them all. In Iowa, the land was plowed up and we didn't have forests and mountains and things, so we don't have as much nature for them to visit. That is very important.

There's always been some people more concerned about the environment than others, but there are some that have never been exposed to nature in a way that would make them want to know more about it. With regard to your question about why so many more people are involved... I'm not sure there are more people—a greater percentage—involved. But another interesting thing is how technology has changed the experience of nature. It used to be you went to the Rocky Mountains maybe once in your lifetime. Now you can watch TV and see more of the Rocky Mountains than you used to if you went out there.

TU: That's so true. You're known for having very strong environmental values. What experiences in your life shaped these?

NS: Growing up during the Great Depression shaped them. There had to be a certain amount of saving anything, people had to do whatever they could to get to next week. If you didn't have coal, you burned corn for warmth. Also, one of the things we have here at the Refuge is the opportunity to see what has happened on this piece of land over 170 years. You need to learn from that.

Congressman Neal Smith with then-Senator John F. Kennedy, 1959.
Photo courtesy of Tayler Ulbrich

TU: Did your conservation values influence your approach to public policy when you were in office?

NS: Well, they did. Any experience that anybody has influences their interest in some subjects more than other subjects. If you haven't had certain experiences, you won't be that interested or won't know how to value certain subjects. So, experiences do make a difference. For anybody that's working with public policy, background makes a difference.

> "When you talk to someone, what they know is on their own farm, in their conditions. It's really difficult for some of them to understand that you can't use the same methods everywhere and expect to have the same effect."

TU: There has been a long-term research project at the Refuge called the STRIPS project [Science-Based Trials of Row-Crops Integrated with Prairie Strips], which is where they're studying how integrating small strips of prairie within row crop agriculture might benefit the landscape and ecosystem surrounding it. Have you heard about this study, and what do you think of it?

NS: Well, any of those kinds of studies are good. Yeah, you recognize that to do it in one field may not be what you do in another. For example, when I was farming, I had some land that needed a way to control the runoff. So, I used strips too! I used switchgrass, pure switchgrass. And some of the conservation people think you shouldn't use switchgrass and they have some other combinations that they want people to use. But I used switchgrass, even though I did not get any government help with planting it, because I wanted it that badly. And then three years later, after it got established very well, some of the conservation people were bringing people to see it. But people are still learning. Yeah, still learning.

TU: How can we address these topics when we're talking to farmers or conservation districts about implementing conservation measures?

NS: When you talk to someone, what they know is on their own farm, in their conditions. It's really difficult for some of them to understand that you can't use the same methods everywhere and expect to have the same effect. And they have to recognize that different parcels of their land are different. We've got farms between here and Des Moines where part of the soil on the farm is from that last glacier and the other half of it was made 8000 years before that. The farmers have fields that need to be treated differently.

TU: Some people argue that conservation practices should be made mandatory rather than voluntary. What is your opinion about that? Also, how could we provide money for farmers to install such practices if we did, in fact, make them mandatory?

NS: Well, we do have programs that offer cost-share for conservation measures. However, there's no one smart enough to write a bill for the right kind of program for each and every farmer, and each and every kind of soil. Some of the results have got to come from experience. It's just different. You just can't write a mandatory procedure for all conditions. So, you can have minimum things [limits], but to say that all farmers must

Neal Smith with U.S. Fish & Wildlife Service Director Mollie Beattie and other dignitaries, planting native species during Prairie Learning Center Ground Breaking, September 1st, 1994. Photo courtesy of Fish & Wildlife Service and Neal Smith NWR

do X or Y is never going to work.

TU: What do you think would be the way around that?

NS: The way we have been doing it: we agree and still debate. Somebody tries to make something more mandatory, then they find out that causes a condition that they didn't expect to see, and they try to change it some more.There are always people working [on it].

TU: Recently, there has been a large push for social and environmental changes to happen through small localized grassroot organizations and movements that can then hopefully spread into more general belief-systems and policies. What do you think about the power and sustainability of those small grassroots movements. Do you think that's the best way for people to influence governmental policies, or if not that, what's the best way a person can help influence?

NS: Well, the main thing I think about is...we've always had some of that. It increased greatly during the Johnson administration. Johnson had some programs that affected cities, especially. During his administration [1963-1969], they encouraged growth of organizations that would speak up and have ever since. But the main thing these organizations need to remember is to be respectful of others and not to force their beliefs, you know. Some of them get out of hand; they only see their own situation. The main thing is: be respectful of others, express yourself, and let them know what your situation is and why you think something. So, to that extent, these organizations are good.

TU: Do you think that the small grassroots organizations have power?

NS: Yes, there is some. But their power and their influence are much greater if they are respectful and try to understand that others may have a different situation.

Future generations and Iowa agriculture

TU: I'm wondering what you think Iowa agriculture will look like in another generation? Will there be anything left of the yeoman farmer ideal that Thomas Jefferson believed was such an important foundation of democracy?

NS: There will always be some. As a matter of fact, there may be more of them right now than there were 10 years ago. There will always be some with different ideas and investment possibilities, and different abilities to respond.

TU: Many people think that education will play a vital role in shaping the future. The Walnut Creek National Wildlife Refuge, which is now renamed in your honor, is trying to educate the people of Iowa—like the students you said that visit and other visitors—about the prairie. What do you see as the ultimate purpose of this education?

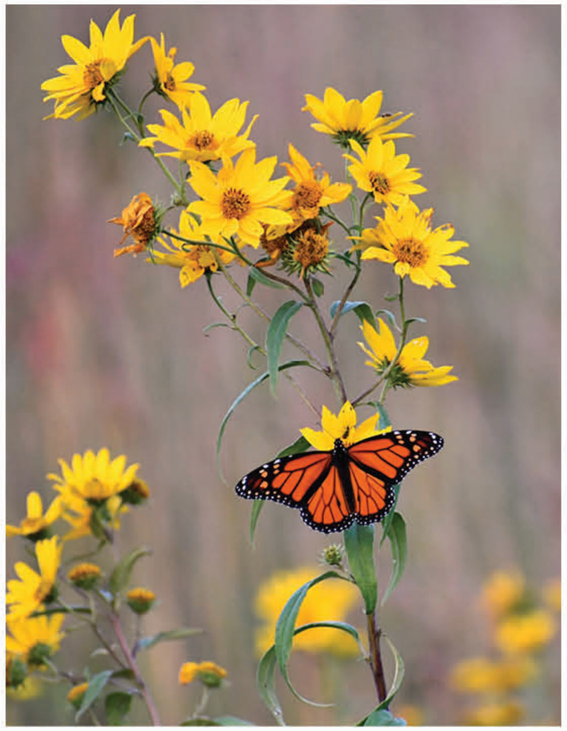
NS: Well, it's so that, in the end, we live in a place we understand and know.

