

Erin Socha

EVRN 336 | Spring 2025

Final Paper

Prairie in Peril: A Biocentric Approach to *Juniperus virginiana* Encroachment in the Great Plains

Introduction

Habitat loss is an ecological disaster told in stories across the globe: human activity is imperiling biodiversity as we convert native spaces to farms, cities, and highways. Almost no corner of the earth remains untouched. In our own backyard, Kansas and the Great Plains have seen the destruction of the grassland biome, which was formed in the rain shadow of the Rocky Mountains and once covered central North America from Texas into Canada. Today, only 4% of the tallgrass prairie—the eastern portion of this biome—remains. Of the myriad reasons for this destruction, farms that transform untold acres into single-crop monocultures and cities that continue to swell are the most well-known. However, they are not the only issues. In this paper, I examine how one crisis, specific to the Great Plains region, is transforming the landscape: woody encroachment by eastern red cedar, *Juniperus virginiana*. Woody encroachment is a term used by ecologists to describe the way that woody perennial species – i.e., trees and shrubs – are burying what was once a grassland ecosystem dominated by herbaceous perennial plants – i.e., grasses and forbs. Although *Juniperus virginiana* is a native species, its behavior in prairie

habitat has dramatically changed in the last two hundred years, since European colonization changed the human relationship with the land.

The dilemmas, causes, and possible solutions posed by woody encroachment scramble some widely held assumptions about nature and humans' role in it – namely the idea that nature is best left to its own devices. Historically, grassland ecosystems in the central United States were managed by humans through controlled fire; both grasslands and indigenous cultures evolved together. In fact, without people, prairie simply *would not be*. Yet, the ecosystem also magnifies human missteps, even those made with best intentions. When we analyze this problem, we see that the beginnings of woody encroachment coincided with a historical turn from a biocentric culture to an anthropocentric one, as European settlers displaced Native Americans in the grassland biome. In doing so, they transformed the land and its ecosystems into a mere commodity and resource to be exploited for human needs. To return this region to ecological balance, modern land stewards must embrace a biocentric worldview that incorporates the ethical ideas put forth by Aldo Leopold in his seminal text *A Sand County Almanac* and its benchmark essay “The Land Ethic,” as well as the traditional ecological knowledge of indigenous people, as exemplified by Robin Kimmerer’s *Braiding Sweetgrass*.

Part I: The Prairie is Collapsing

Biodiversity is the well from which all life springs. Evolution has crafted an intricate balance of symbiosis and mutualism, predator and prey, producer and consumer. Humans, too, depend on this balance. We rely on biodiversity to sustain our food systems through the health of pollinators and microscopic soil organisms, and to provide the base materials we use to make our

medicines.¹ The grassland biome is an ancient one, formed over roughly 10,000 years since the retreat of the last ice age, as periods of fire, drought, and bison grazing produced an ecosystem that is surpassed only by the rainforests of Brazil in its biodiversity.²

One species is threatening to change all of that. *Juniperus virginiana*, commonly known as eastern red cedar, is a long-lived evergreen tree that is native to the eastern United States.³ Historically, in the plains, it was confined to rocky outcroppings where it was spared the culling effects of fire.⁴ In the absence of fire, which has been suppressed since colonization, the tree has aggressively colonized its way westward into the grassland biome in what ecologists have labeled a “green glacier.”⁵ From 2005 - 2010, it spread at a rate of 25,000 acres per year⁶ and today it destroys more prairie than the conversion to row-crops.⁷

The consequences of this transformation are startling. Environmental factors upon which humans rely – namely our water, biodiversity, and climate – are all negatively affected. Eastern red cedar, with its deep and penetrating tap root,⁸ can access deep water stores and sucks up 1.5 billion gallons of water every day in a region facing increasing drought due to climate change.⁹

¹ US EPA, “EnviroAtlas Benefit Category: Biodiversity Conservation,” Overviews and Factsheets, April 24, 2015, <https://www.epa.gov/enviroatlas/enviroatlas-benefit-category-biodiversity-conservation>.

² National Park Service, “A Complex Prairie Ecosystem - Tallgrass Prairie National Preserve (U.S. National Park Service),” accessed April 12, 2025, <https://www.nps.gov/tapr/learn/nature/a-complex-prairie-ecosystem.htm>.

³ USDA, “Species: *Juniperus Virginiana*,” USDA Plant Database, accessed April 12, 2025, <https://www.fs.usda.gov/database/feis/plants/tree/junvir/all.html>.

⁴ “Eastern Red Cedar,” *Grow Native!* (blog), accessed May 13, 2025, https://grownative.org/native_plants/eastern-red-cedar/.

⁵ Carson Vaughan, “A ‘Green Glacier’ Is Dismantling the Great Plains,” *New York Times*, accessed April 12, 2025, <https://www.nytimes.com/2023/12/07/opinion/prairie-great-plains-trees.html>.

⁶ “Eastern Redcedar in Nebraska: Nebraska Conservation Roundtable | Nebraska Forest Service | Nebraska,” accessed May 15, 2025, <https://nfs.unl.edu/eastern-redcedar-nebraska-nebraska-conservation-roundtable/>.

⁷ Leslie Reed, “Grassland Conservation Spotlighted during Federal Official’s Nebraska Visit | Nebraska Today,” University of Nebraska - Lincoln, accessed April 12, 2025, <https://news.unl.edu/article/grassland-conservation-spotlighted-during-federal-officials-nebraska-visit>.

⁸ USDA, “Species: *Juniperus Virginiana*.”

⁹ Graycen Wheeler, “Christmas Tree Drama: Why Many States Want to Get Rid of the Eastern Redcedar,” *KCUR - Kansas City news and NPR*, December 11, 2023, <https://www.kcur.org/2023-12-07/eastern-redcedar-spread-great-plains>.

