

ECOLOGY, SETTLER COLONIALISM, AND THE ENVIRONMENTS OF THE
AMERICAN MIDWEST: THE SCIENCE AND POLITICS OF ECOLOGICAL
RESTORATION SINCE 1950

A Thesis Submitted to the Committee on Graduate Studies
in Partial Fulfillment of the Requirements for the Degree of Master of Arts in the Faculty
of Arts and Science

TRENT UNIVERSITY
© Copyright by Andrew Mitchell Hoyt 2023
Peterborough, Ontario, Canada
History M.A. Graduate Program
September 2023

ABSTRACT

Ecology, Settler Colonialism, and the Environments of the American Midwest: The Science and Politics of Ecological Restoration since 1950

Andrew Mitchell Hoyt

Colonization has transformed the landscapes of the American Midwest and compromised the region's resources and ecologies. In response, governments, environmental scientists, and Indigenous nations have undertaken myriad efforts over the past century to restore Midwestern environments. Yet the appropriate goals and techniques for this work have been deeply contested. This thesis explores the scientific, political, and cultural meanings of ecological restoration in the region. Comparison of different forms of restoration reveals the contingency, malleability, and historical pitfalls of restoration knowledge and practices. By framing the pursuit as a problem of scientific, historical, or technical knowledge, practitioners have often neglected the political and cultural ramifications of restoration efforts. At the same time, restoration practices have influenced the intellectual, environmental, and political history of the Midwest in the twentieth century. The efforts of Midwestern scientists and public agencies have advanced wildlife and ecosystem conservation in the region, but have at times exacerbated environmental injustices and inequalities. More recent wild rice conservation efforts by Ojibwe governments demonstrate that, depending on how the framework has been constructed, ecological restoration has served as a tool for reclaiming Indigenous sovereignty as well as a vehicle for settler colonialism.

Keywords: environmental history, history of science, ecological restoration, life sciences, ecology, conservation, settler colonialism, Indigenous history, American Midwest

ACKNOWLEDGEMENTS

Providing a full account of the support and assistance I have received at Trent is nearly as difficult an undertaking as the thesis itself. The History Department has provided an excellent environment to grow as a scholar and a warm home at the university. My experience has been enriched by my fellow MA program students and our engaging conversations inside and outside of the classroom. I am grateful to have met and learned from each of them. I would surely have lost my way navigating the program without Catherine O'Brien's diligent administration.

I am also grateful to the many students and faculty who welcomed me to the School of the Environment (TES) despite my being a departmental outsider. I am especially appreciative of Stephanie Rutherford (and her generosity in serving as a member of my committee), Tom Whillans, Neil Osborne, and Kaitlyn Fleming, as well as my peers in the Sustainability Studies MA program and Program Director Asaf Zohar. It was a privilege to serve as a Teaching Assistant in the TES and interact with its bright and passionate students—an experience from which I learned as much as I taught.

This thesis was only possible with the insight of experts in several fields who took the time to sit for interviews or discuss the project in an informal capacity. I am grateful to officials at several public and tribal agencies for their willingness to speak, correspond, and share data and reports with me. They include Darren Vogt with the 1854 Treaty Authority, whose interview brought chapter three to life. Among these individuals is also my uncle Steven Taff, whose personal experiences with wetland restoration in Minnesota provided a formative illustration of the environmental management scene in the Midwest in the 1980s. John Myhre shared his extensive knowledge of the history of northwest

Iowa and of farmers' easily overlooked perspectives on state restoration policy in the 1980s. He and Jean Ann Myhre introduced me to the unique and varied landscapes of the Prairie Pothole Region of northern Iowa and southern Minnesota, which I might otherwise have missed among the crop rows. I am also grateful to historians Laura Martin and Nancy Langston, who generously took the time to discuss the project in its early stages. Last but certainly not least, I am indebted to a number of archivists across the Midwest, without whose patient assistance none of this research would have been possible.

At Trent, I have been the beneficiary of far more faculty mentorship than is reasonable for a single student to expect. In his capacity as Graduate Program Director, David Sheinin's invaluable counsel has pushed me in my development as a scholar and helped me navigate the complexities of academia. As a professor and committee member, Finis Dunaway has been a constant source of guidance in my growth as a writer and researcher. In addition to his endless support of my own pursuits, his invitations to assist in his public history work and research have introduced me to new questions and methods and pushed me to consider the broader implications of my work. Outside the halls of Trent, he and Dana Capell have been incredibly generous in their efforts to welcome a fellow American to Peterborough. And finally, I could not have asked for a more supportive or attentive supervisor than Stephen Bocking. Some of my most memorable and fruitful scholarly experiences at Trent have come in the form of our conversations and advising meetings. Always generous with his time and thorough in his feedback, his perceptive and thoughtful comments have not only improved my scholarship, but have also expanded and shaped my thinking on a range of topics in history, teaching, and

environmental stewardship. It has been an honor to work with him and TA for some of his final courses at Trent.

None of my progress in the program would have been possible without the emotional support and companionship of close friends and family. My dear friends and roommates, Juan Borgatello, Agostina Prigioni, and Kyle Frattasio, filled my time in Peterborough with cherished memories. Clare O'Reilly has been both a comrade in environmental history and a steadfast friend. Though supporting me from afar, Gail, Bill, and Ginny Hoyt have been with me every step of the way. Finally, I am grateful to my partner Emma, who read countless drafts, discussed ideas for hours, and crossed an international border nearly a dozen times during a pandemic to support me during my time in the MA program.

TABLE OF CONTENTS

ABSTRACT.....	ii
ACKNOWLEDGMENTS	iii
INTRODUCTION: Ecological Restoration and the American Midwest	1
CHAPTER ONE: Prairie Restoration and the Revival of Midwestern Plant Ecology	19
CHAPTER TWO: Restoration and the Public Good.....	67
CHAPTER THREE: The Minnesota Chippewa Tribe, Wild Rice, and the Ongoing Struggle for Environmental Sovereignty	111
CONCLUSION: The Past, Present, and Future of Ecological Restoration.....	163
BIBLIOGRAPHY	174

INTRODUCTION

Ecological Restoration and the American Midwest

Situated on a typical country road in southwestern Minnesota, Jeffers Petroglyphs immediately stands out from the expanse of corn and soybeans that dominates much of the American Midwest. Visitors' eyes are first drawn to the vast, flat outcrop of reddish-brown Sioux quartzite—hundreds of feet across—that forms the focal point of the historical site. To approach the formation, visitors must first cross the 250 acres of tallgrass prairie that surround the outcrop and typify the pre-colonial environment of the Prairie Pothole Region (PPR), a biome that stretches to Alberta in the northwest and as far south as Indiana. Drawing closer to the outcrop, one can make out faint rock carvings—symbols with complex cultural and spiritual meanings—that Indigenous peoples began creating 7,000 years ago while traveling through the region and undertaking pilgrimages to the site.

The Minnesota Historical Society (MNHS) purchased the grounds for the site in 1966 to preserve and provide access to the roughly 5,000 carvings that span the mineral formation. The organization partners with Native interpreters to lead tours and develop materials that guide school groups, families, and tourists through the history of the petroglyphs and the people who created them. As one of the oldest continually used sacred sites in the world, the MNHS emphasizes the area's cultural and spiritual importance to a number of Indigenous communities in the region today as well as their ancestors. But the MNHS intends for the site to speak to the region's environmental past, too. The acres of tallgrass prairie that surround the site provide natural and historic

context for the carvings, helping to transport viewers into the pre-colonial past of the area. The MNHS regards this glimpse into Minnesota's "rich natural and cultural history" as being as significant as the petroglyphs themselves.¹ Unlike the petroglyphs, however, a significant portion of these prairies are not original artifacts. They are the result of decades-long efforts at ecological restoration, accomplished with the help of the Minnesota Department of Natural Resources, the Nature Conservancy, and numerous volunteers. Informational materials and tour guides highlight the fact that these are re-created ecosystems, framing them as important tools of cultural as well as natural conservation.²

Ecological restoration has emerged over the last century as a rich and diverse body of theory and practice. It is applied in a growing variety of conservation and management scenarios that share an emphasis on the rehabilitation of natural systems that are either too compromised to function or entirely absent. Much of its appeal comes from its future-looking orientation, offering a positive solution amid the narratives of decline that have often dominated environmental discourse. But as Jeffers Petroglyphs shows, ecological restoration is rooted in the past. The park is unusual in that it makes this fact explicit, complete with signs that challenge visitors to spot the differences between side-by-side restored and original prairies. But every act of restoration makes an implicit historical argument. Restorations represent our best guesses at the former environmental conditions of a place and attest to perceptions of the cultural and ecological value of its recovery. For conservationists, this presents complex practical questions when

¹ Language from the MNHS website. See <https://www.mnhs.org/jefferspetroglyphs/activities/trails>.

² Prairie restoration at the site date began in 1974, shortly after its acquisition by the MNHS. For more on Jeffers Petroglyphs and the history of the site, see the official website at <https://www.mnhs.org/jefferspetroglyphs>.

undertaking a restoration. How far back should we look for a baseline? How do we restore a historic ecosystem in a changing world? Even more concerning, the need for historical baselines can subtly reinforce problematic assumptions regarding the history of the land. While the interpretive framework employed at Jeffers Petroglyphs highlights the rich Indigenous history of the site, its prairie restorations take as their de facto model the environment of the area at the time of European settlement. The implication is that the “natural” environment is the one that existed before the arrival of settlers to the region and that it has only lost that status through colonization. The tendency to default to pre-colonial baselines for ecological restoration neglects the role of Indigenous people in shaping the land through millennia of varied interactions and relegates their lives to the purview of natural rather than human history. In doing so, this form of restoration shares the underlying assumptions of American wilderness conservation, which has long conflated “natural” with unpeopled.³

As its name suggests, ecological restoration is premised on scientific as well as historical knowledge. A successful restoration requires not only a historical baseline, but also the technical knowledge needed to re-create specific environmental conditions. That knowledge is usually the product of environmental-scientific research. However, because the notion of ecological restoration is used to frame management efforts across the globe, the specific context, aims, and relevant expertise for so-called restoration projects vary widely. They can include, for example, the creation of forest habitats to protect single

³ For more on American wilderness conservation, see Roderick Frazier Nash, *Wilderness and the American Mind* (New Haven: Yale University Press, 1967) and William Cronon, “The Trouble with Wilderness; or, Getting Back to the Wrong Nature,” in *Uncommon Ground: Toward Reinventing Nature* ed. William Cronon (New York: W. W. Norton and Company, 1995). On Indigenous erasure and dispossession in particular, see Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (Oxford: Oxford University Press, 2000).

endangered species and projects purifying toxically contaminated watersheds by planting wetland grasses. Each of these relies on techniques and knowledge from different fields of environmental science and management. Indeed, each individual practice under the restoration umbrella could just as well be considered part of one of these alternative fields. In addition to a reliance on historical baselines, then, what these practices do share is a dependence on basic ideas about the organization of the natural world derived from the science of ecology. What they intend to restore is the integrity of an ecosystem, a specific ecological process, or other environmental features beneficial to proper ecological function. Historical baselines for restoration must therefore represent a more ecologically whole condition than the present state of the restoration site. Though as the prairies of Jeffers Petroglyphs demonstrate, the end goal of a project can be defined in aesthetic as much as scientific terms.

At its heart, then, ecological restoration is simply a loose framework for environmental management. The notion specifies general historical and scientific assumptions about the end goals of a project. But the individual practices that fall under this umbrella differ greatly in aims, techniques, and context. This breadth has no doubt contributed to the ubiquity of the concept, allowing it to describe a range of otherwise unrelated environmental management practices. But this fact has also presented challenges for the formation of a professional community surrounding ecological restoration. As interest in ecological restoration grew among environmental scientists, conservation advocates, and land management professionals in the second half of the twentieth century, a professional community began to develop that hoped to unite practitioners across these disparate activities. In 1981, one such contingent formalized

itself with the creation of *Restoration and Management Notes*, a journal dedicated to the practice, and the later formation of the Society for Ecological Restoration (SER) in 1988, both based at the University of Wisconsin-Madison (UW) and led by its most prominent booster William Jordan III. Dealing with the challenge of forming a discipline around such a loose concept, these self-described restoration ecologists focused on the development of best practices for ecological restoration—guiding principles and frameworks that could join these activities in a more rigorous way. By the late 1980s and 1990s, they called for the adoption of a universal “conceptual framework” to guide the practice rather than allowing it to continue on an “ad hoc, site- and situation-specific approach.”⁴

Historical studies of ecological restoration have their roots in this project of disciplinary formation. Accounts in this vein have been limited to the small set of scientists and land managers in the Midwestern United States that directly prefigured the formation of the SER. They often revolve around the work and thought of American conservation scientist Aldo Leopold and his successors. Reflecting the disciplinary anxieties among restoration ecologists in the 1980s, these studies tend to consider only those historical examples that most closely resemble typical modern restorations, conceptually and practically, as useful for understanding the development of the field. As the conventional narrative goes, Leopold developed the revolutionary concept of ecological restoration in prairie planting projects at the UW arboretum in the 1930s. Historical studies like Stephanie Mills’s *In Service of the Wild* and *Making Nature Whole* by SER founder William R. Jordan III himself, present Leopold’s UW plantings as the

⁴ In the words of Richard J. Hobbs and David A. Norton, “Towards a Conceptual Framework for Restoration Ecology,” *Restoration Ecology* 4, no. 2 (1996), 93.

foundational event in the history of ecological restoration.⁵ Though Leopold is undoubtedly a key figure in American conservation, attributing the development of restoration to a single individual is symptomatic of an approach that focuses on practical advances in restoration without considering it as a historical practice embedded in cultural, environmental, and scientific context. By focusing on a string of Midwestern botanists and plant ecologists who followed Leopold, these and other studies preclude the communities, institutions, and cultures that have practiced ecological restoration in its most basic sense—the re-creation of functional ecosystems—as relevant to the growth and adoption of the idea. Selective attention to historical context also means that this literature ignores the relation of ecological restoration practices to the settler-colonial processes that define Midwestern history. As a result, these studies can even perpetuate tropes of Indigenous erasure. For example, in recounting the history of prairie restoration activities in the United States, one restoration ecologist describes the midcentury use of fire by UW plant ecologist John Curtis as “one of the most important discoveries” in the development of restoration techniques, despite the fact that Indigenous North Americans have long employed the practice to manage grasslands.⁶

Taken together, the earliest historical studies of ecological restoration avoided difficult questions regarding the complicity of restoration practices in North American settler colonialism, while favoring a teleological and exclusionary narrative that portrays

⁵ Stephanie Mills, *In Service of The Wild: Restoring and Reinhabiting Damaged Land*, (Boston: Beacon Press, 1996); William Jordan III and George Lubick, *Making Nature Whole: A History of Ecological Restoration* (Washington, DC: Island Press/Center for Resource Economics, 2011).

⁶ Roger Anderson in “History and Progress of Ecological Restoration in Tallgrass Prairie,” in *Canaries in the Catbird Seat: The Past, Present, and Future of Biological Resources in a Changing Environment*, ed. C. Taylor, J. Taft, and C. Warwick (Champaign: Illinois Natural History Survey, 2009), 220. For another example that focuses on Leopold’s successors, see Daryl Smith, “Prairie Restoration: Bridging the Past and the Future,” *The Prairie Naturalist* 46 (August 2014): 62-69. See footnote 38 of chapter one of this thesis for more on Indigenous prairie management in the pre-colonial period.

the modern field as the culmination of an inevitable process of technoscientific progress. This founding mythology developed to ground the recently institutionalized field of restoration ecology as it coalesced around the SER in the 1980s and 1990s. However, by portraying the organization and its practitioners as the conceptual successors to Aldo Leopold himself, this narrative has only added to the basic challenges of forming a discipline around the restoration framework. To argue that all restorations are a product of Leopold's ideas reinforces the hegemony of the problematic vision of the practice enshrined in the UW arboretum—as a return to an imagined static environmental past of North America that pre-settlement conditions represent. And to emphasize the scientific development of prairie restoration as the sole origin of ecological restoration excludes the varied practices that the first self-described restoration ecologists hoped to bring into the fold in the first place.