TU: My father told me that you taught him how to make willow whistles on the streets of DC when he was a kid, and that this helped him realize that nature can exist in a city. I think that's missing for a lot of children that are now growing up in urban areas. How do you think that educators and policymakers should work on improving environmental education in urban areas?

NS: We need to expose people as soon as we can to other species. I have seen it here so many times. Ten miles from here, there are people and young children or teenagers that hardly know that there are other species in the world besides them. They come here to the Refuge, and I see it. I saw a little boy get so excited when he looked up at the exhibit with the cross-section of grass roots under the ground. He said, "I didn't know grass grows below the ground." He thought grass only grows up.

TU: Did you have close contact with nature growing up?

NS: I spent hours and hours and hours in the timber. I lived on a farm, and there was a pasture and creek running through it. And there were trees along the creek, with a couple more timbers a mile away. So, I spent a lot of time just out sitting and watching and observing, listening to the species talk to one another. I mean, they don't talk to one another, but each species in the timber knows what others are saying. For example, when an enemy of some kind comes through the timber, say a coyote or something, a bird will fly through cackckckaka [sound effect]. The



Monarch butterfly on a prairie sunflower. Photo courtesy of Joan Van Gorp, President and Community Coordinator for Friends of the Neal Smith National Wildlife Refuge (https://www.tallgrass.org)

squirrels know what the bird says, and they run up the tree. But they couldn't answer back. They communicate by listening. So, yes, I spent a lot of time in timber watching. And I remember so well that when I was very, very small, probably four or five years old, I discovered that no matter what two trees you looked at they were in line with one another. I thought I really had discovered something. [laughter]. And I saw that it wasn't true with three trees! Just observation, you learn a lot with observation.

Bison herd at the Neal Smith National Wildlife Refuge (NWR). Photo courtesy of Joan Van Gorp, President and Community Coordinator for Friends of the Neal Smith NWR

TU: Do you think that your connection with nature has helped you in your relationships with people because you learned how to observe and how to see things work together?

NS: I think that knowing [and] appreciating other species is always helpful. There are so many thousands of species in the world. You observe them, how they get along, and how they protect themselves while they're devouring others.

Jon Andelson: I'd like to follow up if I may with one question about that. I'm a little worried that — maybe especially in Iowa—it's getting harder and harder for those other species to live. You remember Earl Butz telling farmers to plant fence row to fence row. Most farmers are doing that. There's very little wild land on a farm anymore. Do you have any thoughts about that? Are we making it hard for other species to live?

NS: Yes, we are. But it's important to do what we're doing here at the Refuge — trying to re-establish species so that you see them, and you can know how they operated in the past. It's very difficult to re-establish some species. It was too bad that the tall grass prairie was such good farmland. It would have been so much better if maybe 50,000 acres had been reserved somewhere. But we have less than 1% of the original tallgrass prairie left, and that's not enough. You can't have buffalo very many places. But right here at the Refuge they've found species that people didn't even know were here; [the species] have come back on their own after 75 years, once the right conditions appeared.

JA: Maybe you remember the name Ada Hayden. She was an early naturalist in Iowa. Hayden Prairie is named for her. She published an essay in 1916 that Tayler actually read at one of our events [for the Center for Prairie Studies]. Way back in 1916, Hayden called for the preservation of just one quarter-section of original prairie in every township in Iowa for the ecological knowledge it could give us. It's a pity that we didn't follow her advice.

NS: They just didn't think about how valuable it would be for future generations 100 years ago. "Well, I want to plow that up because I need it right now." Yeah. When I was in Congress, we set aside a lot of land in the West that was about to be torn up.

JA: I think they're trying to take away some of that protection.

NS: Yes, they are.

JA: One of the concerns that I've had about agriculture in Iowa is all the chemicals being used, because some of the chemicals are intended to kill things, the insecticides and so on. And I'm especially concerned about it from the standpoint of the soil, because what makes Iowa soil so special is the life in it. It's got all the microorganisms; it's got all the root structures and so on. What you see in the exhibits here at the Refuge shows that very clearly, but we've become so reliant on insecticides that we're killing the life in the soil. Do you think there is a solution to that?

> "They just didn't think about how valuable [the prairie] would be for future generations 100 years ago. 'Well, I want to plow that up because I need it right now.'"

NS: Well, we're overpopulated, and we're responding to that to try and get more and more food from the land. So, we have special corn varieties that have been developed now, it's mostly feedstock and food stock. So that means you use more and more and more chemicals.

JA: Do you think there's any way that we can return to a more diversified farming like we had in the past?

NS: Well, we have some diversified farming, but it'd be very difficult for many people to farm that way.

Reflections on Neal Smith's political career

JA: I wanted to ask a question about the United States as a whole, which has been through a lot of very challenging political periods in its life. You mentioned the Great Depression, which certainly is one of them. World War II, obviously, the whole Vietnam era and the political turmoil that it created, the more recent wars in Afghanistan and Iraq, the collapse of the markets in 2008. Are there some political periods that you think that we as a country handled better than others?

NS: Oh, no question about that. The World Wars, for example, especially World War II. During World War II, overnight it went from two-thirds of the people being against it, to everyone being for it, to everybody united.

JA: December 7.

NS: Yes, it made a difference because we were attacked.

JA: Do you have any thoughts on the Kennedy administration [1961-1963] since you were in Congress at that time?