This is drying up rivers, which lowers the quality of the water upon which residents of the Great Plains rely.¹⁰ In fact, woody plant encroachment is a greater threat to the water supply of grassland regions than climate change.¹¹ And, in a textbook example of a destructive positive feedback loop, invasive trees in the Great Plains are actually making climate change worse, by absorbing heat from the sun in a way that offsets any carbon storage gains.¹²

The conversion of grassland to *Juniperus virginiana* forest is an existential threat to plant, bird, mammal, and arthropod species. Populations of herbaceous plant species that define the prairie shrink by 99% in eastern red cedar forest.¹³ In “Assessing the Rate, Mechanisms, and Consequences of the Conversion of Tallgrass Prairie to *Juniperus virginiana* Forest,” in *Ecosystems* (2002), the authors write “Beneath the red cedar canopy, virtually all grassland species were eliminated and richness was very low – often fewer than four species per 10-m² plot.”¹⁴ It follows that insects and spiders, many of which are dependent on these disappearing prairie plants, are dwindling in population as well. These declines create feedback loops that negatively affect pollination, nutrient cycling, decomposition, and food resources for other animals.¹⁵ Many grassland birds are dependent on insects, and they have declined faster than any

¹⁰ Wheeler.

¹¹ Adam P. Schreiner-McGraw et al., “Woody Plant Encroachment Has a Larger Impact than Climate Change on Dryland Water Budgets,” *Scientific Reports* 10, no. 1 (May 15, 2020): 8112, <https://doi.org/10.1038/s41598-020-65094-x>.

¹² Celia Llopis-Jeplin, “Trees Are Spreading across the Great Plains. They’re Actually Making Climate Change Worse | KCUR - Kansas City News and NPR,” KCUR - Kansas City news and NPR, accessed April 12, 2025, <https://www.kcur.org/news/2024-05-06/trees-are-spreading-across-the-great-plains-theyre-actually-making-climate-change-worse>.

¹³ John M. Briggs, Greg A. Hoch, and Loretta C. Johnson, “Assessing the Rate, Mechanisms, and Consequences of the Conversion of Tallgrass Prairie to *Juniperus Virginiana* Forest,” *Ecosystems* 5, no. 6 (September 1, 2002): 581, <https://doi.org/10.1007/s10021-002-0187-4>.

¹⁴ Briggs, Hoch, and Johnson, 583.

¹⁵ Stephen R. Archer et al., “Woody Plant Encroachment: Causes and Consequences,” in *Rangeland Systems: Processes, Management and Challenges*, ed. David D. Briske, Springer Series on Environmental Management (Cham: Springer International Publishing, 2017), 59, <https://doi.org/10.1007/978-3-319-46709-2>.

other category of North American bird in the last thirty years.¹⁶ In fact, after eastern red cedar cover reaches just 10%, grassland birds all but disappear.¹⁷

Among the primary causes of this transformation are poor grazing practices, increased atmospheric concentrations of carbon dioxide (CO₂), and, most importantly, the absence of fire as a land management practice. When prairies are heavily grazed by cattle, who eat grasses and forbs, eastern red cedar faces less competition for resources and has more open space to colonize.¹⁸ Increased CO₂ is also thought to be a contributing factor, because woody plants utilize CO₂ at greater rates than herbaceous species.¹⁹ However, no factor is greater than the reduction in fire management.²⁰

Historically, fire limited the proliferation of *Juniperus virginiana* and other woody species while encouraging the spring growth of grasses and forbs.²¹ For millennia, Native American tribes of the Great Plains intentionally set fire to the prairie to maintain the health of the ecosystem—a practice referred to as “cultural burning”. The incredible ability of fire to rejuvenate flora attracted the herds of bison upon which these tribes relied. “[Cultural burning] links back to the tribal philosophy of fire as medicine. When you prescribe it, you’re getting the right dose to maintain the abundance of productivity of all ecosystem services to support the ecology in your culture,” said Frank Kanawha Lake, a research ecologist with the U.S.

¹⁶ Archer et al., 60.

¹⁷ Robert N. Chapman et al., “Tree Invasion Constrains the Influence of Herbaceous Structure in Grassland Bird Habitats,” *Écoscience* 11, no. 1 (January 1, 2004): 55–63, <https://doi.org/10.1080/11956860.2004.11682809>.

¹⁸ O. W. Van Auken, “Causes and Consequences of Woody Plant Encroachment into Western North American Grasslands,” *Journal of Environmental Management* 90, no. 10 (July 1, 2009): 2931–42, <https://doi.org/10.1016/j.jenvman.2009.04.023>.

¹⁹ Archer et al., “Woody Plant Encroachment: Causes and Consequences,” 39–40.

²⁰ Briggs, Hoch, and Johnson, “Assessing the Rate, Mechanisms, and Consequences of the Conversion of Tallgrass Prairie to *Juniperus Virginiana* Forest,” 584.

²¹ National Park Service, “Indigenous Fire Practices Shape Our Land - Fire (U.S. National Park Service),” NPS, accessed April 12, 2025, <https://www.nps.gov/subjects/fire/indigenous-fire-practices-shape-our-land.htm>.

Department of Agriculture (USDA) Forest Service, and a wildland firefighter of Karuk descent.²²

This mutualistic balance between human, prairie, and fire is directly responsible for the incredible biodiversity that evolved in this sun-kissed corner of the world.

When we removed fire, things began to change. When European settlers arrived around the middle of the nineteenth century, they viewed fire as a threat to their homes and farms and began to actively suppress it.²³ Simultaneously, their need for timber further fueled their motivation to reshape the vast, treeless landscapes of the Great Plains. These new dynamics were encouraged by the U.S. government: the Timber Culture Act of 1873 promised settlers an additional 160 acres of land if they planted 25% of it with trees. Although the act was ultimately repealed, it introduced 2.5 million acres of trees to Nebraska alone.²⁴ The need to protect homes and introduced timber from fire culminated in the Weeks Act of 1911. The legislation is widely regarded as an early success of conservation activists, but it outlawed indigenous fire management practices in the name of forest fire prevention.²⁵

Perhaps no effort on the part of the American government to change the prairie landscape is as striking in both its ambition and erroneousness as the Prairie States Forestry Project. In response to the man-made ecological disaster of the Dust Bowl, the Franklin Roosevelt administration initiated a New Deal program to afforest the plains, in the hopes that trees would stabilize the farming-stripped topsoil and provide valuable wind buffers. Over seven years, a total of 222,825,220 trees were planted on 13,599 miles of shelterbelts (rows of trees planted to

²² National Park Service.