Sure enough, this narrow framework for the history of ecological restoration could not be sustained as the concept grew in popularity. In recent years, thinking on the necessity of a unified conceptual framework for restoration has reversed course. At the turn of the twenty-first century, restoration ecologists, environmental humanists, and contributors working outside of North America began to embrace the ambiguity of ecological restoration. They argued that disparate approaches are necessary due to the broad and contingent construction of the restoration concept and the wide range of practices which it describes.⁷ Central to this thinking has been criticism of the orthodox “historical fidelity” method, a term coined by Canadian environmental philosopher Eric Higgs, which entails restoring an ecosystem to its exact historical state as closely as

⁷ On this point, see especially Joan G. Ehrenfeld, “Defining the Limits of Restoration: The Need for Realistic Goals,” *Restoration Ecology* 8, no. 1 (2000).

possible—Leopold’s own rationale.⁸ Higgs and fellow critics pointed out that, in a North American context, using a pre-colonial reference point as a baseline ignores the role of Indigenous peoples in shaping the environment for thousands of years before European settlement. The approach is equally problematic in societies that have a continuous history of development stretching deeper into the past, where determining any kind of natural historical state is often impossible.⁹ Increasing awareness of the fact that ecosystems shift in species composition and structure over time has further complicated the use of historical baselines. Adopting a humanistic perspective, restoration ecologists have also begun to tailor their approaches to the specific cultural and economic needs of the communities that will benefit from a restoration.¹⁰ For these reasons, restoration ecologists in the past two decades have increasingly advocated for a more flexible definition of the practice, one that considers not only the past environmental conditions of a site, but also the land use and human history of the location, the inevitability of environmental change, and the characteristics and needs of affected communities.

Mirroring this turn in restoration ecology, historians and practitioners have developed more robust and expansive frameworks for the historical study of ecological restoration. They have begun to consider a broader set of practices and individuals in the history of the concept. Some authors have used this approach to reexamine the traditional narrative of the practice’s development. American ecologists Peter Smiley Jr. and John Shuey critique the idea of Leopold as founder of the field by emphasizing the work of

⁸ Eric Higgs, “The Two-Culture Problem: Ecological Restoration and the Integration of Knowledge,” *Restoration Ecology* 13, no. 1 (2005): 160.

⁹ Eric Higgs, Donald Falk, Anita Guerrini, Marcus Hall, Jim Harris, Richard Hobbs, Stephen Jackson, Jeanine Rhemtulla, and William Throop, “The Changing Role of History in Restoration Ecology,” *Frontiers in Ecology and the Environment*. (November 1, 2014), 499.

¹⁰ Higgs et al., 499-501.

early-twentieth century landscape architect Jens Jensen in the Chicago area. They contend that Jensen developed similar prairie planting projects decades before Leopold. Indeed, greater attention to practices not framed in terms of restoration by practitioners, including Robert Wilson's exploration of waterfowl habitat "enhancement" by the US Fish and Wildlife Service (FWS), has informed our knowledge of the diverse history of restoration practices. J. Baird Callicott revisits Leopold's own articulation of the restoration concept, arguing that his formulation of the historical fidelity model was based on environmentally deterministic concepts that held sway among American plant ecologists at the time. Also focusing on scientific context, Laura Martin examines the role of ecological research and thought in the development of concepts and practices of ecological restoration in the United States. Taking a broad view of American ecology and environmental policy in the twentieth century, she shows that ecological restoration practices have developed along multiple fronts as research-driven attempts to repair the damage of settler colonialism, without adequately attempting to address the roots of those disasters in settler-colonial ideas and land management practices. The connections between settler colonialism and restoration have become a core theme in other American histories of the framework. For example, David Tomblin argues that the White Mountain Apache in the American Southwest appropriated knowledge of restoration practices and techniques, as well as the framework itself, to reclaim sovereignty over resources and traditional lands in the second half of the twentieth century.¹¹

¹¹ Peter C. Smiley Jr. and John Shuey, "Discovering the Roots of Ecology and Restoration Ecology in the Midwest," In *Ecological Restoration in the Midwest: Past, Present, and Future*, ed by Christian Lenhart and Peter C. Smiley Jr. (Iowa City: University of Iowa Press, 2018); Robert M. Wilson, *Seeking Refuge: Birds and Landscapes of the Pacific Flyway*, (Seattle: University of Washington Press, 2010); J. Baird Callicott, "The Arboretum and the University: The Speech and the Essay," *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters* 87 (1999): 5-22; Laura J. Martin, *Wild by Design: The Rise of Ecological Restoration* (Cambridge: Harvard University Press, 2022); David C. Tomblin, "Managing

Some of the most valuable studies in the emerging literature on ecological restoration make clear that, despite claims to the concept's universal applicability, restoration practices are often shaped by local contexts. This includes not only specific environmental conditions, but also the cultural and political characteristics of different regions.¹² Given the many forms of environmental restoration across the globe, attention to regional history is key to developing a broader view of the restoration framework and its development. Despite its limitations, the conventional narrative of the emergence of ecological restoration touches on the fact the idea that ecological restoration constitutes a novel form of environmental management developed within the American Midwest. The region has been home to the key figures and organizations that have asserted the distinct identity of restorationists and endeavored to form a professional community and research apparatus around the pursuit. This is one reason that centering a historical study of ecological restoration in the American Midwest is particularly illustrative. In addition, a striking variety of restoration practices other than tallgrass prairie restoration have emerged from different contexts within the Midwest.

As the meeting place of the North American grasslands to the west and south and the Great Lakes basin to the north and east, the American Midwest hosts a variety of ecosystems—tallgrass prairie, wetlands, forests, and numerous freshwater bodies. It is also rich in exploitable resources. The United States of America incorporated much of

Boundaries, Healing the Homeland: Ecological Restoration and the Revitalization of the White Mountain Apache Tribe, 1933 – 2000,” PhD diss. (Virginia Polytechnic Institute, 2009).

¹² These include Marcus Hall's *Earth Repair*, which makes the case that differing approaches to restoration in the Western US and Italy are based on different perceptions of the land and its history. Nancy Langston's *Climate Ghosts* evaluates attempts to restore wildlife populations in the Great Lakes Region in the context of the region's settler-colonial history. Marcus Hall, *Earth Repair: A Transatlantic History of Environmental Restoration* (Charlottesville: University of Virginia Press, 2005); Nancy Langston, *Climate Ghosts: Migratory Species in the Anthropocene*, (Waltham, Massachusetts: Brandeis University Press, 2021).

these lands with the passage of the Northwest Ordinance of 1787. The accompanying Land Ordinance of 1785 funded surveys to assess these lands and divide them into settlement-ready plots. Settlers who claimed these square-mile parcels were encouraged to establish farms on the fertile soil of the plains. Over the course of the twentieth century, the federal government expanded these holdings through treaties with Anishinaabe and Siouan communities in the region. To facilitate development, settlers undertook the systematic drainage of the region's wetlands and plowed 98% of the tallgrass prairie.¹³ The subsequent centuries of intensive agriculture have etched these survey lines into the landscape itself, creating the distinctive grid that separates farmland, cities, and what little undeveloped land remains in the Midwest today. In tandem with logging in the region's northern reaches, this development decreased the quantity and quality of habitat in the Midwest. This process decimated wildlife populations, including the many waterfowl that bred in and migrated through the Midwest in the summer. Other animals were driven out by non-native species. This includes the disappearance of native fish in Lake Superior, the ecology of which has been entirely restructured through the introduction of invasive species like sea lamprey. As the mining industry boomed throughout the Great Lakes basin in the twentieth century, its toxic byproducts further impaired water quality in Upper Midwest states like Minnesota and Wisconsin.¹⁴

As constituent processes of settler colonialism, these environmental changes have also had severe consequences for the Indigenous peoples of the Midwest. Other forms of colonization involve one nation's exploitation of resources in and establishment of

¹³ Smith, "Prairie restoration: Bridging the Past and Future," 62.

¹⁴ For more on environmental and hydrological changes in the Upper Midwest especially, see Nancy Langston *Sustaining Lake Superior: An Extraordinary Lake in a Changing World* (New Haven: Yale University Press, 2017).

political control over another. In contrast, settler colonialism is the process by which an invading people attempt to destroy and replace Indigenous societies, cultures, and peoples. In his foundational articulation, Patrick Wolfe characterizes the phenomenon as “a structure, not an event”—one created through interacting transformational processes that pervade all realms of society.¹⁵ These include not only the displacement of Indigenous peoples for settlement and development, but also the creation of new political and legal structures that enable further dispossession. In many cases, settler states have prioritized the creation of policies intended to assimilate Indigenous peoples into settler society through the imposition of hegemonic ideas and values and the erasure of Indigenous knowledge and culture. Germane to discussions of ecology in settler contexts, a feature of settler colonialism is also the replacement of Indigenous knowledges by settler science. In North America, it is through this process that ecology and other environmental sciences have become the dominant means of knowing and modifying the environment since the advent of settler society. Though these practices often seek to remedy the degradation of the physical environment that is a distinctive feature of settler colonialism, they have often perpetuated colonial injustices.¹⁶

Indeed, it is in response to the unraveling of the ecologies of the Midwest through colonization that the logic of restoration has come to dominate environmental management in the region today. This thesis charts the emergence of practices of ecological restoration in the American Midwest and examines their role in the

¹⁵ Patrick Wolfe, *Settler Colonialism and the Transformation of Anthropology: The Politics and Poetics of an Ethnographic Event* (London: Cassel, 1999), 163.

¹⁶ On the environmental dimensions of settler colonialism, see Kyle Whyte, “Settler Colonialism, Ecology, and Environmental Injustice,” *Environment and Society* 9, no. 1 (September 2018): 125–44. For more on the role of settler environmental management in Indigenous dispossession, see Langston, *Climate Ghosts*.

environmental, intellectual, and political history of the region. One facet of this process has been a shift in the methods and professional obligations of environmental scientists in the region. The first chapter reconsiders the development of the practice of tallgrass prairie restoration by contextualizing it within the tradition of scientific ecology in the American grasslands. The grasslands were a founding site of the discipline of ecology in the United States, but research in the region declined as the discipline dispersed across the nation and took on new methods and questions in the postwar period. However, during the following decades, the imperative of environmental restoration facilitated a rebirth of scientific ecology in the region. Prairie ecologists like John T. Curtis at UW shaped their research around dual concerns of basic ecology and the development of prairie planting techniques. As the practice spread in the postwar period, it followed existing professional networks of ecologists, state officials, and conservation professionals in the region. This process contributed to professionalization of environmental management in the Midwest. At the same time, restored prairies provided important grounds for experimental research in plant ecology, helping to revitalize the tradition of field research in the grasslands. But these sites, along with the methodologies and perspectives of this new plant ecology, also perpetuated settler fictions regarding the environmental history of the region. Driven by a form of plant ecology that emphasized the naturalness of pre-colonial ecological conditions, restored prairie sites displayed a whitewashed vision of the past that erased the presence of Indigenous peoples on the landscape.

While plant ecologists developed and popularized prairie restoration as a conservation strategy, public agencies in the Midwest focused their management efforts

on the restoration of game and waterfowl habitat. Composing much of the Midwest, the PPR today is made up of a patchwork of protected waters, wetlands, and prairies. Some of these parcels are surviving fragments of a pre-settlement landscape, but many have been re-created for a very specific reason—to maintain and revive dwindling game populations in response to growing demand for sport hunting. The second chapter traces the adoption of ecological restoration practices by the Iowa Conservation Commission, the state agency that has been tasked with the regulation of Iowa's environments and environmental amenities since the early twentieth century. In the mid-twentieth century, the agency faced the dilemma of developing a conservation policy for the US state with the highest rate of private land ownership and in the face of intensifying agricultural development. Agency officials looked to the emerging science of game management to maximize the production of game populations, arriving at a model of restoration based on the creation of new habitat in the most efficient manner possible. From the start, this policy prioritized sport hunters over other constituents. But this began to change in the 1980s, when Iowans with increasingly nuanced, ecologically informed views of conservation pushed the agency to reconsider its view of restoration. In response, the Commission began framing its management efforts around benefits to a greater range of species and in terms of ecosystem conservation and services. The agency remade itself to fit this new political environment—structurally, culturally, and in terms of in-house scientific expertise. Yet instead of material changes, many of these adjustments were rhetorical shifts intended to appease a larger and more diverse set of interest groups. In practice and messaging, restoration for public agencies in the region had to be conceived in ecological terms to be politically viable by the end of the twentieth century.

Though recent decades have brought restoration policies with a broader appeal, the environmental management practices of public agencies, environmental scientists, and conservation professionals throughout the twentieth century contributed to the ongoing dispossession of Indigenous lands and resources in the Midwest. Chapter three details the work of Ojibwe governments in Minnesota that have used ecological restoration as a tool to resist and reverse these processes. Even as prairie ecologists and public agencies attempted to restore the prairies and wetlands of the region, natural populations of *manoomin* (wild rice in Ojibwe) harvested by Ojibwe communities on the shores of Lake Superior declined with little intervention from state scientists or conservation agencies. Since the 1990s, Ojibwe governments have developed models of management that draw on traditional knowledge and stewardship practices to preserve and restore populations of *manoomin* in Minnesota. But because of the spiritual, economic, and cultural importance of the resource to the Ojibwe, these restoration efforts have reverberated beyond the realm of environmental management policy. The restoration of wild rice has provided grounds for rebuilding customs of resource stewardship on ceded territory, sustaining the economic and cultural vitality of Ojibwe communities, and securing a greater degree of political autonomy and authority in environmental governance and diplomacy in the Midwest. Through this process, Ojibwe governments have pushed the state of Minnesota and other environmental agencies and organizations to recognize Ojibwe sovereignty and see ecological restoration as dependent on political and cultural factors.

Over the past century, these new forms of prairie restoration, public land management, and wild rice conservation have altered the landscapes of the Midwest in

striking ways. But as they developed, these practices have also reshaped the institutions and governments responsible for them. Restoration provided the impetus and methods for the renewal of plant ecological research and the birth of professional environmental management in the region. Changing popular ideas about which elements of the natural world ought to be restored shaped the professional composition and structure of the Iowa Conservation Commission in the 1980s. Ojibwe governments have molded wild rice management programs around several tribal priorities, including food sovereignty and public health initiatives, the management of ceded territory, and water pollution remediation. Disputes and later political partnerships over rice provided grounds for Ojibwe tribes to build political leverage in their relations with the states of the Upper Midwest and federal agencies. Introducing those state governments and organizations to a form of restoration based on traditional knowledge has pushed them to view resource management as an issue of cultural renewal. In these ways, ecological restoration has been a significant force for environmental and political change in the Midwest since the mid-twentieth century.

Conversely, environmental, cultural, and political factors specific to the Midwest have shaped the development of restoration knowledge and practices in the region. Histories of US conservation have tended to focus on the role of national policy in driving conservation practices. As a result, state laws and policies represent an understudied element of conservation history. State governments must account for and work within federal conservation frameworks, but also deal with unique local pressures in designing and implementing programs. For example, political-economic shifts specific to Iowa in the 1980s forced the Iowa Conservation Commission to adapt its restoration

practices, even as federal conservation efforts faltered during the decade. In addition, specific environmental characteristics in the Midwest shaped the techniques and scientific knowledge used in restoration efforts. This included obvious cases, such as the use of dams and earthen dikes to flood land and re-create the distinctive wetland habitats of the PPR. But these influences could be more subtle, including instances in which the use of tallgrass prairies as sites of field research shaped ostensibly universal ecological concepts to reflect the unique characteristics of the biome. For both plant ecologists and public agencies, settler-colonial histories and attitudes particular to the region influenced decisions about the appropriate goals and methods of restoration projects. Ojibwe governments' efforts to conserve wild rice are also shaped by the region-specific histories of both US-tribal relations and the local environmental consequences of settler colonialism. Though all these conservation efforts were influenced by national political and scientific paradigms, they played out in the context of local culture, political economy, and environmental conditions. A regional perspective thus combines multiple political scales to demonstrate the differential ways in which environmental policies and management initiatives are shaped and enacted at the state, regional, and federal levels.

If the history of ecological restoration in the Midwest demonstrates the importance of examining specific restoration practices within their local contexts, it also reveals general problems with the ecological restoration framework as it has been understood historically. Scientists, environmental managers, and public agencies have often viewed restoration strictly as a technical problem. They have expended considerable effort to develop best practices in the restoration of different ecosystems, habitat types, and individual plant and animal species. While our ability to create precise

restorations and meet specific conservation goals has improved considerably, the basic aims and definitions of restoration have received little attention until the past few decades. The historical fidelity model offered a simple and seemingly intuitive conceptual framework, but its multiple pitfalls have forced restoration ecologists back to the drawing board. What is needed to advance ecological restoration is not just more specific historical or technical knowledge, but continued attention to the larger role of the practice in human culture and society.