NS: Kennedy had a lot of good ideas, but they didn't get implemented. Then Johnson picked them up and passed them. In other words, they were creative people who were thinking of something, but accomplishing it was something else. And some of that was not their fault. Johnson had a unique background. He was from the South, but not from the Deep South. And he had the ability to get along with everybody, no matter where they were from. And even more important, he

Neal Smith and wife Bea with Great-Granddaughters Madison (center left) and Tayler (center right) in 1996 at the Franklin D. Roosevelt Memorial in Washington, DC. Photo courtesy of tayler ulbirch

had the ability to know how to put coalitions together. And he had the ability to realize what had to be done to get the right kind of coalition to do one thing, even though they were opposed to something else. He was unique in his ability. The conditions today are different. Years ago, we had the Southern Democrats and Northern Democrats and Republicans. You really had three parties, and you had to put different coalitions together. In the last election, the majority of the people voted for a Democratic House of Representatives, but because of how districts are set up we have a Republican House. So, you don't have the voice of the people. To have that we may need to have some kind of constitutional amendment, which would be very difficult to pass. Former [Supreme Court] Justice Stevens has proposed one. He says we need to think about changing the constitution once in a while to match the changes in the times. During my service of 36 years, we had five amendments to the Constitution. In the last 20 years we've had virtually none.

JA: I'm under the impression that a lot of the problems come from the re-districting procedures.

NS: That's one of the things that [Justice] Stephens is talking about. Through redistricting you end up with some districts that are 80 percent one party or the other, and not enough are between 45 and 55. There are other things that would be almost impossible to change. One is that the small states are not wanting to give up having two senators. So now there are 21 states, with 42 senators, that have the same population as California with two. You don't have majority rule when you have that.

JA: Well, the Constitution was also set up to protect the rights of the minority and the small states.

NS: Well, it was set up as if each state was an independent country.

Lessons from the past

JA: A few minutes ago, I referred to the various crises of the 20th century. I'm curious to know your thoughts about what lessons the American people should draw from the crises of the 20th century.

NS: We draw lessons from each one of them. Not immediately, maybe 50 years later. From World War II, how up until December 7th, the overwhelming majority said, "Well, there's a big ocean between us and those people are over there, and that acts to protect us. We don't want to have anything to do with them." So, we ignored what Hitler was doing. And then all at once you find out it does affect you. Lessons can be learned from each one of these crises, but in many cases almost nobody foresees the lesson.

JA: What was the lesson of the Great Depression?

NS: The Great Depression showed Americans that things get done by getting together and utilizing the government as a tool. We did something that benefited almost all the people. It wouldn't have happened unless they did it through government.

JA: I'm feeling a little pessimistic right now about the government. There seems to be a kind of inability to work across the aisle. Do you see some hope?

NS: Well, it's difficult. It started in the early 1990s, it started with the majority of each party making the minority go along with [their preferences]. And I never thought I would ever, ever see anything like the Hastert Rule. [Editor's Note: "The Hastert Rule says that the Speaker will not schedule a floor vote on any bill that does not have majority support within their party – even if the majority of the members of the House would vote to pass it" - Wikipedia.]

JA: So where does the hope lie?

NS: It is going to be very, very difficult to make some changes that would improve things, but there are some that can be made. There's hope. You've got to think things can be done. A lot of things can be done to improve it, even if it isn't going to change fundamentally. It can be improved.

JA: Well, it's probably never been 100 percent.

NS: No, no it never has.

Elk grazing at the Neal Smith National Wildlife Refuge (NWR). Photo by the U.S. Geological Survey

Photo by Beck Lambert

Will Gresham *is an undergraduate at Grinnell College where he leads the off-campus Stew Makerspace's (https://stew.sites.grinnell.edu) 3D printing, scanning, and modeling capabilities. He is currently researching the digitization and replication of physical anthropological artifacts such as stone tools and tools made by non-humans. His interests include archaeology and spaceflight.*

Sundogs

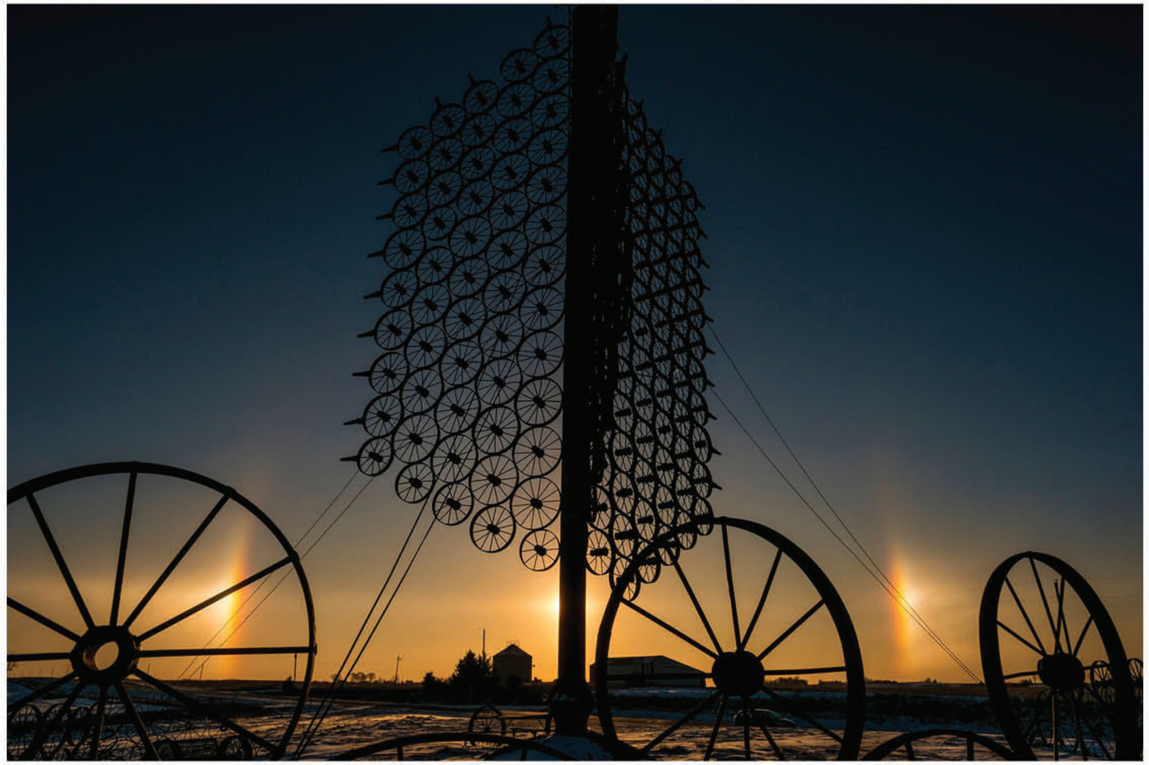
by Will Gresham

The photographs on the facing page and the page following are of a sundog, or rather of *two* sundogs, which flank the sun in the middle. Sundogs are an atmospheric oddity with many of the same original characteristics of a rainbow. A spectacular phenomenon, they are caused by hexagonal prism-shaped ice crystals in the upper atmosphere.[1]