²³ National Park Service.

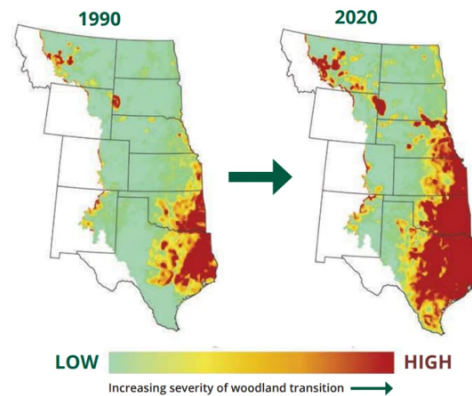
²⁴ Nebraska State Historical Society, "Flashback Friday: Timber Culture Act of 1873," Nebraska State Historical Society, October 29, 2022, <https://history.nebraska.gov/flashback-friday-timber-culture-act-of-1873/>.

²⁵ Jane Palmer, "Fire as Medicine: Learning from Native American Fire Stewardship - Eos," accessed April 12, 2025, <https://eos.org/features/fire-as-medicine-learning-from-native-american-fire-stewardship>.

protect areas from wind) throughout the Great Plains.²⁶ Eastern red cedar was among the most commonly planted trees, and invasiveness was not a consideration.²⁷

The problems that arise from invasive species always grow exponentially. The purposeful introduction of *Juniperus virginiana*, combined with heavy grazing and fire suppression, has exploded the eastern red cedar population in the past twenty years. From 1999 to 2018, cedar cover increased by over 44 million acres.²⁸ Eastern red cedar can transform open prairie to closed canopy cedar forest in as little as forty years.²⁹

The Great Plains Biome is Collapsing Due to Woody Encroachment



This illustration from Flatland KC shows the northwestern march of eastern red cedar over the last thirty years.³⁰

²⁶ Sarah Thomas Karle and David Karle, *Conserving the Dust Bowl: The New Deal's Prairie States Forestry Project*, Reading the American Landscape (Louisiana State University Press, 2017), 123.

²⁷ Karle and Karle, 78–80.

²⁸ Vaughan, “A ‘Green Glacier’ Is Dismantling the Great Plains.”

²⁹ Briggs, Hoch, and Johnson, “Assessing the Rate, Mechanisms, and Consequences of the Conversion of Tallgrass Prairie to *Juniperus Virginiana* Forest,” 578.

³⁰ Celia Llopis-Jeplin, “A ‘Green Glacier’ Is Burying Prairies, Threatening Ranchers and Wildlife,” *Flatland KC*, April 23, 2024, <https://flatlandkc.org/news-issues/a-green-glacier-is-burying-prairies-threatening-ranchers-and-wildlife/>.



An aerial photo shows densely packed *Juniperus virginiana* trees alongside open grassland. Photo by Eric Fowler, Nebraskaland Magazine.³¹



Young *Juniperus virginiana* trees proliferating on a hill in Nebraska. Photo by Nati Harnik, Associated Press.³²

³¹ Renae Blum, "Halt Eastern Redcedar Invasion," *Nebraskaland Magazine* (blog), January 30, 2020, <https://magazine.outdoornebraska.gov/stories/conservation/halt-eastern-redcedar-invasion/>.

³² "Eastern Red Cedar Trees Spread out of Control - Washington Times," accessed May 15, 2025, <https://www.washingtontimes.com/news/2018/aug/26/eastern-red-cedar-trees-spread-out-control/>.

Part II: The Search for Solutions

The vast scope of the eastern red cedar crisis has become undeniable. Research has shown the devastating ecological transformations incurred by the loss of grassland. Farmers and ranchers are losing valuable rangeland while water quality and access for millions of Great Plains residents are in peril. The monarch butterfly, one the prairie's most iconic pollinators, has been proposed for protection under the Endangered Species Act.³³ The time to act was yesterday, but now will have to do.

A growing collection of problem-solvers have sprung to life around this catastrophe. The USDA is leading numerous federal initiatives to protect rangeland by subsidizing the removal of eastern red cedar, often through its Natural Resources Conservation Service (NCRS).^{34 35} Universities and research institutions are studying the issues surrounding woody encroachment and are leading the way on outreach to ranchers and the general public. Two notable research enterprises are the Eastern Red Cedar Science Literacy Project at the University of Nebraska-Lincoln³⁶ and The Prairie Project at Oklahoma State University.³⁷ Conservation organizations of all sizes, from global to hyper local, are working to protect what remains of the prairie.

³³ "Monarchs Proposed for Endangered Species Act Protection," Center for Biological Diversity, accessed May 14, 2025, <https://biologicaldiversity.org/w/news/press-releases/monarchs-proposed-for-endangered-species-act-protection-2024-12-10/>.

³⁴ National Resources Conservation Service, "Funds Available to Help Restore and Protect Rangeland | Natural Resources Conservation Service," November 8, 2022, <https://www.nrcs.usda.gov/state-offices/nebraska/news/funds-available-to-help-restore-and-protect>.

³⁵ USDA, "Removal of Invasion Eastern Red Cedar for Socially Disadvantaged Farmers and Ranchers | Natural Resources Conservation Service," accessed April 12, 2025, <https://cig.sc.egov.usda.gov/projects/removal-invasion-eastern-red-cedar-socially-disadvantaged-farmers-and-ranchers>.

³⁶ Eastern Redcedar Science Literacy Project, "Eastern Redcedar Science Literacy Project | Nebraska," accessed April 12, 2025, <https://cedarliteracy.unl.edu/>.

³⁷ The Prairie Project, "The Prairie Project," accessed April 12, 2025, <https://www.theprairieproject.org/>.