In North America, the heart of the problem is that, due to the pervasive and multipronged structure of settler colonialism, environmental management practices that are informed only by settler-produced scientific knowledge will alter the environment in ways that erase and replace Indigenous ways of knowing and being. But these same traditions can inform better restoration practices. As a form of what Potawatomi ecologist Robin Kimmerer describes as “reciprocal restoration,” Ojibwe wild rice management provides an example of an alternative framework.¹⁷ Restoring wild rice has as much to do with the maintenance and renewal of Ojibwe resource stewardship and subsistence culture as it does plant conservation. At its heart, this is a much more ambitious view of the practice. Ecological restoration is not only useful for repairing the harm we have done to the natural world; it can help us build more beneficial relationships between humans and their environments going forward.

¹⁷ Robin Wall Kimmerer, “Restoration and Reciprocity: The Contributions of Traditional Ecological Knowledge,” in *Human Dimensions of Ecological Restoration: Integrating Science, Nature, and Culture* ed. Dave Egan, Evan E. Hjerpe, and Jesse Abrams, 257–276 (Washington, DC: Island Press/Center for Resource Economics, 2011), 258.

CHAPTER ONE

Prairie Restoration and the Revival of Midwestern Plant Ecology

Conference organizer Peter Schramm could not help but feel that the inaugural Symposium on Prairie and Prairie Restoration was “a very special happening.” It brought “120 enthusiastic prairie devotees,” to Galesburg, Illinois, in a show of the “renewed interest in the subject of prairie” among conservation professionals in the American Midwest in 1968.¹ Spanning this field, attendees included “scientists from universities, professional botanists, wildlife people, rangers and naturalists from state parks and wildlife refuges.”² Schramm himself was an ecologist, as were many of those responsible for the gathering. Their “concentrated attention” on applied prairie ecology made the restoration practices showcased at the event possible.³ Yet this kind of applied research reflected few of the topics and approaches popular among American ecologists at the time. Ecology had gained a national identity with the emergence of the popular environmental movement during the 1960s and the growth of the discipline’s central professional organization, the Ecological Society of America (ESA). With an influx of funding from federal agencies, ecologists turned their attention to universal concepts and problems of greater scope. Many even began to deliberately distance themselves from the problems of popular environmental concern. When they did apply their research directly to conservation issues, they tended to do so through national organizations, such as the

¹ Peter Schramm, “Preface,” in *Proceedings of a Symposium on Prairie and Prairie Restoration*, ed. Peter Schramm (Galesburg: Knox College Biological Field Station, 1970), 2.

² Peter Schramm, “My Career in Prairie Research and Restoration,” in *Proceedings of the 24th North American Prairie Conference*, ed. Roger Anderson and Chris Brenda (Normal: Illinois State University, 2016), 64.

³ Schramm, “Preface,” 2.

Nature Conservancy, that had the influence needed to establish large nature reserves.⁴

The prairie restoration practices on show in Galesburg seemed provincial in comparison to these shifting national priorities. This regional group of ecologists worked with local governments and universities to create carefully planned and painstakingly tended local prairie plant communities. Their meticulously researched planting techniques yielded prairies that often included more than one hundred plant species, collected from local populations and hand-seeded, acre by acre, over several years.⁵

Contemporary prairie restoration ecologists regard this inaugural conference as a foundational moment in the development of their discipline. The biennial meetings have remained a touchstone as the practice has grown more popular in the subsequent half-century. Yet the conference also represents the revival of a scientific tradition that confounds the nationalizing trend in American ecology in the mid-twentieth century. In his foundational history of American ecology, *Saving the Prairies*, historian of science Ronald Tobey depicts the rise and fall of American grasslands ecology.⁶ Concerned by the rapid disappearance of this biome in the late nineteenth century, the first generation of ecologists in the region, including the University of Nebraska's Frederic Clements and University of Chicago's Henry Chandler Cowles, formed an expansive network of researchers in plant ecology across the prairie states. But their influence extended beyond the prairies. Tobey argues that "their struggle to understand and to preserve one of the great biological regions of the world... created the science of ecology, in a professional

⁴ Stephen Bocking, *Ecologists and Environmental Politics: A History of Contemporary Ecology*, 2nd ed. (Morgantown: West Virginia University Press, 2017), 183-186.

⁵ For examples, see Peter Schramm, "A Practical Restoration Method for Tall-Grass Prairie," and Arthur H. Ode, "Some Aspects of Establishing Prairie Species by Direct Seeding," in *Proceedings of a Symposium on Prairie and Prairie Restoration*, ed. Peter Schramm (Galesburg: Knox College Biological Field Station, 1970).

⁶ Tobey, 219.

sense, in the United States.”⁷ The concepts and methodologies they developed defined the field of plant ecology in the country for the first half of the twentieth century. But by the 1940s, shifts in the conceptual foundations of biology, the outbreak of the Second World War, and new empirical sensibilities drove a dispersal of plant ecological research across the nation. At the same time, as environmental catastrophes like the Dust Bowl and continued development reduced the prairies to a fraction of their historic extent, the preservationist mission of America’s first ecologists seemed to have been a failure.⁸

Yet the 1961 symposium suggests that Midwestern plant ecology did not disappear. Instead, its practitioners adopted new empirical standards and new frameworks for conservation. Where the first generation of prairie ecologists attempted to save the disappearing prairies, this chapter contends that the imperative of ecological restoration drove a conceptual and empirical shift in Midwestern plant ecology and a revival of its professional networks in the mid-twentieth century. I focus on the work of John T. Curtis, a botanist and plant ecologist, and his students at the University of Wisconsin-Madison (UW). In the 1940s and 1950s, Curtis and his students conducted a program of field research at the University of Wisconsin Arboretum that advanced basic plant ecology and introduced new techniques for the emerging practice of prairie restoration. They disseminated this new applied prairie ecology among a then-dormant network of plant ecologists in the region, popularizing the practice of prairie restoration and the novel ecological concepts that informed it and establishing a series of restored prairie research sites that now provide the foundation for ecological field research in the Midwest.

⁷ Ronald Tobey, *Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895–1955* (Berkeley: University of California Press, 1981), 2.

⁸ Tobey, 221–222.

Midwestern plant ecology transformed from a discipline based in observational, basic science to one focused on experimental methods and applied conservation problems. Ecological restoration drove—and remade—a Midwestern ecology that contrasted the national discipline in the second half of the twentieth century.

At the same time, I characterize the twentieth-century emergence of the ecological restoration framework in the United States as a product of the larger conceptual, methodological, and institutional shifts in the discipline of ecology. Despite the basic role of the ecosystem concept in the notion of ecological restoration, few studies have critically examined the part that the science of ecology has played in the development of the framework. Laura Martin's recent *Wild by Design* demonstrates that changing ideas, methods, and political priorities among American ecologists shaped the emergence of restoration practices in the United States throughout the twentieth century. Yet while this national scope yields important insights, as the inherent geographic boundaries of a practice like prairie restoration suggest, the emergence of ecological restoration has also been bound up with more localized issues. As Jeremy Vetter has observed, regional frameworks are an underutilized tool for historians of science. His accounts of "science in action" in the American West demonstrate that this scale captures many of the environmental and institutional characteristics that have most directly shaped the day-to-day lives of field scientists.⁹ Similarly, this chapter aims to portray applied ecology "in action" by exploring the ways in which regional history, environment, and institutions

⁹ Jeremy Vetter, *Field Life: Science in the American West During the Railroad Era* (Pittsburgh: University of Pittsburgh Press, 2016), 5-8. For another example of this regional framework, and one which links field research to developing conservation practices, see Albert G. Way, "Burned to be Wild: Herbert Stoddard and the Roots of Ecological Conservation in the Southern Longleaf Pine Forest," *Environmental History* 11 (July 2006): 500-526.

have interacted with changing ecological ideas to shape the structure of environmental management in the Midwest. A reinvigorated Midwestern ecology provided the professional, epistemic, and organizational foundations for the emergence of professional, research-driven environmental management in the Midwest—a field for which prairie restoration continues to provide a key management strategy.

The role of place in this history extends beyond the geographic boundaries that defined these communities of practitioners. Environmental, cultural, and social characteristics of the Midwest itself shaped both the ecological research and restoration practices conducted in the region. This includes, for instance, ostensibly universal ecological principles that were molded to and limited by the ecology of tallgrass prairie. Even more striking is the implication of plant ecological research in Midwestern settler colonialism. The logic of the historical fidelity model was ubiquitous among restoration efforts in North America as the ecological restoration framework spread in the 1980s. But due to its problematic implications, the approach has been a source of consternation in recent decades as restoration ecologists have sought methodological alternatives and new conceptual frameworks to guide their work. However, this chapter demonstrates that this implicit historical revisionism is not simply a byproduct of problematic restoration methodologies. In the Midwest, it has been rooted in cultural assumptions and attitudes particular to the settler-colonial history of the region. For Midwestern plant ecologists in the mid-twentieth century, prairie restoration sites served a vital empirical function by facilitating the pursuit of experimental rather than observational field research. But at the same time, these sites took on subtle, problematic historical meaning. By making real a static pre-colonial baseline, restored prairies invoked an imaginary, whitewashed history

of the region that erased the evidence of Indigenous management practices on the land. Even as plant ecologists attempted to repair the damage that settler colonialism had wrought on the prairie landscape, plant ecology became a tool for reinforcing colonial narratives. Historians have explored several contexts in which the science of ecology has functioned as a tool for colonial domination. Yet the notion of a “residential” Midwestern ecology—in which the production of knowledge is embedded within the environmental and cultural particularities of place—demonstrates how ecological research and knowledge can be shaped by and reinforce subtle processes of settler colonialism.¹⁰

John T. Curtis and the Vegetation Question

The scientific restoration of vegetation in the United States has long relied on concepts that explain the structure of plant communities. This area of inquiry would fall under the purview of plant ecology as the field emerged in the late-nineteenth century. For much of its early history, the discipline was dominated by the thought of Frederic Clements, a botanist and plant ecologist at the University of Nebraska. As he formulated his ideas in the early twentieth century, he drew on Nineteenth-century European biogeographers like Alexander Von Humboldt, who related patterns in the distribution of vegetation across the landscape to gradients in environmental conditions. Humboldt introduced the concept of the “association” to describe groups of plants that shared similar environmental

¹⁰ For analyses of ecology in colonial contexts, see Eugene Cittadino, *Nature as the Laboratory: Darwinian Plant Ecology in the German Empire, 1880-1900* (Cambridge: Cambridge University Press, 1990); Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895-1945*, (Cambridge: Harvard University Press, 2001); Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950* (Chicago: University of Chicago Press, 2011).

conditions.¹¹ However, even if one might be able to easily distinguish, say, a forest from a prairie through observation, it was not a given that these groupings had any bearing on ecological processes. Clements attributed biological meaning to these units, theorizing that the plant community functioned as a unified “superorganism” composed of individual species.¹²

Clements also built on the turn-of-the-century ideas of Henry Chandler Cowles at the University of Chicago, whose research on the shores of Lake Michigan introduced the notion of “succession”—a process by which, following a disturbance, the species that compose the vegetation of an area progress towards their previous, natural state.¹³ This might start with a collection of weeds, advance to larger, hardier plants, and culminate in a mature plant community. The exact composition of each community represented the “climax” conditions of a site, so named because they were determined by the climate and other environmental factors of the region—an environmentally deterministic view adopted from biogeographers. Synthesizing these frameworks, Clements viewed succession as a process of embryonic development towards a mature climax “formation.” Though conceived as functional organisms, each formation encompassed significant variation in geography and species, comprising, for example, the whole of the tallgrass prairie.¹⁴

¹¹ For more on the role of Humboldtian ideas in plant ecology see Malcolm Nicolson, “Community Concepts in Plant Ecology: From Humboldtian Plant Geography to the Superorganism and Beyond,” *Web Ecology* 13, no. 1 (December 2013): 98-100.

¹² Frederic E. Clements, *Plant Succession: An Analysis of the Development of Vegetation* (Washington DC: Carnegie Institution of Washington, 1916), 3.

¹³ For more on Cowles’s research, see Eugene Cittadino, “A ‘Marvelous Cosmopolitan Preserve’: The Dunes, Chicago, and the Dynamic Ecology of Henry Cowles,” *Perspectives on Science* 1, no. 3 (September 1993): 520-559.

¹⁴ Each formation could be further divided into associations based on these variations, though Clements viewed the entire formation as the primary and most biologically significant unit of vegetation. Clements, *Plant Succession*, 126.

Under a Clementsian paradigm, the structure of plant communities and their successional properties became the primary objects of study for American plant ecologists in the first half of the twentieth century. However, the existence of the plant community itself was subjected to widespread critique when several ecologists entering the profession in the 1940s introduced new theories of vegetational structure.¹⁵ One of the most prominent of these individuals was John Curtis. His research at UW during the 1940s and 1950s culminated in the development of a new “community continuum” concept. This theory borrowed from the 1920s research of American plant geneticist Henry Gleason. Gleason accepted that collections of plants could be observed and characterized, but he argued that these groupings had no functional properties in and of themselves. Instead, the distribution of plant populations was determined only by the environmental requirements and adaptations of the individual species which composed them. Plant communities were merely coincidental groupings of species adapted to similar conditions—an artifact of human observation rather than ecological fact.¹⁶

American plant ecologists largely rejected Gleason’s “individualistic hypothesis” until individuals such as Curtis revisited it in the 1940s. In fact, Curtis considered his approach only a “slight modification” of Gleason’s. He differed in believing that plant associations did have their own internal ecological properties, in that some dominant species could influence the distribution of others. However, he also disagreed with the

¹⁵ Debate during this period focused on the degree of biological integration within the community as well as scale at which units of vegetation should be defined. See Nicolson, “Community Concepts in Plant Ecology,” 98-100.

¹⁶ Henry A. Gleason, “The Individualistic Concept of the Plant Association,” *American Midland Naturalist* 21, no. 1 (January 1939): 93. In addition to Gleason, the other most notable critique of Clements before the Second World War came from British ecologist Arthur Tansley, who proposed an early form of the ecosystem concept. See Arnold G. van der Valk, “From Formation to Ecosystem: Tansley’s Response to Clements’ Climax,” *Journal of the History of Biology* 47, no. 2 (July 2013): 294.

notion that plants existed in discrete, major formations. Communities were therefore not separate, bounded entities, like Clements believed, nor were they entirely matters of happenstance, as Gleason contended—they existed along a fluid, dynamic continuum of associations defined by each distinct combination of species. At the same time, Curtis acknowledged that the continuum itself was subject to selection pressure—reconciling the environmental determinism of Clements with an increasingly common Darwinian perspective.¹⁷ Occupying an appealing middle ground, Curtis’s community continuum concept would be developed further by plant ecologists in the second half of the century as the field shifted towards the study of individual plant populations and their relation to the ecosystem.¹⁸

The Prairie Laboratory at the University of Wisconsin

Historians of ecology have emphasized the role that Curtis’s commitment to statistically robust methods played in the development of the community continuum theory. Along with many of his peers, Curtis considered basic statistics and new computational technologies to be important foundations for “establishing ecology as a science instead of an art.”¹⁹ As he developed the continuum concept, he ensured it met these heightened

¹⁷ John T. Curtis to C. G. G. J. van Steenis, October 8, 1956, box 6, folder B.5, John Curtis Papers, University of Wisconsin-Madison Archives, Madison, Wisconsin (hereafter JCP).

¹⁸ Robert P. McIntosh, “The Continuum Continued: John T. Curtis’ Influence on Plant Ecology,” in *John T. Curtis: Fifty Years of Wisconsin Plant Ecology*, ed. James S. Fralish, Robert P. McIntosh, and Orie L. Loucks (Madison: The Wisconsin Academy of Arts, Letters, and Sciences, 1992), 106-111.

¹⁹ John T. Curtis to P. Grieg-Smith, February 10, 1958, box 4, folder Other foreign countries, JCP. On Curtis and shifting methodologies and empirical standards, see Malcolm Nicolson, “Towards Establishing Ecology as a Science Instead of an Art’: The Work of John T. Curtis on the Plant Community Continuum,” *Web Ecology* 2, no. 1 (February 2001): 2; T. F. H. Allen, Gregg Mitman, and T.W. Hoekstra, “Synthesis Mid-Century: J. T. Curtis and the Community Concept,” in *John T. Curtis: Fifty Years of Wisconsin Plant Ecology*, ed. James S. Fralish, Robert P. McIntosh, and Orie L. Loucks (Madison: The Wisconsin Academy of Arts, Letters, and Sciences, 1992), 125-129; and Tobey, 221-222.

empirical standards. Early in his career, he and his students developed survey techniques for gradient analysis, a method for the quantitative characterization of plant communities as collections of species that gradually shift across the landscape. In 1946, he secured funding to apply the technique in a ten-year survey of plant communities across Wisconsin. Over the following decade, plant ecologists at UW amassed hundreds of boxes of cutting-edge punch cards to store this data, providing the raw materials for dozens of published papers and filling several rooms at the university. By 1960, Curtis synthesized this meticulous program of field research into his book, *The Vegetation of Wisconsin*, which he framed as a treatise in support of the continuum idea and a proof-of-concept for the gradient analysis method as a means of describing the structure of vegetation.²⁰

Yet, in addition to these new methods, the discipline of American ecology underwent another transition at the time that proved just as influential for Curtis's ideas. Even as some American ecologists began to focus on more theoretical problems in the mid-twentieth century, others increasingly viewed their research as providing a scientific foundation for conservation. Restoration itself became a pressing problem in applied ecology. However, as several historians have shown, concepts of restoration developed by American ecologists in the first half of the twentieth century were molded by the dominant Clementsian paradigm of the time.²¹ Laura Martin's work on ecologists' response to the Dust Bowl provides a striking example. Following years of intensive agriculture, droughts in the early 1930s left millions of acres of farmland stretching from

²⁰ Descriptions of quantitative methods in John T. Curtis. to A. G. Vestal, April 10, 1954, box 3, folder U-Z, JCP. See also John T. Curtis to William E. Martin, January 8, 1958, box 4, folder A-Z, JCP.