Microscopic hexagonal prisms of ice (see the photograph, at right) work together to diffract the light of the sun at precise angles across a horizon. The ring connecting the two sundogs in the photographs is created by similar crystals that have a longer height. Acting together, these crystals produce a halo effect around the sun that follows alongside just like a pair of loyal dogs.[2]

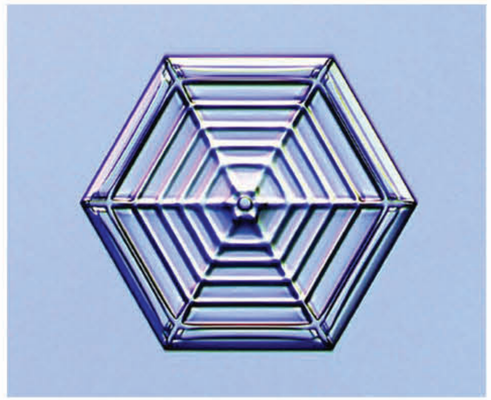
The things that set sundogs apart from rainbows can be ascribed to a couple of factors. First, in contrast to a rainbow, the arcs appear separated from the sun at precise 22-degree arcs on either side of it. This means that unless one has a habit of looking directly at or around the sun, sundogs can be tricky to catch. Secondly, the crystals essential for the creation of these phenomena are only formed at low temperatures and under specific climate conditions. The long winters of the prairie region, combined with the flat, uninterrupted horizon, make for a perfect harmony that allowed Grinnell College's campus photographer, Justin Hayworth (https://justinhayworthphotography.zenfolio.com), to take the beautiful photographs you see here.

The origin of the word "Sundog" is hotly debated. Most linguists agree that the name has roots in mythology. Norse mythology makes reference to the term *Solhunde* or *Solvarg*, both meaning, essentially, "Sun Dog." However, the scientific terminology for the phenomenon is *parhelion*, which is derived from the Ancient Greek meaning "beside the sun." Aristotle is quoted as saying, "two mock suns rose with the sun and followed



Sundogs flanking L. J. Maasdam's wheel sculpture outside Sully, Iowa. Photo by Justin Hayworth

it all through the day until sunset."[3] Aristotle follows this with the statement, "mock suns" are always to the side, never above or below, most commonly at sunrise or sunset, more rarely in the middle of the day." This could indicate that at the time Aristotle was writing, no common name yet existed. Aristotle was describing the event rather than simply offering a name. Aristotle isn't the only noteworthy historical figure to discuss Sundogs, as William Shakespeare also makes reference to sundogs in the third part of his play *King Henry VI.*



Sundogs form when light diffracts through hexagonal ice crystals in the upper atmosphere. Photo by Kenneth Libbrecht, California Institute of Technology

Sundogs over an Iowa farmstead. Photo by Justin Hayworth

Three glorious suns, each one a perfect sun;
Not separated with the racking clouds,
But sever'd in a pale clear-shining sky.
See, see! they join, embrace, and seem to kiss,
As if they vow'd some league inviolable:
Now are they but one lamp, one light, one sun.
In this the heaven figures some event.

Act Two, Scene One
Henry VI, Part 3
William Shakespeare

Endnotes

The Propaganda of Postcards

[1] Jeffrey L. Meikle, Postcard America: Curt Teich and the Imaging of a Nation, 1931-1950 (Austin, Texas: University of Texas Press, 2016).

[2] Ibid.

[3] History.com Editors, "Andrew Jackson Signs the Indian Removal Act into Law - History," History.com, August 30, 2021, https://www.history.com/this-day-in-history/indian-removal-act-signed-andrew-jackson.

[4] "Manifest Destiny and Indian Removal - American Experience," Smithsonian American Art Museum, accessed March 21, 2023, https://americanexperience.si.edu/wp-content/uploads/2015/02/Manifest-Destiny-and-Indian-Removal.pdf.

[5] Pam Cornelison and Ted Yanak, The Great American History Fact-Finder the W.H.O., What, Where, When, and Why of American History (Boston , Massachusetts: Houghton Mifflin, 2004).

[6] "Trail of Tears," The Museum of the Cherokee Indian, September 16, 2015, https://cherokeemuseum.com/archives/era/trail-of-tears.

[7] Larry O'Dell, "Miller Brothers 101 Ranch," The Encyclopedia of Oklahoma History and Culture, https://www.okhistory.org/publications/enc/entry.php?entry=MI029. v

[8] Fixico, Donald. "American Indians." Oklahoma Historical Society | OHS. Oklahoma Department of Libraries. Accessed April 30, 2023. https://www.okhistory.org/publications/enc/entry?entryname=AMERICAN+INDIANS.

Technology on the Prairie

The First Electronic Computer

Mobley, B. P. (2001). The Ingenuity of Common Workmen: and the Invention of the Computer (dissertation). ProQuest Information and Learning Company, Ann Arbor, MI.

Burks, A. R., & Burks, A. W. (1988). The First Electronic Computer: The Atanasoff Story. University of Michigan Press.