The Nature Conservancy (TNC) is one of the largest conservation non-profits in the world, with over a billion dollars in annual revenue³⁸ and initiatives around the globe. They employ over 1000 scientists and protect over 125 million acres.³⁹ State chapters of TNC are leading the way on prairie conservation in the Great Plains states. In Kansas, TNC collaborates with the National Park Service to maintain the Tallgrass Prairie National Preserve, the largest expanse of tallgrass prairie left on earth.⁴⁰ Also in the Flint Hills, they preserve the Konza Prairie Biological Station in collaboration with Kansas State University.⁴¹ These two properties constitute 20,000 virgin acres of highly endangered ecosystem. At the same time, dozens of local activist-run organizations operate on shoe-string budgets to protect their own backyards. Examples include the Grassland Heritage Foundation⁴² (Kansas), the Missouri Prairie Foundation⁴³ (Missouri), and the Prairie Plains Resource Institute⁴⁴ (Nebraska). In Kansas, the Kansas Land Trust was formed in 1990 when a 70-acre plot of rare native prairie was destroyed by plowing. Today, it protects 40,000 acres across the state through conservation easements.⁴⁵

Conservation organizations and researchers are also realizing that if prairie is going to be preserved at the broadest scale possible, collaboration with private landowners and ranchers will be necessary, in order to develop methods of land stewardship that are both economically viable

³⁸ ProPublica, "Nature Conservancy - Nonprofit Explorer," ProPublica, May 9, 2013, <https://projects.propublica.org/nonprofits/organizations/530242652>.

³⁹ The Nature Conservancy, "Who We Are," The Nature Conservancy, accessed April 12, 2025, <https://www.nature.org/en-us/about-us/who-we-are/>.

⁴⁰ The Nature Conservancy, "Tallgrass Prairie National Preserve, Chase County, Kansas," The Nature Conservancy, accessed April 12, 2025, <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/tallgrass-prairie-national-preserve/>.

⁴¹ Kansas State University, "Konza Prairie Biological Station," accessed April 12, 2025, <https://kpbs.konza.k-state.edu/>.

⁴² Grassland Heritage Foundation, "Home | Grassland Heritage Foundation," Grassland Heritage, accessed April 12, 2025, <https://www.grasslandheritage.org>.

⁴³ Missouri Prairie Foundation, "Home," Missouri Prairie Foundation, accessed April 12, 2025, <https://moprairie.org/>.

⁴⁴ Prairie Plains Resource Institute, "Prairie Plains Resource Institute," accessed April 12, 2025, <https://www.prairieplains.org/>.

⁴⁵ "About Us," Kansas Land Trust, accessed May 14, 2025, <https://www.klt.org/about>.

and ecologically sound. Despite the downsides of heavy grazing, cattle ranching is recognized as one of the reasons that large tracts of prairie have been spared the plow: Chad Bladow, prescribed fire coordinator with TNC Nebraska, said “We owe an incredible debt of gratitude to Nebraska ranchers for keeping the Sandhills intact. They see the cedar trees making pastureland unusable for cattle. The conservation community wants to support them.”⁴⁶ Working Lands for Wildlife and the Great Plains Grassland Initiatives, two programs within the USDA, are using voluntary incentive programs to encourage ranchers to adopt environmentally sound practices.^{47 48}

Regenerative grazing, a practice that mimics indigenous prairie stewardship, is perhaps the most exciting development in the fight against eastern red cedar.⁴⁹ Prescribed fire is utilized to rejuvenate flora and cull woody species while cattle are rotated between pastures to prevent over-grazing. Light grazing mimics the natural activity of bison and encourages plant biodiversity.⁵⁰ Additionally, studies of Mongolian grasslands have shown that a switch from heavy grazing (which releases CO₂) to regenerative grazing can sequester twenty years’ worth of atmospheric CO₂ in less than four years.^{51 52} Crop farmers, too, are seeing the benefits of

⁴⁶ The Nature Conservancy, “Chad Bladow Celebrates 25 Years at TNC,” The Nature Conservancy, accessed April 12, 2025, <https://www.nature.org/en-us/about-us/where-we-work/united-states/nebraska/stories-in-nebraska/sandhills-fire-conservation/>.

⁴⁷ Working Lands For Wildlife, “Working Lands for Wildlife,” Working Lands For Wildlife, accessed April 12, 2025, <https://www.wlfw.org/>.

⁴⁸ Kansas Grazing Lands Coalition, “Great Plains Grasslands Initiative,” Great Plains Grasslands Initiative, accessed April 12, 2025, <https://www.kglc.org/great-plains-grasslands-initiative.cfm>.

⁴⁹ Anna McNulty, “Native Agriculture Never Went Away. Now It Is on the Rise.,” January 21, 2022, <https://andthewest.stanford.edu/2022/native-agriculture-never-went-away-now-it-is-on-the-rise/>.

⁵⁰ Richard Teague and Urs Kreuter, “Managing Grazing to Restore Soil Health, Ecosystem Function, and Ecosystem Services,” *Frontiers in Sustainable Food Systems* 4 (September 29, 2020), <https://doi.org/10.3389/fsufs.2020.534187>.

⁵¹ H. Kato, Y. Onda, and Y. Tanaka, “Using 137Cs and 210Pbex Measurements to Estimate Soil Redistribution Rates on Semi-Arid Grassland in Mongolia,” *Geomorphology* 114, no. 4 (February 1, 2010): 508–19, <https://doi.org/10.1016/j.geomorph.2009.08.009>.