²¹ See, for examples, J. Baird Callicott, "The Arboretum and the University: The Speech and the Essay," 11-13 and chapter three of Marcus Hall, *Earth Repair*.

Iowa to the Texas panhandle barren. As topsoil became unstable and quickly eroded, Franklin Delano Roosevelt's New Deal program dispatched Civilian Conservation Corps (CCC) teams across the grasslands to stabilize affected lands. Some American ecologists, Clements chief among them, were critical of CCC land management programs. Their grievances centered on the fact that the CCC's approach contradicted fundamental tenets of Clementsian ecology. Foresters working with the Corps tended to prescribe planting hardy, though successional inappropriate plant species that could hold down topsoil. Ecologists advocated instead for setting land aside and letting succession take its natural course—that is, to let the land recover to its climatically determined conditions. Victor Shelford at the University of Illinois and Emma Lucy Braun at the University of Cincinnati spearheaded campaigns to establish such “nature reservations,” which would allow for this form of conservation and provide sites for research on succession. Though they were ultimately unable to capitalize on federal interest at the time, American ecologists had developed a coherent theory of ecological restoration—at this point dependent on mechanisms of Clementsian ecology.²²

Curtis shared with this earlier generation a commitment to applied research in plant conservation. As he finished his doctoral work in botany in the late 1930s, this motivation led him to the field of ecology and the notion of restoration itself. He initially researched problems of orchid germination, “working constantly” to develop methods for propagating the sensitive plants in a greenhouse.²³ After working with public agencies and conservation organizations in Wisconsin to identify and protect areas containing rare wildflower species throughout the decade, it became clear to him that the propagation of

²² Martin, *Wild by Design*, 42-62.

²³ John T. Curtis to Carl T. Ramsey, October 13, 1936, box 1, folder R, JCP.

individual plant species could not scale to match conservation needs.²⁴ Plant ecology offered a more “workable phase” of “wild plant conservation” because the field focused on entire plant communities rather than individual species.²⁵ By 1938, when he was hired as a professor of botany at UW, Curtis had come to see ecology as “the basic science of conservation.”²⁶ He began to view the “regeneration and maintenance” of plant communities as the most effective direction for his research.²⁷

At the outset, though, Curtis shared a belief that Clements’s account of succession held the key to restoring vegetation. He first began to doubt the validity of the concept during the Second World War, when the U.S. Board of Economic Warfare recruited him to be the scientific director for the “Cryptostegia Project” in Haiti, where he attempted to develop new botanical sources of rubber.²⁸ Seeing the “immensely complex group of tropical plant associations,” a striking contrast to the relative uniformity of Midwestern forests and prairies, caused him to question “the validity of the entire plant-association concept.”²⁹ So transformative was this experience that Curtis felt forced to renounce a previously awarded Guggenheim Fellowship for research on the role of climax succession in the restoration of forests in northern Minnesota. This “changed outlook borne of field experience” made clear that a “basic understanding of the constituent

²⁴ An example being his extensive collaboration with Albert Fuller, curator of the Milwaukee Botanical Garden, to identify sites containing rare orchids. Albert M. Fuller to John T. Curtis, March 8, 1937, box 1, folder Fuller, Albert M., JCP.

²⁵ John T. Curtis to Ovid Butler, March 11, 1941, box 1, folder A, JCP.

²⁶ John T. Curtis to John F. Reed, March 5, 1954, box 5, folder B.16, JCP.

²⁷ John T. Curtis to J. R. Schramm, January 12, 1942, box 1, folder S, JCP.

²⁸ “Records of War Research as a Civilian—John T. Curtis,” copy of US War Department document, August 25, 1947, box 1, folder Letters to be filed, JCP, 2. Curtis and his team of botanists and chemists studied the potential of rubber vine (*Cryptostegia grandiflora*) as an emergency source of rubber for the next three years—one of several wartime projects through which the US used the expertise of American biologists to build economic ties with Central American nations. See Megan Raby, *American Tropics: The Caribbean Roots of Biodiversity Science* (Chapel Hill: The University of North Carolina Press, 2017), 137.

²⁹ John T. Curtis to W. S. Cooper, March 12, 1945, box 6, folder Guggenheim Foundation, JCP.

species of... plant formations” was necessary for an effective approach to applied plant ecology.³⁰

Upon his return to UW, he attempted to address this problem through a joint research program on the structure and restoration of native plant communities. This began in earnest in 1949 when, following the tragic death of prominent conservationist Aldo Leopold in a brush fire, Curtis succeeded him as the Director of Research for the UW arboretum. Though American ecologists had been unable to convince the CCC to establish nature reservations in the aftermath of the Dust Bowl, Leopold—a firm Clementsian and supporter of the nature reservation policy—had succeeded in enlisting a CCC team to assist with a series of prairie restorations at the arboretum. Leopold and his collaborator Ted Sperry, a plant ecologist provided by the National Park Service, directed the team to transplant sod from native prairie remnants into the restoration site. By 1940, they had transferred fifteen tons of earth and plant matter into the arboretum.³¹

Though this initially appeared to be the best method to create accurate “artificial prairies,” it became clear over the next two decades that prairie restoration was not such a simple process.³² While Leopold and Sperry had experimented with some additional management and planting practices, Curtis introduced a greater variety of techniques and rigorous and regular surveys to test them. However, this was more than a corrective to earlier management practices. These efforts transformed the restored prairies into sites of basic research on the structure of plant communities. Studies intended to address

³⁰ John T. Curtis to Henry Allen Moe, October 25, 1945, box 6, folder Guggenheim Foundation, JCP.

³¹ “Itemized List of Accomplishments by CCC-NPS at University Arboretum,” memorandum, 1940, box 1, folder 1936-1940, Arboretum Collection, University of Wisconsin-Madison Archives, Madison, Wisconsin (hereafter AC), 3. For more on the Clementsian basis of Leopold’s ideas, see Callicott, “The Arboretum and the University,” 11-13.

³² John T. Curtis, “Prairie Reestablishment at the University of Wisconsin,” article in *The University of Wisconsin Arboretum News*, October 1952, box 1, folder 1950-1955, AC, 2.

problems in both applied and basic plant ecology became “the main botanical project of the arboretum” under Curtis’s purview.³³ The resulting phenomenological and empirical evidence contributed to the conceptual and empirical foundations of Curtis’s developing continuum concept and the refinement of prairie restoration practices at the arboretum—a process which blurred the lines between basic and applied field research and created a model for the empirical and professional transformation of Midwestern plant ecology.

One such occasion was Curtis’s experimental study of controlled vegetation burns as a management tool. Plant ecologists in the Midwest had long been perplexed by the border between the tallgrass prairie biome and the hardwood forests of the Great Lakes region. Through the process of “prairie-forest succession,” tree saplings encroached in adjacent prairies, slowly transforming them into hardwood forests over time.³⁴ As Clementsians, Leopold, Sperry, and other ecologists in the region identified distinct soil types at the border as the probable factor distinguishing the two climaxes. However, this hypothesis could not explain how tree species outcompeted climax prairie plants in soil that provided supposedly inadequate growing conditions.³⁵ The process also presented a practical challenge for restoring and managing tallgrass prairie, requiring regular efforts to keep encroaching saplings at bay. Though intended to deal with this latter problem, the solution to both issues came when Curtis and his students implemented the arboretum’s first program of experimental prairie burns.³⁶ Regular fires, it seemed, prevented “the

³³ John T. Curtis, “Arboretum Technical Committee Annual Research Report,” July 1, 1947, box 1, folder 1944-1948, AC, 1.

³⁴ “An Outline of Major Problems Involved in the Study of the University of Wisconsin Arboretum Area,” n.d., box 1, folder 1936-1940, AC, 2.

³⁵ Ibid.

³⁶ Aldo Leopold, “Prairie Plantings,” memorandum, November 14, 1938, box 1, folder 1934-1939, AC.

invasion of woody species” into the prairies.³⁷ This applied research demonstrated that fire was not only a tool for maintaining restored prairies, but that it was also the mechanism which shaped the structure of the prairie-forest border—a regular disturbance instead of a static environmental determinant like climax theory suggested.³⁸

Curtis’s experimental burnings provided solutions for additional management problems and further insights into plant community structure. In the restored prairies, transplanted grasses and wildflowers were “not holding their own” against non-native plants like quack grass and bluegrass that had previously occupied the sites.³⁹ In experimentally burned tracts, however, fire not only suppressed woody plants, but allowed native species to outcompete otherwise dominant non-native grasses. Curtis and his student, Max Partch, hypothesized that prairie plants had adapted to the destructive impact of fire, while non-native grasses were unable to regrow as quickly in its aftermath.⁴⁰ One result was the first full burn of all the arboretum’s prairies in 1950 (“Operation Prairiefire”), which cemented the practice as standard procedure for managing restored prairies.⁴¹ It also demonstrated that the adaptations of individual plants

³⁷ John T. Curtis and Max L. Partch, “Effect of Fire on the Competition Between Blue Grass and Certain Prairie Plants,” *American Midland Naturalist* 39, no. 2 (March 1948): 437.

³⁸ John T. Curtis and Robert P. McIntosh, “An Upland Forest Continuum in the Prairie-Forest Border Region of Wisconsin,” *Ecology* 32, no. 3 (July 1951): 478. This use of fire replicated practices that Indigenous North Americans had used to manage grazing lands long before the advent of prairie restoration practices. In fact, the entire prairie-forest border region, which composes much of what is now known as the Midwest, was shaped by these practices. Curtis was aware of this fact—the implications of which are explored in the final section of the chapter. On the use of fire by Indigenous peoples in the tallgrass prairie, see Robert Michael Morrissey, *People of the Ecotone: Environment and Indigenous Power at the Center of Early America* (Seattle: University of Washington Press, 2022), 57-59.

³⁹ Curtis and Partch, “Effect of Fire on the Competition Between Blue Grass and Certain Prairie Plants,” 437.

⁴⁰ Curtis and Partch, “Effect of Fire on the Competition Between Blue Grass and Certain Prairie Plants,” 446.

⁴¹ John T. Curtis, “Operation Prairiefire,” memorandum to arboretum staff, April 1950, box 1, folder 1950-1955, AC, 1.

to environmental conditions drove their distribution across the landscape—what would become a core component of the continuum concept.

Research on new techniques for the propagation of native grasses also eroded Curtis's faith in succession, while further contributing to a conception of plant community structure based on the requirements of individual species. The Dust Bowl had made this research a federal priority. US Department of Agriculture "conservation farming" programs already provided funding and seeds for the cultivation of quick-growing (often non-native) grasses by traditional agricultural methods, which proved successful as a means of controlling erosion.⁴² However, the establishment of native grasses in anything resembling a natural assemblage was a more complex task. Early attempts to establish prairie by direct seeding failed to achieve sufficient rates of germination, even for grasses which were viewed as hardier and more adaptable than many of the prairie wildflower species.⁴³ The prospect of doing so with a mix of dozens of species was a daunting task. Leopold and Sperry had also attempted to seed some prairies directly in the late 1930s—with little success.⁴⁴ They too were surprised by the complexity of propagating hardy grasses, which, based on Clementsian ideas, were thought to recolonize and alter the soil through the process of succession.⁴⁵

Both federally funded research and practical experience with prairie planting thus made clear that knowledge of the environmental requirements of individual species was necessary to reestablish tallgrass prairie by direct seeding. Curtis and his students

⁴² M. M. Hoover, *Seed for Regrassing Great Plains Areas* (Washington DC: US Department of Agriculture, 1947), 2. For more on federal re-grassing efforts in western rangelands see Nathan Sayre, *The Politics of Scale: A History of Rangeland Science* (Chicago: University of Chicago Press, 2017), 146-149.

⁴³ C. J. Coukos, "Seed Dormancy and Germination in Some Native Grasses," *Agronomy* 36, no. 4 (April 1944): 337-338.

⁴⁴ John T. Curtis, "Prairie Reestablishment at the University of Wisconsin Arboretum," 3.

⁴⁵ John T. Curtis, "Introduction to Existing Flora," March 1951, box 1, folder Prairie Garden, AC, 4.

conducted studies of native grass germination throughout the 1950s in an attempt to address this problem. The evolution of this research also demonstrates Curtis's gradual adoption of a definition of plant community structure based on individual species. With the support of US Department of Agriculture (USDA) grants, Curtis and his students began subjecting experimental grass plantings to several germination and management treatments in the early 1950s. In the vein of existing research in the area, they initially studied only select dominant grasses, based on an assumption that germination and management practices could be generalized across species.⁴⁶ Over time, though, these investigations demonstrated that treatments like burning, mowing, and clipping elicited differential responses in germination rates and abundance among different species. This, in turn, prompted UW researchers to examine a greater variety of grasses.⁴⁷ Rather than a simple successional process, creating a restoration with the desired balance of species required tailoring management techniques to different plants. Curtis's background in orchid germination and plant physiology had already attuned him to individual requirements of different plant species. This "direct knowledge of the behavior of prairie grasses" further eroded the idea that tallgrass prairie existed as a single monolithic formation, demonstrating instead that the community must be defined by characteristics of its component species.⁴⁸

⁴⁶ John T. Curtis and Max L. Partch, "Some Factors Affecting Flower Production in *Andropogon Gerardi*," *Ecology* 31, no. 3 (July 1950): 488–89; H.C. Greene and John T. Curtis, "Germination Studies of Wisconsin Prairie Plants," *American Midland Naturalist* 43, no. 1 (January 1950): 186–94.

⁴⁷ W. C. Robocker, John T. Curtis, and H. L. Ahlgren, "Some Factors Affecting Emergence and Establishment of Native Grass Seedlings in Wisconsin," *Ecology* 34, no. 1 (January 1953): 194–99; Bonita Miller Neiland and John T. Curtis, "Differential Responses to Clipping of Six Prairie Grasses in Wisconsin," *Ecology* 37, no. 2 (April 1956): 355–65; W. C. Robocker and Bonita J. Miller, "Effects of Clipping, Burning and Competition on Establishment and Survival of Some Native Grasses in Wisconsin," *Journal of Range Management* 8, no. 3 (April 1955): 117–120.

⁴⁸ John T. Curtis to James E. Cole, January 15, 1957, box 6, folder 1955-1957 Misc., JCP.

Curtis's experimental research in prairie restoration thus revealed several insights into the structure of plant communities that he captured in his continuum concept—developed in parallel in the field research sites of the UW arboretum. However, a rigorous “mathematical formulation” was still necessary to “adequately portray... the spatial distribution of plants” on a continuum.⁴⁹ Curtis derived the methodology for this undertaking, too, from his developing prairie restoration practices. As the community concept crystallized, Curtis and his UW collaborators were more attentive than ever to the specific plant species which composed their restored prairies. Where, in the 1930s, sod or seeds from various locations might have been used for restorations, it now seemed essential to replicate the specific collection of plants original to the local area. Working with UW Arboretum Manager Henry Greene to address this need for precise restoration baselines, Curtis undertook several surveys of “relic prairies” in the Madison area in the late 1940s.⁵⁰

The methodology they developed for these surveys was a departure from the norm. American plant ecologists typically examined vegetation within quadrats—small survey areas, at most a few square meters in size, which were selected to represent a major type of plant community. Clements and his students had introduced this method to differentiate their research from that of biogeographers like Humboldt. Rather than examine broad patterns in vegetation at the landscape level, the use of small sampling sites allowed the surveyor to collect detailed measures of composition, including the presence, abundance, and dominance of individual species.⁵¹ Curtis and Greene struck a

⁴⁹ John T. Curtis to Dwight W. Billings, June 12, 1953, box 5, folder B.16, JCP.