Mackintosh, A. R. (1988). Dr. Atanasoff's Computer. Scientific American, 259(2), 90–96. http://www.jstor.org/stable/24989199

The Discovery of Helium

American Chemical Society. (n.d.). Discovery of Helium in Natural Gas - National Historic Chemical Landmark. American Chemical Society. Retrieved May 5, 2023, from https://www.acs.org/education/whatischemistry/landmarks/heliumnaturalgas.html

Cady, H. P., & McFarland, D. F. (1906). Helium in Kansas Natural Gas. Transactions of the Kansas Academy of Science (1903-), 20, 80–81. https://doi.org/10.2307/3624645

Williams, M. (2016, March 15). Who Discovered Helium? Phys.org. Retrieved May 5, 2023, from https://phys.org/news/2016-03-helium.html

The First Sky Scraper
Bellis, M. (2020, January 10). Why the First Skyscraper was Only Ten Stories Tall. ThoughtCo. Retrieved May 4, 2023, from https://www.thoughtco.com/how-skyscrapers-became-possible-1991649
Editors, History.com. (2010). Home Insurance Building. History.com. Retrieved May 4, 2023, from https://www.history.com/topics/landmarks/home-insurance-building

The Liquid-Crystal Display
Sharpe, S. (n.d.). Funding Breakthrough Technology - Centre for Business Research. Retrieved May 5, 2023, from https://www.cbr.cam.ac.uk/wp-content/uploads/2020/08/lcd-case-report.pdf
Massachusetts Institute of Technology. (2004, May 30). Inventor of the week. Archive. Retrieved April 24, 2023, from https://web.archive.org/web/20040530161518/http://web.mit.edu/invent/iow/fergason.html

First American Gasoline Automobile
Ohio History Central. (2020, October 21). John W. Lambert - Ohio History Central. Retrieved May 4, 2023, from https://ohiohistorycentral.org/w/John_W._Lambert
The Cincinnati Enquirer. (1960, October 20). The Cincinnati Enquirer, 20 Oct 1960, page 76. Historical Newspapers from 1700s-2000s - Newspapers.com. Retrieved May 4, 2023, from https://www.newspapers.com/image/101138055/?clipping_id=65352327&fcfToken=eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJmcmVlLXZpZXctaWQiOjEwMTEzODA1NSwiaWF0IjoxNjgxOTk0Mjg3LCJleHAiOjE2ODIwODA2ODd9.jitUsCMLuyGeRiH8WBGnxDWCFzJ14opmkVPBomHx9ak

Stroboscopic Photography
Massachusetts Institute of Technology. (n.d.). Harold Edgerton. Lemelson. Retrieved May 4, 2023, from https://lemelson.mit.edu/resources/harold-edgerton
Massachusetts Institute of Technology. (n.d.). Studies at MIT: 1926 – 1931 Harold "Doc" Edgerton. Harold 'Doc' Edgerton, visionary engineer. The Edgerton Digital Collections (EDC) project. Retrieved May 5, 2023, from https://edgerton-digital-collections.org/docs-life/studies-at-mit
Ibid.

Four-Legged People

1 Brown, Joseph Epes. Animals of the Soul: Sacred Animals of the Oglala Sioux. Element, 1998.
2 Ibid.
3 Ibid. Note that here I use the words bison and buffalo interchangeably, referring in each instance to the same animal, although technically the species Bison bison is not related to buffalo at all. I use them interchangeably because many of the sources I reference do also
4Ibid.
5 Lewis, Thomas H. The Medicine Men: Oglala Sioux Ceremony and Healing (Studies in the Anthropology of North American Indians) University of Nebraska Press, 1992
6 Brown, Joseph Epes. Animals of the Soul: Sacred Animals of the Oglala Sioux. Element, 1998.
7 Onion, Amanda, et al. "Indian Reservations." History.com, A&E Television Networks, 18 Mar. 2019, https://www.history.com/topics/native-american-history/indian-reservations.
8 Brown, Joseph Epes. Animals of the Soul: Sacred Animals of the Oglala Sioux. Element, 1998.

9 Powers, Marla N. Oglala Women Myth, Ritual, and Reality. University of Chicago Press, 1986.
10 Lott, Dale F. American Bison: A Natural History. 1st ed. University of California Press, 2002. http://www.jstor.org/stable/10.1525/j.ctt1ppxd1.
11 Powers, Marla N. Oglala Women Myth, Ritual, and Reality. University of Chicago Press, 1986.

Wolves Under Threat

1 Wisconsin Department of Natural Resources. "Wisconsin DNR Announces Wolf Season Begins Nov. 6, 2021." https://dnr.wisconsin.gov/newsroom/release/39871. Accessed May 15 2023.
2 Wisconsin Department of Natural Resources Bureau of Wildlife Management. "Wisconsin Wolf Management Plan 2022." 2022, pp. 1-178. https://widnr.widen.net/s/kpfkd8nr2n/draft_wisconsin_wolf-management_plan_nov2022.
3 "Hunter Nation V. Wisconsin Department of Natural Resources." Case No. 21CV31, United States Circuit Court for Jefferson County, Wisconsin, 2021. https://will-law.org/wp-content/uploads/2021/11/Hunter-Nation-SJ-Decision.pdf.
4 Defenders of Wildlife. "Fall 2021 Wolf Harvest Season Comments." 2021. https://defenders.org/sites/default/files/2021-08/DefendersOfWildlife_Comments_NRB_meeting_2021.pdf.
5 Johnson, Randy and Anna Schneider. "Wisconsin Wolf Season Report." edited by Wisconsin Department of Natural Resoruces, 2021, pp. 1-9. https://widnr.widen.net/s/k8vtcgjwkf/wolf-season-report-february-2021.
6 Ibid.
7 Ibid.
8 Ibid.
9 Hubbuch, Chris. "Wolf Hunters Vastly Exceed Wisconsin Quota in First Hunt since Federal Protections Dropped." Wisconsin State Journal, 2021. https://madison.com/wsj/news/local/environment/wolf-hunters-vastly-exceed-wisconsin-quota-in-first-hunt-since-federal-protections-dropped/article_47537484-7cf6-56d6-bd0f-21d0a0b4a76e.html//.
10 Clemons, Alan. "Wisconsin Hunters Take 216 Wolves and Exceed Harvest Quota in Controversial Hunt That Closed after Just Three Days." Outdoor Life, 2021. https://www.outdoorlife.com/story/hunting/wisconsin-wolf-hunt-exceeds-harvest-quota/.
11 Johnson, Randy and Anna Schneider. "Wisconsin Wolf Season Report." edited by Wisconsin Department of Natural Resoruces, 2021, pp. 1-9. https://widnr.widen.net/s/k8vtcgjwkf/wolf-season-report-february-2021.
12 Learn, Joshua Rapp. "The ESA Fails Due to Slow Listing Process." https://wildlife.org/the-esa-fails-due-to-slow-listing-process/. Accessed April 1 2023.
13 Hoffman, Austin and Annie White. "Brief History of Wild Wolves." Mission:Wolf. https://missionwolf.org/brief-history-of-wolves-in-the-wild. Accessed April 1 2023.
14 "America's Gray Wolves: A Long Road to Recovery." Center for Biological Diversity. https://www.biologicaldiversity.org/campaigns/gray_wolves/. Accessed April 1 2023.
15 White, Annie B. "A History of Wild Wolves in the United States." Gray Wolf Conservation. https://www.graywolfconservation.com/Wild_Wolves/history.htm#:~:text=It%20is%20estimated%20that%20over,over%20the%20past%2050%20years. Accessed April 1 2023.
16 Ibid.