⁵² N.P. He et al., “Grazing Intensity Impacts Soil Carbon and Nitrogen Storage of Continental Steppe - He - 2011 - Ecosphere - Wiley Online Library,” accessed April 20, 2025, <https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES10-00017.1>.

biodiversity. “Prairie strips” – swaths of land planted with native flora between row crops – are exploding in number across the plains. These micro-prairies improve soil nutrition and give local fauna a boost. In just five years, coverage by prairie strips has grown from 586 acres to almost 23,000.⁵³

Research efforts are now being aided by prevention initiatives. At Kansas State University, scientists are conducting research into the control of woody encroachment.⁵⁴ Researchers continue to find that prescribed fire is instrumental in the fight against *Juniperus virginiana*.⁵⁵ South Dakota, which has not yet seen the explosive cedar growth of its southern neighbors, is working to stop encroachment in its tracks.⁵⁶ Scientists in Nebraska are also looking towards prevention: “We have reoriented our approach with new science to focus our efforts to prevent woody encroachment within our intact grasslands, while previous efforts focused only on areas already overtaken with woody growth. Waiting to act causes control costs to become much higher for producers,” said Robert Lawson, Nebraska NRCS state conservationist.⁵⁷

Part III: No Biocentricity Without Humans

When European settlers arrived on the Great Plains, they brought not only a need for timber, but technologies, religion, and an anthropocentric ethical system that did not evolve

⁵³ Cara Buckley, “Hidden in Midwestern Cornfields, Tiny Edens Bloom,” *The New York Times*, October 3, 2024, sec. Climate, <https://www.nytimes.com/2024/10/03/climate/iowa-prairie-farming-environment.html>.

⁵⁴ Pat Melgares, “K-State Researchers Embark on Study to Preserve Prairie Health,” K-State Research and Extension, accessed April 12, 2025, <https://www.ksre.k-state.edu/news/stories/2023/01/agriculture-woody-encroachment-on-native-grassland.html>.

⁵⁵ Adam Russell, “Research Says High Energy Fire Influences Prescribed Burn Effectiveness,” Phys.org, June 14, 2024, <https://phys.org/news/2024-06-high-energy-effectiveness.html>.

⁵⁶ Addison Dehaven, “South Dakota’s Stand against the ‘Green Glacier’ | South Dakota State University,” January 10, 2025, <https://www.sdstate.edu/news/2025/01/south-dakotas-stand-against-green-glacier>.

⁵⁷ Reed, “Grassland Conservation Spotlighted during Federal Official’s Nebraska Visit | Nebraska Today.”

alongside the prairie. This worldview, steeped in Judeo-Christian teachings, dictated that the earth and its ecosystems existed for man to exploit. We can see the fingerprints of anthropocentrism throughout the story of *Juniperus virginiana* encroachment in the Great Plains: suppression of the beneficial cycle of fire, over-grazing of land for human profit, and attempts to transform the prairie into a man-made forest. However, reflecting on the failings of anthropocentrism – an ethical system that places humans at the top of its hierarchy – isn't enough. The survival of the grassland biome requires us to move towards a land ethic, underpinned by biocentrism – a belief that nature has as much intrinsic value as humans – and informed by traditional ecological knowledge.

Aldo Leopold accurately captured European settlers' worldview in his essay "The Land Ethic," from his 1966 book *A Sand County Almanac*. In Europeans' ethical approach, land was property, lacking intrinsic value, and therefore without rights. The human-land relationship was merely that of conqueror and conquered: "There is yet no ethic dealing with man's relationship to land and to the animals and plants which grew upon it," he writes. "...the land-relation is still strictly economic, entailing privileges but not obligations."⁵⁸ We see the green glacier in Leopold's assessment: "Many historical events, hitherto explained solely in terms of human enterprise, were actually biotic interactions between people and land."⁵⁹ Replacing this worldview with a land ethic would require the adoption of a biocentric approach that bestows equal worth and value to ecosystems.

That ethical change is happening, I believe, and we see it in response to the crisis of woody encroachment. In its mission statement, the Eastern Red Cedar Literacy Project states: "As scientists, we feel an ethical responsibility to disseminate decades of research findings to the

⁵⁸ Aldo Leopold, *A Sand County Almanac* (Oxford University Press, 1966), 237–40.

⁵⁹ Leopold, 241.

general public, politicians, K-12 educators, natural resource professionals, city planners, and the next generation of scientists.”⁶⁰ Modern researchers and scientists are leading the way in the development of Leopold’s Land Ethic. Lin Qi Feng writes, in “*A Sand County Almanac* at 70: The Significance of Leopold’s Life-Work for Socio-Ecological Practice and Research”: “That Leopold’s book still speaks to our contemporary environmental predicament suggests that Leopold identified major foundational issues that remain unresolved: chiefly, our treatment of the natural world as merely a fund of resources, the relentless exploitation of which may threaten our very own existence.”⁶¹

In grassland conservation efforts, we see a reflection of Leopold’s essay “Odyssey.” The essay describes the interconnected mosaic of biodiversity through the prism of the prairie and the rejuvenation of fire:

But the prairie has two strings to its bow. Fires thinned its grasses, but they thickened its stand of leguminous herbs: prairie clover, bush clover, wild bean, vetch, lead-plant, trefoil, and Baptisia, each carrying its own bacteria housed in nodules on rootlets. Each nodule pumped nitrogen out of the air and into the plant, and then ultimately into the soil. Thus, the prairie savings bank took in more nitrogen from its legumes than it paid out to its fires. That the prairie is rich is known to the humblest deer-mouse; why the prairie is rich is a question seldom asked in all the still lapse of ages.⁶²

In the alliance between ecologists and private landowners, along with the introduction of federal initiatives, we see a solution that may have made Leopold, who looked at economic incentive with skepticism, wary: “One basic weakness in a conservation system based wholly on economic motives is that most members of the land community have no economic value,”⁶³ he wrote. Instead, he saw the solution as the establishment of moral obligation within the

⁶⁰ Eastern Redcedar Science Literacy Project, “Eastern Redcedar Science Literacy Project | Nebraska.”

⁶¹ Lin Qi Feng, “A Sand County Almanac at 70: The Significance of Leopold’s Life–Work for Socio-Ecological Practice and Research,” *Socio-Ecological Practice Research* 2, no. 1 (March 1, 2020): 1–2, <https://doi.org/10.1007/s42532-020-00046-3>.

⁶² Leopold, *A Sand County Almanac*, 112–13.