⁵⁰ John T. Curtis and H. C. Greene, “A Study of Relic Wisconsin Prairies by the Species-Presence Method,” *Ecology* 30, no. 1 (January 1949): 83.

⁵¹ For the development of the quadrat method see Tobey, *Saving the Prairies*, 48-75.

middle ground between these methods, using more numerous, larger, and regularly spaced sample sites, but noting only the presence of each species. Though it lacked useful measures of community composition, the “species-presence” method allowed them to assess the variation in species across sites. The methodology therefore revealed the specific mix of species that ought to be used to restore the distinct prairies of the Madison area.⁵²

In addition to its use in prairie restoration, Curtis expanded the method to provide a robust empirical foundation for the community continuum concept. Initial exploratory surveys for this project relied on the species-presence method to characterize plant communities across the state based on the species present in each tract. From this vast set of data, Curtis mathematically derived lists of “indicator” species that represented common patterns in the distribution of plant species across Wisconsin.⁵³ Curtis and his students then selected stands of vegetation that matched each list, from which they collected more detailed data on environmental characteristics and species composition. Where plant ecologists typically identified representative survey sites by eye, Curtis contended that this method provided objective criteria that were based on mathematical patterns in the distribution of vegetation.⁵⁴ Using the species-presence method, Curtis undertook his 10-year systematic characterization of plant communities across the state, culminating in the publication of his 1958 *Vegetation of Wisconsin*. He intended for the book to demonstrate the validity of the continuum concept through application,

⁵² John T. Curtis, “Arboretum Master Development Plan,” March 1951, box 1, folder Prairie Garden, AC, 2.

⁵³ Curtis and McIntosh, “An Upland Forest Continuum in the Prairie-Forest Border Region of Wisconsin,” 476.

⁵⁴ John T. Curtis, “A Prairie Continuum in Wisconsin,” *Ecology* 36, no. 4 (October 1955): 558–66.

expounding his theory of vegetation through the “ordination” of a dynamic continuum of plant communities across Wisconsin—a project developed in tandem with the practice of prairie restoration.⁵⁵

The Restoration of Midwestern Ecology

Curtis hoped that his comprehensive characterization of plant communities in Wisconsin would prove that the continuum concept could be a universal tool for categorizing vegetation. He pushed for the application of his gradient analysis method beyond the test case of Wisconsin, corresponding with ecologists as far away as the Marshall Islands, Japan, and the Philippines regarding the survey technique.⁵⁶ The dissemination of the approach was part of a larger crusade against Clementsian ecology, which Curtis viewed as a set of “fantastic concepts” sustained by faulty methodologies among American ecologists. In the early 1950s, he began to wage this battle using the institutions of a nationalizing discipline of ecology. As an editor of *Ecology*, his reviews frequently critiqued the methodological shortcomings that marred plant ecological research.⁵⁷ Upon forming a Vegetation Committee within the ESA in 1953, he sponsored a conference session on “Methodology in the study of vegetation,” which attempted to address conceptual and methodological deficiencies head on, while providing “good coverage of the ‘continuum’ concept.”⁵⁸

⁵⁵ John T. Curtis, *The Vegetation of Wisconsin: An Ordination of Plant Communities* (Madison: University of Wisconsin Press, 1959).

⁵⁶ John T. Curtis to Karl. M Wilbur, April 13, 1953, box 1, folder Letters to be Filed, JCP.

⁵⁷ John T. Curtis, “Comments on ‘The classification of neo-tropical vegetation types,’” editorial review for *Ecology*, March 26, 1954, box 5, folder B.18, JCP.

⁵⁸ Eugene P. Odum, “Memorandum to Members of the ESA Program Committee,” December 13, 1954, box 5, folder B.16, JCP.

Along with the contributions of like-minded colleagues, these efforts eroded the hegemony of Clements's ideas. By 1955, Curtis was happy to report to Henry Gleason himself—the earliest of these dissenters—that “the last major holdout appears to be in the group of Range Managers in the Plains States who are still imbued with the Clementsian doctrine.”⁵⁹ However, the continuum concept was not widely adopted in its place. Several colleagues noted its limitations, pointing out that the idea seemed to be molded by characteristics of the environment in which it was produced. For instance, plant ecologist Jonathan Sauer argued that the continuum concept reflected “the weak gradients in environmental factors” in Wisconsin, and that it might not apply in regions with “strong gradients in independent environmental factors... such as California.”⁶⁰ The ambiguous structure of the prairie-forest border, a definitive characteristic of Wisconsin and the surrounding region, had driven Curtis to emphasize the distinct species which defined plant communities rather than the relatively subtle environmental factors which dictated their distribution.

Curtis's new methodology for the restoration of plant communities—the other product of his research at the UW arboretum—reflected the same tension between relevance to local environmental context and universal application. Similar problems spanned the discipline of American ecology at the time. Before the Second World War, American ecologists typically stressed the relevance of their work to local economic and environmental concerns, often consulting directly with local institutions and governments. After the war, the increasing prevalence of national research institutions

⁵⁹ John T. Curtis to Henry A. Gleason, January 14, 1955, box 2, folder G, JCP.

⁶⁰ Sauer was noting the subtle differences between Curtis's ideas and those of University of California-Berkeley botanist Herbert Mason. Jonathan Sauer to Herbert Mason, December 9, 1951, box 2, folder M, JCP.

and funding bodies, along with a greater emphasis on universal concepts, encouraged research on more general and theoretical problems. When it came to considering the applications of their work, many were torn between a conventional commitment to regional conservation issues and the allure of research that could inform conservation efforts on a national or international scale.⁶¹ Indeed, Curtis intended for the arboretum to serve as a model for a general approach to the restoration of native vegetation. Curtis, his students, and their UW colleagues explicitly aimed to recruit additional “research collaborator[s] on the project” of restoring plant communities.⁶² He also advocated for general research on environmental restoration through national institutions, leveraging advisory and research positions with the National Science Foundation, the Atomic Energy Commission, and the National Resource Council and appealing to his fellow ecologists through the Applied Ecology committee in the ESA.⁶³

Yet despite Curtis’s hopes for general application, the restoration practices developed at UW were limited in scale. This becomes clear in comparison to earlier forms of restoration based on Clementsian succession. Reflecting the concerns of other American ecologists in the 1930s, Leopold had envisioned the earliest restorations at UW as contributing to the national recovery from the Dust Bowl. At times, Curtis similarly described prairie restoration research as a “joint project between ecology and agronomy,” justifying its practice as “an agent to stabilize and rejuvenate worn out and eroded soil.”⁶⁴

⁶¹ Bocking, *Ecologists and Environmental Politics*, 183-186. See also chapters two, four, and five of Martin, *Wild by Design*, regarding the role of applied ecology in the emergence of a national disciplinary structure.

⁶² John T. Curtis to F. W. Preston, December 1, 1957, box 4, folder Current A-Z, JCP.

⁶³ John T. Curtis, “Suggestions for Promotion of Ecology by NSF,” memorandum to ESA Applied Ecology committee, 1956, box 4, folder Current-Misc., JCP; John T. Curtis to Robert A. Darrow, March 27, 1951, box 2, folder D, JCP; John T. Curtis to E. J. Dyksterhuis, March 29, 1952, box 5, folder B.16, JCP.

⁶⁴ John T. Curtis to Bonita J. Miller, January 8, 1952, box 4, folder Other foreign countries, JCP.

By the 1950s, however, the prairie restorations at the UW arboretum had little to do with the specific environmental challenges of the Dust Bowl. The shift in how Curtis and his students conceived of plant communities—as a gradient of ecologically distinct configurations—had redefined restoration as the cultivation of local, unique groups of plants. Throughout the 1950s, Curtis used the same indicator species groups developed from species-presence survey data to guide the selection of plants for each restoration in the arboretum. Visitors to the arboretum could see these “living examples of the major types of plant communities which can be expected to survive in the climate of Madison.” Rather than addressing the problems of an acute environmental disaster, “a total of 28 plant communities”—including newly planted representations of dry lime prairie, dry prairie, mesic prairie, and wet prairie—captured the local diversity of the prairie continuum.⁶⁵

These distinct conceptions of ecological restoration also entailed entirely different techniques. Whereas earlier American ecologists viewed restoration as a natural process of succession to a climax state, Curtis’s research demonstrated that the creation of a functional prairie community resembling its native counterparts required continuous management, monitoring, and experimental study. Determining which species to include in a planting necessitated the creation of specific baselines from detailed surveys of relic prairie stands, providing “more ‘complete’ mixture[s] of prairie seeds” that ensured fidelity to local conditions.⁶⁶ Knowledge of the germination requirements of each species ensured that the resulting restorations represented all plants in the correct relative

⁶⁵ John T. Curtis, “Arboretum Plant Communities,” article in *The Arboretum News*, October 1958, box 7, folder 1, AC, 5.

⁶⁶ Grant Cottam and H. Cameron Wilson, “Community Dynamics on An Artificial Prairie,” *Ecology* 47, no. 1 (January 1966): 89.

abundance. Once planted, surveys of each restoration site at five-year intervals documented any aberrations from the desired combination of species. Ongoing experimental treatments assessed which management techniques were most useful—a process which had led to the adoption of labor-intensive burning practices.⁶⁷

Where a successional model of restoration was premised on the notion that plant communities recover of their own accord, conceiving of vegetation on a continuum required restoration practices that drew on a deep knowledge of local conditions and techniques tailored to that context. The result was a form of scientific conservation that ran counter to trends in a nationalizing American ecology. This is reflected in the institutions with which Curtis and his students preferred to work. While this occasionally included national groups like the Nature Conservancy, Curtis spurned national frameworks for conservation. They required the use of generalized criteria to make conservation decisions that ignored specific environmental context, a process that was “so subjective as to be utterly meaningless.”⁶⁸ Rather, UW researchers partnered almost exclusively with regional public agencies. They leveraged expertise of the species and ecology of the region in their work with the governments of Wisconsin, Illinois, Iowa, Minnesota, and even Ontario. This involved assisting in the identification of sites of scientific and natural value, especially those which contained rare plant associations, which agencies then acquired for protection.⁶⁹ Hoping to facilitate this process in Wisconsin, Curtis went so far as to propose, lobby for, and be appointed as the first

⁶⁷ John T. Curtis, “Arboretum Master Development Plan I - The Prairie,” March 1951, box 10, folder Prairie Garden, AC, 11.

⁶⁸ A comment directed at a proposal by Nature Conservancy Secretary George Fell for its “lack of practicality.” John T. Curtis to J. J. Hickey, February 23, box 2, folder H, JCP.

⁶⁹ John T. Curtis to Albert Fuller, July 25, 1951, box 2, folder E-F, JCP.

chairman of the State Board for the Preservation of Scientific Areas. Management responsibilities for tracts of public land in Wisconsin were often turned over to the arboretum entirely due to the expertise of UW scientists and their close relationships with the state's agencies.⁷⁰

The importance of local environmental context in this conservation work also determined the methods and pathways through which UW researchers shared their prairie restoration practices. They relied on an existing network of institutions and professionals whose work related to the management of Midwestern environments. For instance, relationships with regional public agencies provided frequent opportunities to disseminate knowledge of prairie restoration.⁷¹ In his own work, Curtis found that “more and more game managers” had come “to realize that their profession is concerned with... the control of plant succession.”⁷² He frequently consulted with agency officials throughout the region on their own prairie restorations, which were often intended to create wildlife habitat on previously cleared land. Curtis and his colleagues even consulted directly on some of these projects.⁷³ In one instance, the arboretum partnered with the Wisconsin Highway Department to establish roadside demonstration areas for prairie restoration. These projects reduced maintenance costs of roadside mowing for the Highway Department, created habitat for pheasants and other game species (whose

⁷⁰ “Arboretum Committee Meeting Minutes,” September 4, 1959, box 1, folder 1959-1965, AC.

⁷¹ Leopold initiated this process when he proposed a “system of natural areas scattered over the state” that would be guided by environmental scientists but supported by the authority of Wisconsin’s public agencies—a project for which his early prairie restorations were a proof of concept. Aldo Leopold, “A Proposal to the Wisconsin Alumni Foundation for Conservation Research at the University,” April 12, 1937, box 7, folder General-Comm, AC, 2.

⁷² John T. Curtis to E. J. Dyksterhuis, February 26, 1953, box 5, folder B.16, JCP.

⁷³ “Arboretum Committee Meeting Minutes,” October 4, 1940, box 1, folder 1940-1946, AC.

populations were diminished by mowing), and, for the arboretum, provided an opportunity to publicize their restoration practices.⁷⁴

Networks of agricultural expertise also facilitated this process. Curtis, Leopold, and other ecologists frequently collaborated with agricultural scientists and extension agents on agricultural issues in the first half of the twentieth century.⁷⁵ In the 1950s, prairie restoration revived the close ties between Midwestern ecologists and agricultural science. Leopold had long argued for the need to communicate with and recruit private landowners in conservation efforts. With relatively little public land, this was an essential consideration for meeting conservation goals in the Midwest. Based on this logic, the UW arboretum expended considerable efforts building relationships and sharing management knowledge with farmers and other landowners in the region into the 1960s and 1970s. As their work gained exposure, extension offices began connecting Curtis and his UW colleagues to landowners and managers who were interested in establishing their own prairie plantings. In some cases, this correspondence prompted arboretum staff to directly assist in restoration projects on private land.⁷⁶

This process of dissemination also relied on personal relationships among the network of plant ecologists that had developed throughout the Midwest since the late-nineteenth century. Hosting Cowles, Clements, Gleason, and other important plant ecologists, universities in Illinois, Minnesota, and Nebraska, to name a few, were central to the development of American ecology in the late-nineteenth and early-twentieth

⁷⁴ Harvey L. Becker to John T. Curtis, July 1, 1959, box 4, folder Current A-Z, JCP.

⁷⁵ For more the ties between ecology and agricultural science, see Mark D. Hersey, “‘What We Need Is a Crop Ecologist’: Ecology and Agricultural Science in Progressive-Era America,” *Agricultural History* 85, no. 3 (2011): 297–321.

⁷⁶ Examples include a letter from Duane Isely to John T. Curtis, September 7, 1956, John Curtis papers, General Correspondence, box 6, 1955-1957 Misc., University of Wisconsin-Madison Archives, Madison, Wisconsin.

centuries.⁷⁷ Tallgrass prairie had long been a key site for ecological research in the United States. As prairie restoration practices spread, plant ecologists in the region were well-equipped for the practice, with knowledge of local prairie characteristics and flora. In many cases, publications by Curtis and his students on UW prairie restorations prompted ecologists in the region to inquire about the practice. Curtis often replied with practical details and knowledge of specific plant species. Correspondence in this vein throughout the 1950s led to the establishment of prairie restorations at several universities within the historic range of tallgrass prairie, including the University of Minnesota, the University of Illinois Urbana-Champaign, and the University of Chicago.⁷⁸

Efforts to disseminate restoration practices among ecologists, state officials, and private land managers shaped the emerging profession of environmental management in the Midwest. Fueled by new organizations like the Nature Conservancy and the threat of rapid postwar suburbanization and land development in the 1950s and 1960s, the burgeoning Natural Areas movement led to increased acquisition of land parcels to serve as nature reserves for habitat preservation and research. At the same time, the growing acknowledgement of the necessity of active management to maintain proper ecological conditions created a need for a professional class of environmental managers to support the enterprise.⁷⁹ In the Midwest, where undeveloped natural areas were relatively scarce,

⁷⁷ For more on ties between ecological schools in the Midwest, see Tobey, *Saving the Prairies*, 191-192.

⁷⁸ Curtis's most popular paper on the topic was Henry C. Greene and John T. Curtis, "The Re-establishment of Prairie in the University of Wisconsin Arboretum," *Wild Flower* 29, no. 4 (May 1955): 77-88. Examples of correspondence include T. Curtis to S. Charles Kendeigh, April 12, 1955, box 34, folder Allerton Tract, S. Charles Kendeigh Papers, University of Illinois Archives, Champaign, Illinois; John T. Curtis to John Tester, April 9, 1957, box 6, folder 1955-1957 Misc., JCP or Charles E. Olmsted to John T. Curtis, February 18, 1954, box 3, folder O, JCP.