17 "Endangered Species Act of 1973 as Amended through the 108th Congress." 16 USC §1531-1544, United States Fish and Wildlife Service, December 28, 1973 pp. 1-41.
18 Ibid.
19 United States, Department of the Interior, Fish and Wildlife Service,. "Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife." 85 FR 69778, Federal Register, 2020, pp. 69778-895. https://www.govinfo.gov/content/pkg/FR-2020-11-03/pdf/2020-24171.pdf#page=1.
20 Union of Concerned Scientists. "Progress and Problems: Government Scientists Report on Scientific Integrity at Four Agencies." 2015. https://www.ucsusa.org/sites/default/files/attach/2015/10/ucs-scientist-survey-2015-appendix-b.pdf.
21 United States, Department of the Interior, Fish and Wildlife Service,. "Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife." 85 FR 69778, Federal Register, 2020, pp. 69778-895. https://www.govinfo.gov/content/pkg/FR-2020-11-03/pdf/2020-24171.pdf#page=1.
22 Ibid.
23 "Endangered Species Act of 1973." Public Law 93-205 87 Stat., December 28, 1973 pp. 884-903. https://www.govinfo.gov/content/pkg/STATUTE-87/pdf/STATUTE-87-Pg884.pdf.
24 "Endangered Species Act of 1973 as Amended through the 108th Congress." 16 USC §1531-1544, United States Fish and Wildlife Service, December 28, 1973 pp. 1-41.
25 Chaffetz, Mark. "Clarifying the Endangered Species Act's 'Distinct Population Segment' Policy through the Lens of Grizzly Bears." Virginia Environmental Law Journal, 2019, http://www.velj.org/elrs/clarifying-the-endangered-species-acts-distinct-population-segment-policy-through-the-lens-of-grizzly-bears#_ftn2.
26 United States, Department of the Interior, Fish and Wildlife Service. "Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife." 85 FR 69778, Federal Register, 2020, pp. 69778-895. https://www.govinfo.gov/content/pkg/FR-2020-11-03/pdf/2020-24171.pdf#page=1.
27 Ibid.
28 Ibid.
29 Ibid.
30 Ibid.
31 Ibid.
32 "Defenders of Wildlife V. U.S. Fish and Wildlife Service,." 4:21-cv-00344-JSW, United States Disctrict Court of the Northern District of California, 2022. https://www.michigan.gov/-/media/Project/Websites/AG/releases/2022/February/Wolf_Delisting_Order_747978_7.pdf?rev=3e04211d990d4d458025d58d49ea1f68.
33 Ibid.
34 Ibid.
35 Ibid.
36 Ibid.
37 Ibid.
38 Ibid.
39 Ibid.
40 Ibid.

41 United States, Department of the Interior, Fish and Wildlife Service,. "Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife." 85 FR 69778, Federal Register, 2020, pp. 69778-895. https://www.govinfo.gov/content/pkg/FR-2020-11-03/pdf/2020-24171.pdf#page=1.
42 "Defenders of Wildlife V. U.S. Fish and Wildlife Service,." 4:21-cv-00344-JSW, United States Disctrict Court of the Northern District of California, 2022. https://www.michigan.gov/-/media/Project/Websites/AG/releases/2022/February/Wolf_Delisting_Order_747978_7.pdf?rev=3e04211d990d4d458025d58d49ea1f68.
43 United States, Department of the Interior, Fish and Wildlife Service,. "Endangered and Threatened Wildlife and Plants; Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife." 85 FR 69778, Federal Register, 2020, pp. 69778-895. https://www.govinfo.gov/content/pkg/FR-2020-11-03/pdf/2020-24171.pdf#page=1.
44 "Defenders of Wildlife V. U.S. Fish and Wildlife Service,." 4:21-cv-00344-JSW, United States Disctrict Court of the Northern District of California, 2022. https://www.michigan.gov/-/media/Project/Websites/AG/releases/2022/February/Wolf_Delisting_Order_747978_7.pdf?rev=3e04211d990d4d458025d58d49ea1f68.
45 Ibid.
46 Ibid.
47 Ibid.
48 "America's Gray Wolves: A Long Road to Recovery." Center for Biological Diversity. https://www.biologicaldiversity.org/campaigns/gray_wolves/. Accessed April 1 2023.
49 "Defenders of Wildlife V. U.S. Fish and Wildlife Service,." 4:21-cv-00344-JSW, United States Disctrict Court of the Northern District of California, 2022. https://www.michigan.gov/-/media/Project/Websites/AG/releases/2022/February/Wolf_Delisting_Order_747978_7.pdf?rev=3e04211d990d4d458025d58d49ea1f68.
50 Union of Concerned Scientists. "Progress and Problems: Government Scientists Report on Scientific Integrity at Four Agencies." 2015. https://www.ucsusa.org/sites/default/files/attach/2015/10/ucs-scientist-survey-2015-appendix-b.pdf.
51 Hamilton, Lawrence C. et al. "Wolves Are Back: Sociopolitical Identity and Opinions on Management of Canis lupus." Conservation Science and Pratice, 2020, pp. 1-13, doi:10.1111/csp2.213.
52 Niemiec, Rebecca et al. "Public Perspective and Media Reporting of Wolf Reintroduction in Colorado." PeerJ, no. 8:e9074, 2020, doi:10.7717/peerj.9074.
53 Eeden, Lily M. van et al. "Political Affiliation Predicts Public Attitudes toward Gray Wolf (Canis lupus) Conservation and Management." Conservation Science and Pratice, vol. 3, no. 3, 2021, doi:10.1111/csp2.387.
54 Ibid.
55 Hamilton, Lawrence C. et al. "Wolves Are Back: Sociopolitical Identity and Opinions on Management of Canis Lupus." Ibid.2020, pp. 1-13, doi:10.1111/csp2.213.
56 Eeden, Lily M. van et al. "Political Affiliation Predicts Public Attitudes toward Gray Wolf (Canis lupus) Conservation and Management." Ibid.vol. 3, no. 3, 2021, doi:10.1111/csp2.387.
57 Niemiec, Rebecca et al. "Public Perspecgive and Media Reporting of Wolf Reintroduction in Colorado." PeerJ, no. 8:e9074, 2020, doi:10.7717/peerj.9074.
58 The Humane Society of the United States. "Government Data Confirms That Wolves Have a Negligible Effect on U.S. Cattle & Sheep Industries." 2019, pp. 1-30. https://www.humanesociety.org/sites/default/files/