⁶³ Leopold, 246.

landowner.⁶⁴ But for those of us who love the prairie and delight in its beauty and abundance, as Leopold did, how do we encourage that obligation in others? In “Axe-in-Hand,” Leopold writes, “Whoever owns land has thus assumed, whether he knows it or not, the divine functions of creating and destroying plants.”⁶⁵ It is an awesome responsibility.

Chris Helzer, a prairie restoration ecologist and head of TNC Nebraska, offered his theory on the development of a land ethic during a lecture at the University of Kansas in November 2024: “Walking around with a landowner and talking about what you see on their land is probably the best thing you can do,” he said, “because they’re proud of the place they have and they want to know why they should be more proud of it. You show them why it’s interesting, not why it’s useful.”⁶⁶ In my journalistic experience interviewing landowners, I have seen this pride firsthand. Jennifer Moody, a researcher at the University of Kansas, described to me the care she encountered in landowners when studying native prairie pastures in Douglas County, KS: “It was really quite joyful to talk to these landowners. Everybody that we talked to has a good understanding and a lot of pride and care for the native grasslands that they are managing, which was really cool to see.”⁶⁷ Qi Feng believes that Leopold was wise enough to understand that we may not be able to rid ourselves of economic motivation altogether, and I agree: “Leopold was pragmatic enough to recognize that economic thinking will continue to drive decision making. He pleaded for tempering economic logic with the insights and principles of ecology, evolutionary science, ethics, and esthetics.”⁶⁸

⁶⁴ Leopold, 250.

⁶⁵ Leopold, 72.

⁶⁶ Chris Helzer, “Restoring and Managing Diverse and Resilient Prairies” (Kansas Biological Survey Friday Ecology Seminar, University of Kansas, November 15, 2024).

⁶⁷ Erin Socha, “Keeping the Prairie Alive: Douglas County Landowner Has Restored Land over Decades,” *Kansas Reflector*, December 24, 2024, <https://kansasreflector.com/2024/12/24/keeping-the-prairie-alive-douglas-county-landowner-has-restored-l-and-over-decades/>.

⁶⁸ Qi Feng, “A Sand County Almanac at 70.”

Helzer offers a poetic yet pragmatic analogy that speaks to the ethical changes required to confront the green glacier and, in doing so, restore and preserve the grassland biome. Restoring a prairie, he says, is not like restoring a piece of antique furniture, where we strive to recreate the object that once was. Instead, it is akin to restoring a city after a natural disaster: things may not look the same, but the goal is to create a functional, livable ecosystem for its inhabitants.⁶⁹ This practical approach is reflective of both Leopold's land ethic as well as the traditional ecological knowledge we find in Robin Kimmerer's *Braiding Sweetgrass*. In the former, the land and all of its inhabitants are part of an interconnected, working system.⁷⁰ In the latter, Kimmerer's cultural origin story entitled "Skywoman Falling" places human beings as a part of an integrated order of nature. Skywoman's story, she writes, is a compass, not a map: embracing ecosystems holistically will point us in the right direction.⁷¹ Helzer's analogy asks us to look for practical solutions to the modern challenges of prairie conservation.

It is no surprise, considering the failings of our anthropocentrism, that Kimmerer describes teaching young people who can't fathom what beneficial human-nature interactions look like: "How can we begin to move toward ecological and cultural sustainability if we cannot even imagine what the path feels like?"⁷² But Kimmerer's prose reminds us that an anthropocentric worldview is not the only approach to land stewardship, and in fact, the historical norm of human-prairie interaction was one of mutualism. Indigenous ecological knowledge has not been lost; its wisdom is being shared with a new generation through the reintroduction of agricultural practices built on biocentric principles.⁷³ We must re-embrace the traditional wisdom that recognizes humans have vital roles as caretakers of the land, and that the

⁶⁹ Helzer, "Restoring and Managing Diverse and Resilient Prairies."

⁷⁰ Leopold, *A Sand County Almanac*, 237–64.

⁷¹ Robin Wall Kimmerer, *Braiding Sweetgrass* (Minneapolis, Minnesota: Milkweed Editions, 2013), 7.

⁷² Kimmerer, 6.

⁷³ McNulty, "Native Agriculture Never Went Away. Now It Is on the Rise."

earth will reward us with the abundance of biodiversity in return. “It is good to remember the original woman herself was an immigrant,” Kimmerer writes. “Perhaps the Skywoman story endures because we too are always falling... spinning into someplace new and unexpected. Despite our fears of falling, the gifts of the world stand by to catch us.”⁷⁴

Everyone who finds the prairie to be a place of joy, beauty, and solace has a moral obligation to help shepherd the biocentric ethical shift already underway. I consider myself fortunate to be one of those people, and I believe that communication is the most powerful tool in my personal toolbox. By combining my journalistic and environmental studies, I plan to continue writing about and advocating for the health and resilience of native grasslands. I believe that I am skilled at communicating the important work of ecologists as well as sharing the stories of responsible land stewards across the region. The prairie inspires me, and I am doing my best to pay that forward.

Conclusion

It is a simultaneously inspiring and depressing time to care about prairie. As an east coast transplant, Kansas’s native ecosystems have taken me by surprise. The sight of a blooming Flint Hills prairie beneath the expansive Kansan sky has startled me with its beauty. At the same time, my drives along highway K-10 between Lawrence and Johnson County expose the scope of the assault taking place. *Juniperus virginiana* is swallowing up the land.

The prairie is collapsing. Can we stop it? It is easy to look at recent history and feel cynical. Are we really in any position to fix this, when it is human activity that brought us this

⁷⁴ Kimmerer, *Braiding Sweetgrass*, 8–9.

crisis? How can we turn back the tide of eastern red cedar that we, ourselves, unleashed? I believe that we can, but it's going to take a profound ethical shift alongside the administration of sound environmental initiatives.

Biocentrism does not ask us to imagine a world without humans. In the balance of biodiversity, humans, too, are a fundamental part of the equation. We belong to nature as surely as pollinators and prairie chickens. Humans are a part of this landscape and always have been. In returning to a biocentric framework, we can return to our role as inheritors and stewards of the earth.