⁷⁹ For more on the developing profession of environmental management and its ties to biology, see Christopher C. Sellers. *Crabgrass Crucible: Suburban Nature and the Rise of Environmentalism in Twentieth-Century America* (Chapel Hill: University of North Carolina Press, 2012). For developing ideas about the necessity of active management, see chapter seven of Martin.

prairie restoration became the primary tool for creating, rather than protecting, natural areas. Just as Curtis and his UW colleagues had done, other practitioners and their institutions engaged local networks to bolster the regional movement around prairie restoration throughout the late 1950s and 1960s. They published papers and pamphlets, gave interviews for newspapers, and established local advisory boards for restored areas.⁸⁰ Several ecologists promoted the practice through positions as consulting scientists with local governments and public agencies.⁸¹ A growing array of individuals with and without formal training in ecology adopted the practice. Eventually, Peter Schramm of Knox College assembled this growing network of professional practitioners at the first gathering devoted to prairie restoration. In collaboration with David Archibald, UW Arboretum Manager at the time and a former student of Curtis, he convened the Symposium on Prairie and Prairie Restoration at Knox College in 1968.

Archibald and Schramm represented a new generation of ecologists who saw the science of ecology almost entirely in terms of practical application to conservation issues. For them, the formation of a regional community of prairie restoration practitioners through the Symposium was key to reconciling the limited scale of prairie restoration with their hopes that it could present a viable conservation strategy. In his keynote speech, Archibald noted that participants were drawn to the conference from around the greater Midwest—Minnesota, Iowa, Missouri, Nebraska, and Ohio—all of whom were attempting to restore local prairie communities that had largely disappeared from their respective regions. The cooperation of each with their “state and local governments,” was

⁸⁰ Paul Shepard, “Green Oaks: A Memoir,” c.1964, folder Green Oaks Articles, Paul Shepard Papers, Knox College Archives, Galesburg, Illinois (hereafter PSP), 22.

⁸¹ Including Shepard and Schramm. “Knox professor picked for nature commission,” *Register Mail*, July 28, 1976, folder Newspaper Clippings, Peter Schramm Papers, Knox College Archives, Galesburg, Illinois.

necessary to make restoration feasible on a larger scale.⁸² Though alone their efforts were limited by the localized environmental knowledge required to restore prairies, this collection of ecologists, botanists, land managers, and public officials saw as their collective goal the re-creation of the entire North American tallgrass prairie continuum.

Midwestern plant ecologists thus saw prairie restoration as a region-specific alternative to the increasingly nationalized efforts of other American ecologists, spread through a network of conservation organizations, public agencies, and personal relationships in the Midwest rather than through a national structure. At the same time, they were eager to establish the relevance of this region-specific practice to the weight and politics of the environmental era. In his remarks, Archibald warned that “man and environment [were] on a collision course” which threatened the very “survival of man”—framing the symposium in terms of larger environmentalist discourse at the time.⁸³ Where ecology was becoming a nationalized discipline divorced from local environmental context, the new field of prairie restoration ecology mirrored the regional structure and professional dynamics that characterized American ecology before the Second World War.

Though attendees spanned a range of professional backgrounds and various degrees of scientific training, the emerging profession of environmental management in the Midwest retained foundations in ecological research. The many experimental and observational studies presented by environmental scientists at the symposium reflected

⁸² David Archibald, “Keynote Address: Man-Environment Collision,” in *Proceedings of a Symposium on Prairie and Prairie Restoration*, ed. Peter Schramm (Galesburg: Knox College Biological Field Station, 1970), 12.

⁸³ David Archibald, “Keynote Address,” 7. For more on this rhetoric of human survival in 1960s American environmentalism see Finis Dunaway, *Seeing Green: The Use and Abuse of American Environmental Images* (Chicago: University of Chicago Press, 2015), 68-78.

the community's embrace of experimental study as a means of refining their practices. Among these were investigations of the effect that soil characteristics, fire, and various transplanting and seeding techniques had on restored prairies.⁸⁴ Indeed, histories of ecological restoration have emphasized the role of a general ecological perspective and ecologists themselves in the development of restoration practices in the United States.⁸⁵ Yet the conference shows that specific ecological concepts, like a continuous definition of plant communities, shaped the basic logic of environmental management in the Midwest. Several papers presented results of unintended experiments in successional restoration—sites that had been abandoned in the prior decades and subsequently monitored.⁸⁶ In comparison to the finely tuned restoration practices that had grown popular over the preceding two decades, the consensus was that natural succession did not yield prairies that sufficiently resembled local conditions. Instead, studies of the most successful restorations emphasized measures taken to tailor practices to local conditions.⁸⁷

In the Midwest, the adoption of the continuum concept itself contributed to a transition in thinking about restoration as a successional process to one of active management. In the early 1950s, ecologist Paul Shepard convinced Knox College, later the venue for the 1968 prairie restoration symposium, to acquire a 760-acre site to serve

⁸⁴ See studies by Clair Kucera, M. Rebecca Anderson and Grant Cottam, and Sandra Vocolka, in *Proceedings of a Symposium on Prairie and Prairie Restoration*.

⁸⁵ See, for example, Jordan and Lubick, *Making Nature Whole*, 107-119, Stephanie Mills, *In Service of the Wild: Restoring and Reinhabiting Damaged Land* (Boston: Beacon Press, 1995), 92-108, or Anderson, "History and Progress of Ecological Restoration in Tallgrass Prairie," 217-222.

⁸⁶ Studies include those of Robert Bullington and R.E. Wilson in *Proceedings of a Symposium on Prairie and Prairie Restoration*.

⁸⁷ Several papers presented at the conference emphasize plantings based on local conditions, including those by Arthur Ode, Marilyn Bland, Jim Wilson, and Paul Kilburn, as well as the piece by R.Q. Landers, Paul Christiansen, and Terry Heiner, in *Proceedings of a Symposium on Prairie and Prairie Restoration*.

as a “regional nature center.”⁸⁸ He initially hoped to establish a “wilderness preserve,” which, when removed from active use, would “turn all the land back to natural growth”—a form of restoration based on climax succession.⁸⁹ This changed when Shepard visited the UW prairie restorations. He returned several times over the next few years to discuss technique with Curtis and his team. The experience impressed upon Shepard the importance of using local seed sources to replicate the characteristics of prairies “found in [that] part of Illinois.”⁹⁰ He reluctantly accepted seeds offered by UW arboretum staff, noting that “taxonomically it may have been a mistake to use the Wisconsin material, but we needed prairie vegetation to signal our beginning, even at the cost of biogeographical errors.”⁹¹ He later began collecting seeds from local relic plant populations to fill out his supply, finding viable sources along railroads and in cemeteries around the county.⁹²

This shift in ecological concepts of plant community structure also shaped the practices of conservation professionals with little formal training in ecology. For example, in 1957, Raymond Schulenberg, the native plant curator at the Morton Arboretum in Lisle, Illinois, wrote to Curtis regarding his prairie planting methods. Schulenberg hoped to extend a small, existing prairie at the Morton Arboretum onto some unused adjacent land. However, the curator disagreed with the approach, insisting that “the best use of the land was... to let it revert to a wild condition... through secondary succession.”⁹³ Schulenberg used one of Curtis’s articles on prairie restoration to convince

⁸⁸ Paul Shepard, “Green Oaks.”

⁸⁹ Shepard, “Green Oaks,” 9.

⁹⁰ Shepard, “The Knox College Field Study Area,” n.d., box 1, folder 1950-1965, Green Oaks Collection, Knox College Archives, Galesburg, Illinois (hereafter GOC).

⁹¹ Shepard, “Green Oaks,” 9.

⁹² Ibid.

⁹³ Craig B. Johnson and Marcia Rosenthal, “Prairies at the Morton Arboretum,” manuscript, March 1990, folder 4, Raymond Schulenberg Papers, Morton Arboretum Archives, Lisle, Illinois (hereafter RSP), 4.

the curator that they should “deliberately direct the succession by using horticultural and agronomic methods.”⁹⁴ Schulenberg visited the UW arboretum in 1961 to discuss the procedure with arboretum staff. Upon his return, he attempted “to find as many seeds as possible in the Chicago area,” though “where species in that area were extinct, or nearly so” he would “search for them in nearby counties.”⁹⁵ He later explained that one “can’t go too far; he should find [seeds] near the same latitude in which he intends to plant them.” He was even wary of plants that “though belonging to species native to Chicago” might have “adapted to a new environment” elsewhere.⁹⁶

Even as conceptual shifts in ecology shaped professional environmental management in the Midwest, the practice revived and reshaped the science of plant ecology in the region. Some ecologists had attempted to curb the collapse of the regional community of grasslands ecology in the midcentury, including organizations like Victor Shelford’s Grasslands Research Foundation. But where those efforts “didn’t amount to much,” popular and scientific interest in prairie restoration offered a means of sustaining plant ecological research in the region and the network of ecologists that supported it.⁹⁷ The plant ecology school at UW, for example, only emerged in the 1950s—after the Dust Bowl decline of grasslands ecology. Curtis had taken on dozens of students, many of whom became co-authors on a vast body of research in prairie and basic ecology. As one colleague described plant ecology at UW in the late 1950s, “perhaps for the first time

⁹⁴ Ibid.

⁹⁵ “25 acres of historical grassland,” in *The Morton Spout*, May 1963, folder 1, RSP, 5.

⁹⁶ Ibid. Focusing on the development of ecosystem science in the midcentury, Martin similarly stresses the role of declining confidence in Clementsian succession as a factor in the emergence of restoration and more active forms of environmental management. See especially chapter five and, on the development of the Nature Conservancy, pages 172-9.

⁹⁷ Interview of Victor Shelford, March 24, 1956, box 3, Victor E. Shelford papers, University of Illinois Archives, Champaign, Illinois, 29:05.

since at the turn of the century when dynamic ecology burst on the consciousness of students under the leadership of Clements and Cowles, American ecology again has a school.”⁹⁸

Perhaps even more consequential for the revival of Midwestern ecology, new techniques in prairie restoration revolutionized ecological field research in the region. Since the late-nineteenth century, observational studies had been the primary empirical tool of American ecologists. Surveys of plant communities allowed them to characterize and compare plant community structure and composition. While experimental designs with treatment and control groups had become common in lab biology by the time, American ecologists only began to see the possibility of manipulating environments for experimental field study in the 1930s as they adopted similar techniques from agricultural researchers. Many of these early studies involved the use of intact relic plots as controls, which plant ecologists compared to planted sites. In the Midwest, these provided the methodology for Shelford and Braun’s “check areas” that were intended to monitor the progress of succession in the aftermath of the Dust Bowl.⁹⁹

On one hand, prairie restoration offered new opportunities for observational study. As Curtis’s insights at the UW arboretum demonstrate, it provided a window into plant succession on a small, easily monitored scale. But prairie restoration techniques also allowed Curtis and his students to introduce experimental methods into the study of plant community structure. Curtis himself had considerable experience with experimental methods in the lab from his training as an orchid physiologist. As he transitioned into

⁹⁸ Stanley A. Cain, Review of *The Vegetation of Wisconsin*, 1960, John Curtis papers, John T. Curtis biographical file, folder 1, University of Wisconsin Madison-Archives, Madison, Wisconsin.

⁹⁹ Martin, 54-58.

prairie ecology, early experimental studies at the UW arboretum mirrored the methodology of Shelford's check areas by comparing restored prairies to intact relic sites. Similarly, these studies were intended to assess the quality of restoration with reference to intact prairie remnants. However, studies at the UW arboretum in the 1950s pioneered new experimental designs. As in their studies of dominant grasses, prairies could be restored with specific combinations of species, excluding certain plants or even entire functional groups to assess their role in the function of the plant community or autecological characteristics when compared to standard prairie restorations. Using this technique, prairies could be restored in countless combinations and compared to control restorations to study a range of general ecological dynamics.

As other ecologists in the region undertook their own restorations, the practice reinvigorated Midwestern plant ecology and transformed it into a modern experimental science. Sites like Green Oaks at Knox College hosted new biological research stations that elevated the stature of otherwise small biology programs. The practice sustained other, more established schools. This included the University of Illinois, where, in consultation with Leopold and Curtis, Shelford and biologist S. Charles Kendeigh established several prairie restorations for experimental research.¹⁰⁰ In more recent decades, the prospect of long-term research in restored sites has made the tallgrass prairie biome a center for biodiversity and climate science as well as plant ecology. For example, the University of Minnesota's Cedar Creek Ecosystem Science Reserve houses restored prairies with dozens of combinations of species. Since its designation as an NSF Long

¹⁰⁰ Leopold to Victor Shelford, June 8, 1943, S. Charles Kendeigh Papers, box 32, Trelease Grass Tract, University of Illinois Archives, Champaign, Illinois. Curtis to S. Charles Kendeigh, April 12, 1955, S. Charles Kendeigh Papers, box 34, Allerton Tract, University of Illinois Archives, Champaign, Illinois.

Term Ecological Research site in 1982, studies of these patches have provided key evidence of the importance of species richness in plant community biomass productivity.¹⁰¹

Restoration Ecology and the Settler Imagination

As prairie restoration sites took on empirical significance, they also became symbols of Midwestern identity. For many practitioners, prairie restoration was an exercise in reversing a seemingly simple narrative of decline—one which began with the colonization of the region, progressed to the subsequent destruction of the prairies, and ended with a novel approach that could repair that damage. In addition to its conservation benefits, Curtis clearly saw the restoration of a continuum of plant communities as an exercise in historical preservation. He was fascinated by the details of the process by which European settlement had altered grasslands in the region, a topic on which he presented at the influential 1955 “Man’s Role in Changing the Face of the Earth” conference at Princeton University.¹⁰² He worked with the Wisconsin Historical Society (WHS) to develop exhibits on the state’s natural history, contributing his knowledge of the pre-colonial environmental conditions of the state. Beyond an ecological treatise, the *Vegetation of Wisconsin* documented the history of the state’s vegetation following significant losses over the preceding century. To this end, Curtis drew on countless historical records from the archives of the WHS and those of public agencies, universities, and local governments across the state. In fact, demonstrating the existence

¹⁰¹ A.C. Hodson, “History of the Cedar Creek Natural History Area,” *University of Minnesota Field Biology Program Occasional Papers* No. 2 (June 1985).

¹⁰² John T. Curtis, “The Modification of Mid-Latitude Grasslands by Man” in *Man’s Role in Changing the Face of the Earth*, ed. William L. Thomas, 721-736 (Chicago: University of Chicago Press, 1955).

of and characterizing a plant community continuum across the state could only be accomplished with pre-development records. The restorations at the UW arboretum served as “an outdoor demonstration” of the state’s vegetation and the physical culmination of this historical research.¹⁰³ Taken together, the array of vegetative “sub-stations” throughout the arboretum offered a historic snapshot of the prairie-forest border region as it was in the pre-colonial period.¹⁰⁴ Both Curtis’s ecology and restoration work had a fundamentally historical perspective.

Other Midwestern ecologists shared this view. Though Paul Shepard was hired by Knox College as a plant ecologist, he later became an early practitioner of human ecology, focusing on “the study of cultural factors in the modification of natural ecosystems.”¹⁰⁵ Shortly after establishing the Green Oaks restorations, he left Knox to focus on this work, resulting in his 1967 *Man in the Landscape: A Historic View of the Esthetics of Nature*. In this and other works, Shepard argued that the human genome had not evolved beyond the phase of hunter-gatherer civilizations. The subsequent advent of agriculture made environmental decline inevitable—a claim he linked to the destruction of the tallgrass prairie.¹⁰⁶ Foreshadowing this scholarship, Shepard intended for the regional “natural history park” he developed at Green Oaks in the 1950s to demonstrate the dramatic change that “man” had brought to the region.¹⁰⁷ Schramm continued this

¹⁰³ John T. Curtis, “The University of Wisconsin Arboretum,” pamphlet, January 1949, box 1, folder Minutes 49-58, AC, 1.

¹⁰⁴ John T. Curtis, “Proposed Scope of Future Botanical Research in the University of Wisconsin Arboretum,” article in *The Arboretum News*, Jan 3, 1946, box 1, folder 1944-1948, AC, 2.

¹⁰⁵ Blair Stewart, “Central American Faculty Fellowships,” memorandum, June 7, 1962, folder General and Photos, PSP.

¹⁰⁶ Paul Shepard, *Man in the Landscape: A Historic View of the Esthetics of Nature* (Athens: University of Georgia Press, 1967).

¹⁰⁷ “News from Knox College,” faculty newsletter, September 28, 1961, folder General and Photos, PSP.

work, framing Green Oaks as an asset for the Midwest Studies Center he helped establish at the school.¹⁰⁸

Other environmental managers who relied on plant ecological research were drawn to this project of historical preservation. Ray Schulenberg, too, was “strongly concerned about the retreat and extermination of the various types of prairie communities.”¹⁰⁹ After finishing an undergraduate degree in history, he worked at the State Historical Society of North Dakota. Three years later, he returned to Iowa State University to complete a second BA in horticulture. He saw his appointment as native plant curator for the Morton Arboretum as combining both interests.¹¹⁰ As he visited arboreta across Europe and North America in search of models for his native plant displays, he was impressed by the “regional fidelity” some European arboreta had managed to cultivate.¹¹¹ He replicated the approach in re-creating a historic Chicago prairie in the Morton Arboretum, composed of over one hundred species native to the area, that allowed visitors to experience local vegetational history.¹¹²

Closely aligned with their conservation goals, the historical interests of Midwestern ecologists contributed to the revival of plant ecology in the region in the mid-twentieth century. Yet the historical conditions that these practitioners hoped to reproduce were based on a reductive view of environmental change in the region. Their vision of history mirrored that of many American wilderness advocates at the time, who emphasized the importance of preserving pre-Columbian conditions in North America

¹⁰⁸ “Midwest Studies at Knox,” program brochure, c. 1965, folder Newspaper Clippings, Peter Schramm Papers, Knox College Archives, Galesburg, Illinois.