docs/HSUS-Wolf-Livestock-6.Mar_.19Final.pdf.
59 Ibid.
60 Ibid.
61 Ibid.
62 USDA-Animal and Plant Health Inspection Service. "Death Loss in U.S. Cattle and Calbes Due to Predator and Nonpredator Causes, 2015." 2017. https://www.aphis.usda.gov/animal_health/nahms/general/downloads/cattle_calves_deathloss_2015.pdf.
63 The Humane Society of the United States. "Government Data Confirms That Wolves Have a Negligible Effect on U.S. Cattle & Sheep Industries." 2019, pp. 1-30. https://www.humanesociety.org/sites/default/files/docs/HSUS-Wolf-Livestock-6.Mar_.19Final.pdf.
64 Ibid.
65 United States, Department of the Interior, Fish and Wildlife Service,. "Endangered and Threatened Wildlife and Plants; Revision of the Regulations for Listing Species and Designating Critical Habitat." 83 FR 35193, 2018, pp. 35193-201. https://www.govinfo.gov/content/pkg/FR-2018-07-25/pdf/2018-15810.pdf.
66 Ibid.
67 "Endangered Species Act of 1973 as Amended through the 108th Congress." 16 USC §1531-1544, United States Fish and Wildlife Service, December 28, 1973 pp. 1-41.
68 Stracqualursi, Veronica. "Trump Administration Wants to Change Key Parts of the Endangered Species Act." CNN, 2018. https://www.cnn.com/2018/07/20/politics/trump-administration-endangered-species-act-changes/index.html.
69 Holden, Emily. "Trump Officials Weaken Protectiosn for Animnals near Extinction." The Guardian, 2019. https://www.theguardian.com/environment/2019/aug/12/endangered-species-act-trump-administration-protection-changes.
70 U.S. Fish and Wildlife Service. "Statement on the Gray Wolf in the Lower-48 United States." 2023. https://www.fws.gov/media/2023-usfws-gray-wolf-statement.

Is Renewable Energy Enough?

[1] Our Land, Ourselves: Readings on People and Place. 1999. Edited by Peter Forbes, Ann Armbrecht, and Helen Whybrow. Page 184. The Trust for Public Land.
[2] Berry, Wendell. 2015. Our Only World. Chapter 5, Less Energy, More Life. Counterpoint Press.
[3] Klein, Naomi. 2014. This Changes Everything: Capitalism vs. The Climate. Page 16. Simon & Schuster.

Tight, Insulated, and Thermally Massive

https://www.como.gov/Council/Commissions/downloadfile.php?id=8255
[2] https://theecologist.org/2012/apr/20/are-straw-bales-future-sustainable-building
[3] https://www.britannica.com/topic/Earthship
[4] https://chem.libretexts.org/Courses/University_of_Arkansas_Little_Rock/Chem_1402%3A_General_Chemistry_1_ (Kattoum)/Text/5%3A_Energy_and_Chemical_Reactions/5.2_Specific_Heat_Capacity
[5] https://www.squareone.ca/resource-centres/homeowner/what-are-net-zero-or-net-energy- homes#:~:text=A%20Net- zero%20home%20is%20a%20home%20built%20with,doesn%E2%80%99t%20necessarily%20mean%20that%20Net -zero%20homes%20are%20off-grid.
[6] https://www.techtarget.com/whatis/definition/passive- solar#:~:text=Passive%20solar%20is%20the%20use%20of%20the%20sun%E2%80%99s,gathering%20or%20transfo rmation%20through%20mechanical%20or%20electronic%20means.
[7] https://www.greenbuilt.org/articles/156-green-building-glossary/
[8] https://monarch-architecture.com/portfolio/sustainable-accessory-dwelling/
[9] https://www.homebuilding.co.uk/advice/tadelakt
[10] https://echotape.com/construction-and-insulation/why-thermal-bridging-and-thermal-breaks-matter-in-construction/

Tornadoes in Kansas

[1]https://www.statista.com/statistics/237409/economic-damage-caused-by-tornadoes-in-us
[2]https://lisbdnet.com/how-many-people-die-from-tornadoes-each-year
[3]https://weather.com/safety/tornado/news/2020-03-26-average-number-of-tornadoes-by-state-each-year-united-states
[4] https://www.weather.gov/ict/kstorfacts

Iowa's Lichens: Found and Lost

[1] Brodo, I.M., S.D. Sharnoff, S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven, Connecticut.
[2] Spribille, T., Tuovinen, V., Resl, P., Vanderpool, D., Wolinski, H., Aime, M. C., and McCutcheon, J. P. 2016. Basidiomycete yeasts in the cortex of ascomycete macrolichens. Science, 353, 488–492.
[3] Thompson, K.M. and J.T. Colbert. 2020. Lichens of Iowa's White Pine Hollow State Preserve. Evansia 37: 31-49.
[4] Iowa Department of Natural Resources. 2000. Iowa – Portrait of the Land. Des Moines, Iowa.
[5] Dinsmore, J. 1994. A Country So Full of Game. The story of wildlife in Iowa. University of Iowa Press, Iowa City, Iowa.
[6] Poole, K. E. and J. A. Downing. 2004. Relationship of declining mussel biodiversity to stream-reach and watershed characteristics in an agricultural landscape. J. North American Benthological Society 23:114–125.
[7] Consortium of North American Lichen Herbaria. 2023. https://lichenportal.org/portal/. Accessed February 22, 2023.
[8] Podaril, A. L. and J.T. Colbert. 2015. Lichen diversity in southeast Iowa. Opuscula Philolichenum 14: 121-138.
[9] ibid.
[10] Colbert, J.T. 2011. Current status of lichen diversity in Iowa. Proceedings of the Iowa Academy of Science 118: 16-23.
[11] Thompson and Colbert, 2020.
[12] Brodo et al., 2001

A Spirited Land

[1] Susan C. Mulholland, Stephen L. Mulholland, Gordon R. Peters, James K. Huber, & Howard D. Mooers, "Paleo-Indian Occupations in Northeastern Minnesota: How Early?" North American Archaeologist 18, no.