Bibliography

- Archer, Stephen R., Erik M. Anderson, Susanne Schwinning, Robert J. Steidl, Stephen R. Woods, and Katherin I. Predick. "Woody Plant Encroachment: Causes and Consequences." In *Rangeland Systems: Processes, Management and Challenges*, edited by David D. Briske, 25–84. Springer Series on Environmental Management. Cham: Springer International Publishing, 2017. <https://doi.org/10.1007/978-3-319-46709-2>.
- Blum, Renae. "Halt Eastern Redcedar Invasion." *Nebraskaland Magazine* (blog), January 30, 2020. <https://magazine.outdoornebraska.gov/stories/conservation/halt-eastern-redcedar-invasion/>.
- Briggs, John M., Greg A. Hoch, and Loretta C. Johnson. "Assessing the Rate, Mechanisms, and Consequences of the Conversion of Tallgrass Prairie to *Juniperus Virginiana* Forest." *Ecosystems* 5, no. 6 (September 1, 2002): 578–86. <https://doi.org/10.1007/s10021-002-0187-4>.

- Buckley, Cara. "Hidden in Midwestern Cornfields, Tiny Edens Bloom." *The New York Times*, October 3, 2024, sec. Climate.
<https://www.nytimes.com/2024/10/03/climate/iowa-prairie-farming-environment.html>.
- Center for Biological Diversity. "Monarchs Proposed for Endangered Species Act Protection." Accessed May 14, 2025.
<https://biologicaldiversity.org/w/news/press-releases/monarchs-proposed-for-endangered-species-act-protection-2024-12-10/>.
- Chapman, Robert N., David M. Engle, Ronald E. Masters, and David M. Leslie Jr. "Tree Invasion Constrains the Influence of Herbaceous Structure in Grassland Bird Habitats." *Écoscience* 11, no. 1 (January 1, 2004): 55–63.
<https://doi.org/10.1080/11956860.2004.11682809>.
- Dehaven, Addison. "South Dakota's Stand against the 'Green Glacier' | South Dakota State University," January 10, 2025.
<https://www.sdstate.edu/news/2025/01/south-dakotas-stand-against-green-glacier>.
- "Eastern Red Cedar Trees Spread out of Control - Washington Times." Accessed May 15, 2025.
<https://www.washingtontimes.com/news/2018/aug/26/eastern-red-cedar-trees-spread-out-control/>.
- "Eastern Redcedar in Nebraska: Nebraska Conservation Roundtable | Nebraska Forest Service | Nebraska." Accessed May 15, 2025.
<https://nfs.unl.edu/eastern-redcedar-nebraska-nebraska-conservation-roundtable/>.
- Eastern Redcedar Science Literacy Project. "Eastern Redcedar Science Literacy Project | Nebraska." Accessed April 12, 2025. <https://cedarliteracy.unl.edu/>.
- Grassland Heritage Foundation. "Home | Grassland Heritage Foundation." Grassland Heritage. Accessed April 12, 2025. <https://www.grasslandheritage.org>.
- Grow Native! "Eastern Red Cedar." Accessed May 13, 2025.
https://grownative.org/native_plants/eastern-red-cedar/.
- He, N.P., Y.H. Zhang, Y. Qu, Q.S. Chen, M.Q. Pan, G.M. Zhang, and X.G. Han. "Grazing Intensity Impacts Soil Carbon and Nitrogen Storage of Continental Steppe - He - 2011 - Ecosphere - Wiley Online Library." Accessed April 20, 2025.
<https://esajournals.onlinelibrary.wiley.com/doi/10.1890/ES10-00017.1>.
- Helzer, Chris. "Restoring and Managing Diverse and Resilient Prairies." Presented at the Kansas Biological Survey Friday Ecology Seminar, University of Kansas, November 15, 2024.
- Kansas Grazing Lands Coalition. "Great Plains Grasslands Initiative." Great Plains Grasslands Initiative. Accessed April 12, 2025.
<https://www.kglc.org/great-plains-grasslands-initiative.cfm>.
- Kansas Land Trust. "About Us." Accessed May 14, 2025. <https://www.klt.org/about>.
- Kansas State University. "Konza Prairie Biological Station." Accessed April 12, 2025.
<https://kpbs.konza.k-state.edu/>.
- Karle, Sarah Thomas, and David Karle. *Conserving the Dust Bowl: The New Deal's Prairie States Forestry Project*. Reading the American Landscape. Louisiana State University Press, 2017.
- Kato, H., Y. Onda, and Y. Tanaka. "Using ¹³⁷Cs and ²¹⁰Pbex Measurements to Estimate Soil Redistribution Rates on Semi-Arid Grassland in Mongolia." *Geomorphology* 114, no. 4 (February 1, 2010): 508–19. <https://doi.org/10.1016/j.geomorph.2009.08.009>.
- Kimmerer, Robin Wall. *Braiding Sweetgrass*. Minneapolis, Minnesota: Milkweed Editions, 2013.