¹⁰⁹ Raymond Schulenberg to John T. Curtis, December 27, 1955, box 3, folder R, JCP.

¹¹⁰ “Introductory notes on Ray Schulenberg,” February 1979, folder 2, RSP.

¹¹¹ Raymond Schulenberg to A.W.G. Meyer, December 7, 1971, folder 1, RSP.

¹¹² “25 acres of historical grassland,” 5.

because they were more “pure” or “undisturbed” than areas that were visibly changed by European colonization.¹¹³ This view disregarded millennia of land management practices across the continent. At the time of first contact with French explorers, the Ho-Chunk occupied the area now known as Madison. Other Indigenous peoples in the tallgrass prairie region included communities of the Illinois language group to the southeast, the Lakota and Dakota to the west, and Caddoan-speaking communities to the southwest.¹¹⁴ Indigenous peoples throughout the region regularly burned sections of the prairie to maintain and expand grazing pastures for bison. This practice shaped the tallgrass prairie and its border with the forests of the Great Lakes region—the defining ecological feature of the Madison region that had perplexed UW plant ecologists.¹¹⁵

Practitioners of prairie restoration tacitly reinforced this reductive historical narrative in several ways. This included the development of historical baselines that ignored evidence of Indigenous management practices in favor of more recent and dramatic environmental change. In planning the restorations at Green Oaks, Shepard compiled a history of land use at the site from archival, oral, and archaeological sources. He conducted extensive interviews with “old-timers” living in the area, consulted any court records and newspapers he could find, and even used field evidence to “reconstruct much of the land history,” observing the “forest, field layout, old fence rows and lanes, sedimentation and erosion.” In one instance, he interpreted traces of “relict cowpaths” in the site’s woodlands as an indication that they had been cleared in the 1850s.¹¹⁶ At the same time, Shepard’s research into the history of the site also led to the discovery of a

¹¹³ See Spence, *Dispossessing the Wilderness*.

¹¹⁴ Morrissey, *People of the Ecotone*, 14.

¹¹⁵ Morrissey, *People of the Ecotone*, 57-59.

¹¹⁶ Shepard, “Green Oaks,” 7.

“concentration of flint chips and arrowheads.”¹¹⁷ Yet he disregarded any relation this might have had to the history of the land. Rather, restoration efforts were supported by the ongoing “reconstruction from historical and field data of the vegetation preceding the advent of white man” and study of “the changes in plant associations brought about through clearing and land use” by those settlers.¹¹⁸ He estimated that the “reconstructed history which this [evidence] made possible projected the probable stages in land use back to the 18th century,” at which point the area existed in its state of “native biological richness.”¹¹⁹ Informed by a precise idea of restoration that hinged on detailed knowledge of species composition, the gaze with which Shepard considered historical change was both too myopic and temporally limited for him to consider the longer term shifts in the landscape that characterized the region. In his view, any detectable change must have been the product of settler land use. His selective use of evidence to develop a baseline for restoration collapsed the land management practices of earlier Indigenous communities into the natural, rather than human, history of the area.

Shepard’s historical assessment of the Green Oaks site prefigures what later became known as the historical fidelity model of ecological restoration. But in Green oaks, this reductive baseline informed the creation of a site which actively reinforced a whitewashed Midwestern identity. The re-created prairies emulated a static baseline of “virgin prairie” left “untouched by human hands.”¹²⁰ However, they were only one element of a “200-year projection” into the cultural history of the site, which “offered an

¹¹⁷ Ibid.

¹¹⁸ Paul Shepard, “Research Projects for Green Oaks,” c. 1960, folder Articles, PSP.

¹¹⁹ Shepard, “Green Oaks,” 12.

¹²⁰ “Midwest Studies at Knox.”

extraordinary focal point for class and visitor study.”¹²¹ Based on records of settler residence in the area, a log house in the “authentic pioneer family unit” style complemented the “historical importance” of the restoration work, while also providing a “museum and classroom” for Knox College professors in the Midwest studies program to teach about the region’s history and ecology.¹²² The “rustic and primitive” style of the buildings and signage enhanced this historic immersion.¹²³ The combination of pristine prairie and historical elements from the settlement period constituted the kind of “undisturbed area” that was necessary for “a liberal education.”¹²⁴ The site neglected the long history of Indigenous peoples and their land use practices in the region, instead presenting the pioneer age as the beginning of Midwestern history.

Unlike Shepard, Curtis acknowledged the role of Indigenous peoples in shaping the landscape of the region. In fact, he suspected that “the major influence shaping our vegetation was the treatment accorded to it by early Indians.” He even argued that the environmental consequences of colonization in the area “were set into motion at least 200 years” before the arrival of settlers by “the displacement of preexisting Indian tribes.”¹²⁵ Yet the methods he employed in constructing his own baselines still reinforced the same problematic narratives as Shepard and other wilderness advocates. Due to his reliance on a mathematically derived indicator of community composition, the “reconstruction” of plant communities “from historical records” required data of the highest quality. Any sources “would need to be quantitative, not merely qualitative.” He found “the records of

¹²¹ Shepard, “Green Oaks,” 12.

¹²² “Green Oaks and Knox College: A Look at the Future,” research proposal, March 1956, box 3, GOC, 8.

¹²³ Shepard, “Green Oaks,” 19.

¹²⁴ Paul Shepard, “The Natural Encounter,” 1962, Articles, PSP, 6.

¹²⁵ John T. Curtis, “Review of Postglacial Vegetation Change in Wisconsin,” editorial review, February 11, 1957, box 6, folder 1955-1957 Misc., JCP.

the Government Land Survey satisf[ied] this requirement,” offering “great promise” for the reconstruction of native plant communities.¹²⁶ His work on the *Vegetation of Wisconsin* and restorations in the UW arboretum drew extensively on land surveys from the early-nineteenth century—themselves a tool for the dispossession of Indigenous lands as they paved the way for settlement in the region. The fact that the earliest of these came from 1785 presented only a minor technical quirk, considering the value they offered for the development of historically precise restorations. Despite his own knowledge of the long human history of the land, Curtis relied on baselines that disregarded the existence pre-colonial Indigenous land management.

By inscribing a reductive baseline into the physical landscape, prairie restorations created by Curtis, Shepard, and their colleagues reinforced a settler-colonial process of erasing Indigenous peoples from North American history. Popular discourse on prairie restoration demonstrates that white Midwesterners viewed the practice as a way to connect with their settler heritage. James Buss observes that, in the Midwest, local vernacular histories have provided a means of establishing belonging and ownership of land following the domination and relocation of Indigenous residents. The reproduction of stories and myths that trace back to the settlement period bolster settlers’ implicit claims to belonging on the land.¹²⁷ In discussing restored sites, newspapers often reiterated the notion that the human history of the land began with colonization. Green Oaks was hailed by headlines like “Original Illinois Prairie Lives Again on Knox College

¹²⁶ John T. Curtis, “The reconstruction of forest communities from historical records,” speech, December 30, 1950, box 10, folder Misc. Speeches, JCP.

¹²⁷ James Joseph Buss, “Appealing to the Great Spirit: Foundational Fictions and Setter Histories in Middletown America,” *Middle West Review* 2, no. 2 (Spring 2016): 143-167.

Campus,” and “A Visit to the Kind of Prairies the Pioneers Found.”¹²⁸ One magazine described a contemporaneous restoration project as re-creating a “virgin Illinois landscape” not yet desecrated by “the hand of man,” providing “a link to the settlers” for those who saw it.¹²⁹ Some portrayed Indigenous peoples as part of this static natural state, a time “when the Red Men lived on the plains of America... natural prairie plants, trees and swamp growth covered virgin soil.”¹³⁰ These nostalgic narratives reinforced the notion that an “original,” “untouched” or “virgin” prairie existed—an imagined landscape that provided the setting for larger settler-colonial narratives of Midwestern history. As in the restoration of the cottage in Green Oaks, re-creating specific local histories as part of restoration projects went even further in emphasizing the historical precedence and roots of settler society. In the mid-twentieth century, prairie restoration served as a form of mythmaking that justified settler belonging in the Midwest.

Closely tied to their conservation aims, an analogous interest in the historical landscapes of the Midwest drove the work of Curtis, Shepard, and other ecologists. For these individuals, ecological research was a historical exercise. Understanding the natural composition of plant communities—for Curtis, a continuum that only existed in its entirety in the past—meant uncovering their pre-colonial conditions. But this view also undermined the continuum concept. By the time of his death in 1961, Curtis had fully disavowed the existence of plant associations at any scale in favor of Gleason’s

¹²⁸ John Warden, “Original Illinois Prairie Lives Again on Knox College Campus,” *Moline Dispatch*, October 20, 1958, folder Newspaper Clippings, PSP; Leonard Hall, “A Visit to the Kind of Prairies the Pioneers Found,” *Possum Trot*, 1959, box 1, folder 1, GOC.

¹²⁹ “Wild Illinois,” *Field Museum Bulletin*, April 1972, box O, folder 6, Publications by those Associated with NEIU, Northeastern Illinois University Archives, Chicago, Illinois, 3.

¹³⁰ Vera Kinter, “Botanist Recommends Preservation of Mitchell County Virgin Prairie,” *The Mitchell County Press-News*, December 14, 1947, box 1, folder 3, Paul Christiansen Papers, Cornell College Archives, Mount Vernon, Iowa.

individualistic hypothesis. This entailed a view of plants evolving and migrating constantly. Indeed, the mechanism of natural selection was what allowed Curtis to distinguish himself from Clements—one of his most closely held biological beliefs. Based on this framework, groupings of plants in the community continuum would be ephemeral—shifting in time as well as space across the landscape. But restoring prairies to rigid historical baselines required viewing plant communities as static and unchanging—an idea more in line with the environmental determinism of Clementsian ecology than Gleason’s dynamic theory. Defining the plant community as a collection of individual species, rather than an entity that naturally recovered from disturbance, necessitated the creation and use of precise historical baselines to create an ecologically appropriate prairie planting. But a view of the pre-colonial state of the land as its natural condition—borrowed from the settler-cultural milieu of the Midwest—was so deeply engrained as to conflict with Curtis’s basic belief in evolution.

Historian of science Robert Kohler’s concept of a “residential science” helps explain how a colonial perspective could so deeply pervade Midwestern plant ecology in the mid-twentieth century. Kohler argues that, by conducting long-term field research centered on a single location, scientists generate a deep knowledge of place that draws on local environmental knowledge and folk beliefs, narratives, and traditions. This can shape both universal, “cosmopolitan” theories and concepts as well as perceptions of the land and its history. Kohler notes that, in some cases, theories based on such research are themselves residential, in that they emphasize the spatial organization of species or, as in

the case of Leopold's land ethic or Shepard's views on human ecology, seek to explain or prescribe forms of human residence on the land.¹³¹

Midwestern plant ecology in the second half of the twentieth century was defined by this residential mode. A deep knowledge of prairie plant biology developed over a lifetime in Wisconsin shaped Curtis's research on tallgrass prairie. The familiarity of those environments molded his continuum concept to the characteristics of prairie. This residential character only intensified as restored prairie research sites facilitated an experimental turn among plant ecologists and prairies began to provide the grounds for addressing a greater range of ecological questions. For Curtis and his colleagues, the residential nature of their work also subtly shaped their vision of plant ecology as a tool for recovering an imagined Midwestern past. By reproducing that vision of the past through prairie restoration, they reinforced colonial cultural narratives that erased the history of the region's Indigenous inhabitants. Even their historical conception of prairie ecology was residential, in that it tacitly supported the mythmaking processes that justify settler belonging in the Midwest.

Capable of wielding political authority in their capacity as scientific experts, ecologists' internalized settler-colonial attitudes could also directly contribute to the ongoing dispossession of Indigenous lands. For example, in 1954, Curtis took up a campaign against a bill that would have returned the Menominee Indian Reservation to its inhabitants because, "according to expert opinion," it "would lead to the total dismemberment and eventual destruction of the Menominee forest."¹³² The forest was

¹³¹ Robert E. Kohler, "Paul Errington, Aldo Leopold, and Wildlife Ecology: Residential Science," *Historical Studies in the Natural Sciences* 41, no. 2 (2011): 216–54.

¹³² John T. Curtis to Albert Fuller, February 24, 1954, box 2, folder E-F, JCP.

one of the “most successful in the state” and “served as a valuable model as to what [could] and should be done in modern forestry.” As chairman of the State Board for the Preservation of Scientific Areas, he took it upon himself to oppose the transfer. When the state took no action, he went so far as to write to Senator Joseph McCarthy—notorious progenitor of the Blacklists of the 1950s—to request that he reverse his position for the sake of “the scientific benefits of conservation in Wisconsin.”¹³³ His pleas fed a turning tide in federal Native American policy. Three months later, Congress passed the Menominee Termination Act, ending federal recognition of the Wisconsin Menominee Tribe until the 1970s.¹³⁴

Cultural narratives regarding the decline and potential recovery of the Midwestern environment served as a central motivation for the emergence of a widespread practice of prairie restoration, but they also contributed to ongoing processes of Indigenous erasure in the region. Of course, practitioners of prairie restoration were not the only conservation professionals using a pre-colonial baseline to restore native plants or wildlife at the time. In the United States, the tendency emerged simultaneously among several conservation organizations alongside the professionalization of natural areas management in the second half of the twentieth century. Martin notes that, among different organizations, this process was variously driven by ecological justifications as well as aesthetic ones (as in Green Oaks), which allowed visitors to restoration sites to “imagine themselves as white settlers.” As the historical fidelity model emerged in the 1980s, “the cultural goal of settler fantasy was sublimated into the technical goal of

¹³³ John T. Curtis to Joseph McCarthy, February 26, 1954, box 2, folder M, JCP.

¹³⁴ Winona LaDuke, *All Our Relations: Native Struggles for Land and Life* (Chicago: Haymarket Books, 2016), 128. Termination policies in the Midwest are explored in more depth in chapter three of this thesis.

returning ecosystems to a ‘wild’ or ‘natural’ state.”¹³⁵ The work of plant ecologists like Curtis and Shepard demonstrate that, for the residential ecologist in the Midwest, such aesthetic and scientific justifications for a historical fidelity model of restoration blended to a point at which they were impossible to distinguish. In this form, the historical fidelity model was not simply an unfortunate technical challenge for restoration methodology, as it is now widely regarded by restoration ecologists. Fixation on pre-colonial plant communities as a restoration baseline actively contributed to settler-colonial processes of Indigenous dispossession.

Early prairie restoration practitioners also bear noting because of the outsized role they played in shaping the ecological restoration framework as it gained global popularity at the end of the twentieth century. As it continued on a biennial basis, the Symposium on Prairie and Prairie Restoration enabled the creation of the Society for Ecological Restoration (SER) at UW in the 1980s. The SER’s founder William R. Jordan was himself a protégé of Archibald and a UW arboretum employee during the preceding decade. Now the largest professional organization for restoration ecologists internationally, the SER adopted the restoration of “historic ecosystems” as its mission in the early 1990s—codifying the problematic historical fidelity model.¹³⁶ It only changed this definition two decades ago as restoration ecologists confronted the fact that constructing static historical baselines flattens the dynamic realities and human dimensions of environmental history. The development of the technical framing of the

¹³⁵ Martin, 183. See chapter seven of *Wild by Design*.

¹³⁶ For more on this problem of historicity and the SER’s shifting definitions of ecological restoration, see Eric Higgs, *Nature by Design: People, Natural Process, and Ecological Restoration* (Cambridge: The MIT Press, 2003), 107-111. For more on the creation of the SER, see Martin, *Wild by Design*, 192-193.

historical fidelity model in the 1980s built on a tradition of Midwestern prairie restoration that melded colonial and ecological rationales for the practice.