4 (1998): 371–76.
[2] Susan C. Mulholland et al., "Paleo-Indian Occupations," 381–86.
[3] United States Forest Service, "Historical Contact," United States Department of Agriculture, accessed on March 28, 2023. https://www.fs.usda.gov/detail/superior/learning/historyculture/?cid=fsm91_049856#:~:text=-French%20Fur%20Trade%20
[4] John Enger, "Explaining Minnesota's 1837, 1854, and 1855 Ojibwe Treaties," MPR News, February 1, 2016. https://www.mprnews.org/story/2016/02/01/explaining-minnesota-ojibwe-treaties
[5] Minnesota Legislative Reference Library, "Copper-Nickel Studies and Non-Ferrous Mining," Minnesota Legislature, January 2023. https://www.lrl.mn.gov/guides/guides?issue=coppernickel#:~:text=Copper%2Dnickel%20deposits%20have%20been,metals%20developed%20in%20the%20region.
[6] Minnesota Department of Natural Resources, "1854 Treaty," DNR, accessed on March 15, 2023. https://www.dnr.state.mn.us/aboutdnr/laws_treaties/1854/index.html
[7] Minnesota Chippewa Tribe, "Who We Are," MCT, accessed on March 5, 2023. https://www.mnchippewatribe.org/
[8] Douglas P. Thompson, "Understanding Chippewa Treaty Rights in Minnesota's 1854 Ceded Territory," 1854 Treaty Authority, 2020. https://www.1854treatyauthority.org/images/ToHuntandFish.updated2020.pdf
[9] MDNR, "1854 Treaty."
[10] United States District Court Fourth Division, "Grand Portage Band of Chippewa of Lake Superior v. State of Minnesota," 1985. https://data.glifwc.org/ceded/legal.references/Grand.Portage.v.Minnesota.No.%204-85-1090.pdf
[11] Karii Krogseng, "Minnesota v. Mille Lacs Band of Chippewa Indians," Ecology Law Quarterly 27, no. 3 (2000): 773-78.
[12] Legal Information Institute, "Supreme Court of the United States 119 S.Ct. 1187 143 L.Ed.2d 270," Cornell Law School, accessed on April 3, 2023. https://www.law.cornell.edu/supremecourt/text/526/172
[13] MDNR, "1854 Treaty."
[14] United States Department of Justice, "Minnesota v. Mille Lacs Band," January 4, 2022. https://www.justice.gov/enrd/minnesota-v-mille-lacs-band
[15] "Minnesota v. Mille Lacs Band of Chippewa Indians," Oyez, accessed on April 24, 2023. https://www.oyez.org/cases/1998/97-1337
[16] Office of Mark Dayton, "State of Minnesota and Fond du Lac Band of Lake Superior Chippewa Reach Agreement Resolving Outstanding Fish and Wildlife Issues Related to 1854 Treaty," State of Minnesota, December 8, 2017. https://www.leg.mn.gov/docs/2018/other/181224/governor/newsroom/indexee39.htm
[17] "History of the Boundary Waters and its Protections," Save the Boundary Waters Campaign, April 7, 2021. https://www.savetheboundarywaters.org/updates/history-boundary-waters-and-its-protections
[18] "What is the Threat?" Save the Boundary Waters Campaign, accessed on May 1, 2023. https://www.savetheboundarywaters.org/current-threats
[19] "Sulfide Mining Fact Sheet," Minnesota Environmental Partnership, 2017. https://www.mepartnership.org/wp-content/uploads/2018/02/MEP-Sulfide-Mining-Fact-Sheet-2018.pdf
[20] United States Forest Service, "BWCAW Overview and History," United States Department of Agriculture, accessed on March 7, 2023. https://www.fs.usda.gov/detail/superior/specialplaces/?cid=stelprdb5203434
[21] United States Department of Interior, "Biden-Harris Administration Protects Boundary Waters Area Watershed," January 26, 2023. https://www.doi.gov/pressreleases/biden-harris-administration-protects-boundary-waters-area-watershed
[22] Catherine Chavers, "Minnesota Chippewa Tribe Letter of Support for Copper Mining Ban Near Boundary Waters,"

Minnesota Chippewa Tribe, January 31, 2020, 1. https://www.documentcloud.org/documents/6792326-Chippewa-Tribe-Letter-of-Support
[23] Catherine Chavers, "MCT Letter," 2.
[24] Ibid.
[25] Lee R. Johnson & Juan Martinez, "Rainy River Withdrawal: Tribal Traditional Needs and Values Report," United States Forest Service. June 2022, 1-8. https://eplanning.blm.gov/public_projects
[26] Ibid, 3.
[27] Ibid, 5.
[28] Ibid, 6.
[29] United States Forest Service, "Rainy River Withdrawal: Environmental Assessment," June 2022.
[30] "Fond du Lac and Grand Portage Bands File Suit Against EPA to Reverse Approval of Minnesota's Damaging New Class 3 & 4 Water Quality Standards," Indian Country Today, July 15, 2022. https://ictnews.org/the-press-pool/fond-du-lac-and-grand-portage-bands-file-suit-against-epa-to-reverse-approval-of-minnesotas-damaging-new-class-3-4-water-quality-standards
[31] Greg Seitz, "Tribes and Forest Service Announce Co-Stewardship of Superior National Forest," Quetico Superior Wilderness News, May 9, 2023.https://queticosuperior.org/tribes-and-forest-service-announce-co-stewardship-of-superior-national-forest

Sundogs

[1]"Cloud Crystals and Halos, Atmospheric Optics UK," https://atoptics.co.uk/halo/crhal.htm
[2] "What Causes Halos, Sundogs and Sun Pillars?," National Weather Service, 2006, https://www.weather.gov/arx/why_halos_sundogs_pillars
[3] Aristotle, *Meteorologica (*340 B.C.E.)