- Leopold, Aldo. *A Sand County Almanac*. Oxford University Press, 1966.
- Llopis-Jeplin, Celia. “A ‘Green Glacier’ Is Burying Prairies, Threatening Ranchers and Wildlife.” *Flatland KC*, April 23, 2024.
<https://flatlandkc.org/news-issues/a-green-glacier-is-burying-prairies-threatening-ranchers-and-wildlife/>.
- . “Trees Are Spreading across the Great Plains. They’re Actually Making Climate Change Worse | KCUR - Kansas City News and NPR.” *KCUR - Kansas City news and NPR*. Accessed April 12, 2025.
<https://www.kcur.org/news/2024-05-06/trees-are-spreading-across-the-great-plains-theyre-actually-making-climate-change-worse>.
- McNulty, Anna. “Native Agriculture Never Went Away. Now It Is on the Rise.” January 21, 2022.
<https://andthewest.stanford.edu/2022/native-agriculture-never-went-away-now-it-is-on-the-rise/>.
- Melgares, Pat. “K-State Researchers Embark on Study to Preserve Prairie Health.” *K-State Research and Extension*. Accessed April 12, 2025.
<https://www.ksre.k-state.edu/news/stories/2023/01/agriculture-woody-encroachment-on-native-grassland.html>.
- Missouri Prairie Foundation. “Home.” *Missouri Prairie Foundation*. Accessed April 12, 2025.
<https://moprairie.org/>.
- National Park Service. “A Complex Prairie Ecosystem - Tallgrass Prairie National Preserve (U.S. National Park Service).” Accessed April 12, 2025.
<https://www.nps.gov/tapr/learn/nature/a-complex-prairie-ecosystem.htm>.
- . “Indigenous Fire Practices Shape Our Land - Fire (U.S. National Park Service).” *NPS*. Accessed April 12, 2025.
<https://www.nps.gov/subjects/fire/indigenous-fire-practices-shape-our-land.htm>.
- National Resources Conservation Service. “Funds Available to Help Restore and Protect Rangeland | Natural Resources Conservation Service,” November 8, 2022.
<https://www.nrcs.usda.gov/state-offices/nebraska/news/funds-available-to-help-restore-and-protect>.
- Nebraska State Historical Society. “Flashback Friday: Timber Culture Act of 1873.” *Nebraska State Historical Society*, October 29, 2022.
<https://history.nebraska.gov/flashback-friday-timber-culture-act-of-1873/>.
- Palmer, Jane. “Fire as Medicine: Learning from Native American Fire Stewardship - Eos.” Accessed April 12, 2025.
<https://eos.org/features/fire-as-medicine-learning-from-native-american-fire-stewardship>.
- Prairie Plains Resource Institute. “Prairie Plains Resource Institute.” Accessed April 12, 2025.
<https://www.prairieplains.org/>.
- ProPublica. “Nature Conservancy - Nonprofit Explorer.” *ProPublica*, May 9, 2013.
<https://projects.propublica.org/nonprofits/organizations/530242652>.
- Qi Feng, Lin. “A Sand County Almanac at 70: The Significance of Leopold’s Life–Work for Socio-Ecological Practice and Research.” *Socio-Ecological Practice Research* 2, no. 1 (March 1, 2020): 1–2. <https://doi.org/10.1007/s42532-020-00046-3>.
- Reed, Leslie. “Grassland Conservation Spotlighted during Federal Official’s Nebraska Visit | Nebraska Today.” *University of Nebraska - Lincoln*. Accessed April 12, 2025.

- <https://news.unl.edu/article/grassland-conservation-spotlighted-during-federal-officials-nebraska-visit>.
- Russell, Adam. "Research Says High Energy Fire Influences Prescribed Burn Effectiveness." Phys.org, June 14, 2024. <https://phys.org/news/2024-06-high-energy-effectiveness.html>.
- Schreiner-McGraw, Adam P., Enrique R. Vivoni, Hoori Ajami, Osvaldo E. Sala, Heather L. Throop, and Debra P. C. Peters. "Woody Plant Encroachment Has a Larger Impact than Climate Change on Dryland Water Budgets." *Scientific Reports* 10, no. 1 (May 15, 2020): 8112. <https://doi.org/10.1038/s41598-020-65094-x>.
- Socha, Erin. "Keeping the Prairie Alive: Douglas County Landowner Has Restored Land over Decades." *Kansas Reflector*, December 24, 2024. <https://kansasreflector.com/2024/12/24/keeping-the-prairie-alive-douglas-county-landowner-has-restored-land-over-decades/>.
- Teague, Richard, and Urs Kreuter. "Managing Grazing to Restore Soil Health, Ecosystem Function, and Ecosystem Services." *Frontiers in Sustainable Food Systems* 4 (September 29, 2020). <https://doi.org/10.3389/fsufs.2020.534187>.
- The Nature Conservancy. "Chad Bladow Celebrates 25 Years at TNC." The Nature Conservancy. Accessed April 12, 2025. <https://www.nature.org/en-us/about-us/where-we-work/united-states/nebraska/stories-in-nebraska/sandhills-fire-conservation/>.
- . "Tallgrass Prairie National Preserve, Chase County, Kansas." The Nature Conservancy. Accessed April 12, 2025. <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/tallgrass-prairie-national-preserve/>.
- . "Who We Are." The Nature Conservancy. Accessed April 12, 2025. <https://www.nature.org/en-us/about-us/who-we-are/>.
- The Prairie Project. "The Prairie Project." Accessed April 12, 2025. <https://www.theprairieproject.org/>.
- US EPA. "EnviroAtlas Benefit Category: Biodiversity Conservation." Overviews and Factsheets, April 24, 2015. <https://www.epa.gov/enviroatlas/enviroatlas-benefit-category-biodiversity-conservation>.
- USDA. "Removal of Invasion Eastern Red Cedar for Socially Disadvantaged Farmers and Ranchers | Natural Resources Conservation Service." Accessed April 12, 2025. <https://cig.sc.egov.usda.gov/projects/removal-invasion-eastern-red-cedar-socially-disadvantaged-farmers-and-ranchers>.
- . "Species: Juniperus Virginiana." USDA Plant Database. Accessed April 12, 2025. <https://www.fs.usda.gov/database/feis/plants/tree/junvir/all.html>.
- Van Auken, O. W. "Causes and Consequences of Woody Plant Encroachment into Western North American Grasslands." *Journal of Environmental Management* 90, no. 10 (July 1, 2009): 2931–42. <https://doi.org/10.1016/j.jenvman.2009.04.023>.
- Vaughan, Carson. "A 'Green Glacier' Is Dismantling the Great Plains." New York Times. Accessed April 12, 2025. <https://www.nytimes.com/2023/12/07/opinion/prairie-great-plains-trees.html>.
- Wheeler, Graycen. "Christmas Tree Drama: Why Many States Want to Get Rid of the Eastern Redcedar." KCUR - Kansas City news and NPR, December 11, 2023. <https://www.kcur.org/2023-12-07/eastern-redcedar-spread-great-plains>.

Working Lands For Wildlife. “Working Lands for Wildlife.” Working Lands For Wildlife.
Accessed April 12, 2025. <https://www.wlfw.org/>.