Conclusion

Though he did not live to see the 1968 Symposium, Curtis's ideas fueled the development of the modern practice of prairie restoration, while also contributing to the adoption of the problematic historical fidelity model of ecological restoration. In its tacit reliance on Curtis's new definition of the plant community, the spread of prairie restoration practices facilitated the dissolution of climax succession as a basis for environmental management, instead entailing the use of empirically tested methods, local flora, and deliberate disturbance to effectively reproduce natural conditions. Perhaps most significantly, his research on and promotion of prairie restoration provided the empirical grounds and conservation techniques that fueled the revival of Midwestern plant ecology in the second half of the twentieth century. At the same time, his historical view of plant ecology and prairie restoration tacitly perpetuated some of the settler-colonial processes that lurk at the heart of Midwestern history.

The development of prairie restoration in the Midwest also provides insight into the larger relationship between the science of ecology and the land management practices it informs. Even as American ecologists like Curtis turned their attention towards the production of ostensibly universal concepts, the novel ecological theory created through field research at the UW arboretum was shaped by local environmental context and conservation goals. This ecological idea, in turn, influenced the development of new management practices on a tacit level. The seemingly esoteric debate over concepts of

plant community structure among a small group of American plant ecologists was reflected in two distinct forms of ecological restoration. The transition from a model of restoration by succession to site-specific prairie restoration also entailed the formation of a new community of practitioners. The exact path by which the practice spread demonstrates that the influence of scientific expertise in conservation is exerted through a complex network of personal and professional relationships as well as mechanisms intended to facilitate the transfer of environmental-scientific knowledge.

In this case, this network relied on existing intellectual, institutional, and political structures characteristic to the American Midwest—features that might have been imperceptible with a broader geographic framework. These institutions and networks centered around the management of Midwestern environments, and a shared knowledge of tallgrass prairie provided the foundations for the growth of the practice. The prairie's own history—or at least a reductive version of it—also contributed to the development of prairie restoration ecology, as well as the problematic framework with which its practitioners still grapple today. The distinctively Midwestern factors that contributed to and shaped midcentury prairie restoration ecology demonstrate that the histories of ecology and conservation in the United States—and their roles in American settler colonialism—can only be fully understood with the insight afforded by regional studies.

CHAPTER TWO

Restoration and the Public Good

Unlike most who petitioned the Iowa Conservation Commission (ICC), Robert Leonard testified at the public agency's monthly meetings numerous times. He attended his first meeting in October 1976 to air his frustrations over the state of the "hunter-farmer relationship" in Iowa, alleging that the ICC's failure to enforce their own hunting regulations harmed farmers like himself.¹ Over the next decade, Leonard became a fixture of Commission meetings, weaving increasingly complex conspiracies about the ways that the agency favored hunters over other citizens of the state. In 1981, under the alias of his organization, Concerned Citizens to Investigate Conservation Commission Policies, he took to the *Des Moines Register* to accuse the ICC of having "two sets of rules: one for itself and its 'friends' and another for the public."² It was easy for the commissioners to write Leonard off as a lone provocateur as he became increasingly belligerent over these years. But as he continued to make himself a nuisance, a growing number of Iowans began to echo his central contention. This collection of environmentalists, homeowners, and farmers felt that, as the agency responsible for "preserving Iowa's natural heritage," the ICC had failed to live up to its mission.³ Over the preceding four decades, the agency had made the restoration of Iowa's wildlife habitats its primary goal. But where prairie restoration efforts in the region had been

¹ Minutes of the Iowa Conservation Commission Meeting on October 5, 1976, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, Records of the Iowa Conservation Commission (RG022), State Archives of Iowa, Des Moines, Iowa (hereafter RICC), 129.

² "Attention, Iowa Citizens: Regarding the Conservation Commission," April 21, 1981, 10A, *Des Moines Register*, Historical Newspapers, Des Moines Public Library, Des Moines, Iowa (hereafter HN).

³ "Iowa Conservationist" February 1942, *Iowa Conservationist*, Vol. 1, No. 1, Books and Periodicals Collection, Des Moines Historical Library, Des Moines, Iowa (hereafter BPC).

driven by ecological ideas, the ICC's practices were intended to maximize the availability of game species for the state's growing population of sport hunters. In the final decades of the century, as environmental and political interests grew more varied in the state, critics like Leonard pushed the agency towards a more ecologically sophisticated and collaborative form of ecological restoration that served the environmental needs of a greater number of Iowans.

The ICC's twentieth-century restoration policies applied to only a small portion of the country, but their development provides insight into larger dynamics in the history of US conservation policy. Environmental historians have often viewed public conservation efforts in the United States from a national perspective. Some studies have focused on landmark policies like the New Deal, the Endangered Species Act (ESA), and the National Environmental Protection Act (NEPA) and the federal agencies created to enforce them. Others have shown that the on-the-ground conservation efforts that this national framework supports have been shaped by local contexts and actors. The work of scholars like Robert Wilson, Keith Woodhouse, Nancy Langston, Nathan Sayre, Joshua Blu Buhs, and Peter Alagona demonstrate the ways that such local environmental, political, and cultural characteristics have influenced the conservation efforts of federal agencies like the FWS, the USDA, and the Bureau of Land Management (BLM).⁴ Most studies in the latter vein have taken a regional view of conservation policy, focusing on

⁴ For examples of works that focus on national environmental policy, see Martin, *Wild by Design* or Neil M. Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement*. (Oxford: Oxford University Press, 2008). Studies focusing on federal conservation efforts in specific regions includes Wilson, *Seeking Refuge*; Keith Makoto Woodhouse, "Regulating Off-Road: The California Desert and Collaborative Environmentalism," *Modern American History* 2, no. 3 (2019): 321–43; Langston, *Climate Ghosts*; Sayre, *The Politics of Scale*; Joshua Blu Buhs, *The Fire Ant Wars: Nature, Science, and Public Policy in Twentieth-Century America* (Chicago: University of Chicago Press, 2004); Peter S. Alagona, *After the Grizzly: Endangered Species and the Politics of Place in California* (Berkeley: University of California Press, 2013).

environmentally significant areas like the Pacific Flyway, the Great Plains, or the Great Lakes basin.⁵

Yet state conservation policy remains an understudied aspect of conservation in the United States. Much of the work of environmental and public land management in the country has been legislated at the state level and conducted by state agencies. But studies of specific states can also provide insight into larger environmental and political dynamics. In crafting policy, state governments are often more attuned to the needs of local constituencies and specific environmental contexts than their federal counterparts. While the environmental policies of states are tailored to these local conditions, they are shaped by federal oversight and regional, federal, and international management frameworks. As a unit of analysis, then, viewing conservation policy from the level of the state retains an important emphasis on the distinct contexts of different environmental regions within the United States while also providing insight into the interaction of several political scales. Indeed, a close examination of the evolution of the ICC and its policies over the twentieth century begins to demonstrate some of the challenges and particularities of conservation policymaking on the state level. Like the ideas of the region's plant ecologists, the ICC's efforts to restore the habitats of the Midwest were shaped by the characteristics of the region's environments and the requirements of individual species of concern. But as the influence of individuals like Robert Leonard reveals, ecological restoration in Iowa was also molded by the culture and political economy of one of the world's most heavily farmed regions. At the same time, the ICC was forced to navigate larger political systems, including regional bodies like the

⁵ In the work of Wilson, Sayre, and Langston, respectively.

Mississippi Flyway Council, laws, and public agencies responsible for conservation on a national scale, and even international treaties. These interacting forces begin to demonstrate how intersecting political scales and local contexts shaped state conservation efforts in the twentieth century.

Shifts in the ICC's restoration policies also reflected the emergence of a new set of frameworks for environmental management in the final decades of the twentieth century. Perhaps the most widespread of these was the concept of ecosystem management—an approach that aims to regulate ecosystem processes and functions rather than populations of individual species. Scientific ideas like the ecosystem concept itself played a central role in this framework. At the same time, where earlier resource management policies usually catered to sport hunting interests and economically important resources, agencies intended for ecosystem management to meet public demand for multi-species conservation and a greater variety of environmental amenities. On a national scale, movements spanning the political spectrum informed this shift by calling for new forms of public oversight and participatory governance. The Environmental Justice movement began to hold public institutions, often on the state and local level, accountable for the unequal burden of pollution and toxicity on marginalized communities. Conservative factions directed skepticism towards the efficacy of the increasingly arcane bureaucratic systems responsible for environmental regulation. With the late 1960s genesis of the Red Power movement, Indigenous nations across North America began to re-assert and litigate their rights to manage resources on their traditional lands. Many nations successfully pushed settler governments to collaborate in the development of co-management models for national parks and other public lands in

the United States and Canada, while others regained control of resource management on their lands entirely.⁶ Studies of the rise of ecosystem management have focused on the scientific developments and political conditions that drove federal agencies like the FWS to pursue new land management strategies.⁷ Yet the history of the ICC and its evolving policies demonstrates that the transition towards ecosystem management was also a product of concerns specific to environmental contexts and political economic conditions on the state level. A shifting political culture among Iowans from diverse backgrounds provided the impetus for a new approach to conservation policy in the state. As a model of resource management that prioritized sport hunters grew unpopular, it became more politically convenient for the ICC to manage for ecosystems and ecosystem services than for game conservation.

Sport Hunting and Game Production on Public Lands

Until only the past few decades, the management of public natural lands in the United States has prioritized a single constituency: sport game hunters. The adoption of this perspective by the government of Iowa was tied to the colonization of the state. In the

⁶ For a history of the early American environmental justice movement, see Robert D. Bullard, *Dumping in Dixie: Race, Class, and Environmental Quality* (Boulder: Westview Press, 2000) or Giovanna Di Chiro, “Nature as Community: The Convergence of Environment and Social Justice,” in *Uncommon Ground: Toward Reinventing Nature* ed. William Cronon (New York: W. W. Norton and Company, 1995); For more on conservative opposition to federal environmental regulation, see chapter six in Michael J. Makley, *Open Spaces, Open Rebellions: The War over America’s Public Lands* (Amherst: University of Massachusetts Press, 2018). For a brief review of the development of co-management models in the United States, see Charles F Sams III, “Tribal Co-Management of Federal Lands: Acknowledging the History and Considering the Path Forward,” Statement by the US Department of the Interior, March 8, 2022. See chapter three of this thesis for more on tribal resource management and the state.

⁷ For perspectives on the development of ecosystem management in federal agencies, see James R. Koontz and Jennifer Bodine, “Implementing Ecosystem Management in Public Agencies: Lessons from the U.S. Bureau of Land Management and the Forest Service,” *Conservation Biology* 22, no. 1 (2008): 60–69 and James R. Skillen, *Federal Ecosystem Management: Its Rise, Fall, and Afterlife* (Lawrence: University Press of Kansas, 2015).

nineteenth century, hunting on the colonial frontier of North America—including the American Midwest, West, and western portions of what is now Canada—was still largely a subsistence activity practiced by Indigenous peoples. Colonization brought increased agricultural development of habitat and hunting pressure on game species, and as game populations diminished in the final decades of the century, growing contingents of sport hunters across the United States petitioned state and federal governments to formally regulate the activity.⁸ Settlers from the eastern United States began to colonize most of the region that is now Iowa following its purchase from the Sac and Fox Nation in the early 1830s. The Iowa territory incorporated in 1838 and was admitted as a state in 1846. With nearly a million residents by 1872, the state government appointed its first Fish and Game Warden to manage pressures on the fish and game populations in the state. For the next forty years, the office attempted to remedy declines in those species through the production of fish at state-owned hatcheries and the imposition of catch limits for birds and other game species.⁹

From the start, this agency catered to elite sport hunters. In the early years of the office, the Warden's game management efforts centered on the importation of non-native but high-status sport game species that were popular in Europe. They shipped species like the ring-neck pheasant and Hungarian partridge from game farms in the east in the

⁸ For the role of sport hunting and wildlife conservation in the exclusion of Indigenous subsistence hunting, see especially John Sandlos, *Hunters at the Margin Native People and Wildlife Conservation in the Northwest Territories*, (Vancouver: UBC Press, 2007). For the US context, see chapters seven and eight in Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*, (Berkeley: University of California Press, 2003). A broader history of wilderness conservation in Canada is offered by Tina Loo, *States of Nature: Conserving Canada's Wildlife in the Twentieth Century* (Vancouver: UBC Press, 2006).

⁹ Dorothy Schweider, "History of Iowa," n.d., *Iowa Official Register*, Iowa Archives Online (hereafter IAO); George A. Lincoln, "Twentieth Biennial Report of the State Fish and Game Warden to the Governor of Iowa," 1912, IAO.

thousands each year. In the same period, the state adopted hunting regulations that limited the take of game to those who could afford a license. In 1912, one Warden cited subsistence hunters as the primary threat to the state's game populations, lamenting that the state's "native game... are fast disappearing, not only because of the relentless war made on them by the class of people known as sooners [subsistence hunters], but also by the foreign element imported into this country as laborers on public improvements."¹⁰ Officials in Iowa began to prioritize sport hunting and desirable game species over other constituents and wildlife from the early years of public conservation in the state, at this point guided by explicitly racist and elitist ideas.

The government of Iowa developed a more systematic approach to sport hunting policy as game management developed into a scientific discipline in the first half of the twentieth century. In 1917, the state legislature replaced the position of Warden with a five-member State Board of Conservation. Rebranded as the Conservation Commission in 1931, the body of elected officials was responsible for the creation and administration of state parks as well as the management of fish and game.¹¹ By this time, the agency had established game farms in the state to meet growing demand for sport hunting. However, when importation and in-state game farming proved inadequate for the task, the ICC turned to new scientific approaches to wildlife restoration to address declining game populations.¹² Since the late nineteenth century, federal game management policy in the United States had consisted of limits on hunting and "predator control" measures. Employees for the Bureau of Biological Survey shot, poisoned, or otherwise annihilated

¹⁰ Lincoln, 5.

¹¹ Stan Widney, "Historically Speaking," March 1960, *Iowa Conservationist*, Vol. 19, No. 3, BPC, 23.

¹² Ibid.

predators of popular game species due to the belief that they reduced overall game populations. Following the First World War, though, a new generation of conservation scientists, including Aldo Leopold and his student Paul Errington at UW, began to advocate for alternative approaches. Drawing on field research in wildlife ecology, they came to a view that the management of environmental factors that facilitated the production of game species, rather than those that limited them, would allow for a more effective and less laborious means of regulating game populations. Practitioners of the new field of game management regarded game species as crops to be cultivated through the manipulation and enhancement of habitat, defined in terms of cover and food. Leopold distilled these ideas in his 1933 *Game Management*, establishing the blueprint for this new scientific approach by suggesting specific habitat compositions that best suited different animal species—guidelines which ICC biologists continued to reference into the final decades of the twentieth century.¹³

Conservation scientists like Leopold also advocated for the creation of federal land management policy based on the science of game management. Along with political cartoonist and fellow conservationist J. N. “Ding” Darling, Leopold had an opportunity to shape these policies as a member of FDR’s Committee on Wildlife Restoration. The result was the 1937 Federal Aid in Wildlife Restoration Act, also known as the Pittman-Robertson (P-R) Act, which distributed an excise tax on the sale of firearms to state governments for the acquisition and management of game habitat. The later 1950 Dingell-Johnston (D-J) Act used the same model to provide funds for the restoration and

¹³ Aldo Leopold, *Game Management* (New York: Scribner, 1933); Gary K. Swanson and Bob Barratt, “Farming for Wildlife,” May 1975, *Iowa Conservationist* Vol. 34, No. 5, BPC, 10. For more on the wildlife ecology of Leopold and Errington, see Kohler, “Paul Errington, Aldo Leopold, and Wildlife Ecology,” or Martin, 77-86.

management of fishing waters, both through the creation of artificial lakes and acquisition of natural ones. Though state governments remained responsible for regulating hunting and managing game populations within their boundaries, the federal government managed game restoration efforts on a national scale through the FWS, which was created in 1940 by combining the Biological Survey and the Bureau of Fisheries. The agency contributed to game restoration through its management of habitat on existing and newly acquired federal lands through the Wildlife Refuge system. Collectively known as the New Deal for Wildlife, these policies translated the science of game management into a federal framework for the restoration of game.¹⁴

The federal turn towards habitat preservation and enhancement defined the ICC's approach to public land management as game restoration took on a new urgency in the midcentury. As average incomes and standards of living increased during the economic boom that followed the Second World War, sport hunting gained popularity throughout the United States as a newly accessible form of recreation. At the same time, widespread urban, industrial, and agricultural development began to pose greater threats to existing game habitat. These pressures were particularly acute in Iowa. When the state was opened to settlement through the Northwest Ordinance, Iowa's lands had been divided into a grid of individual parcels available for private claim. Settlers flooded in from the east to claim land, and by the early twentieth century the preponderance of land in the state was privately owned. This contrasted western states, where settlement had been less extensive by the time the federal government began acquiring land for conservation

¹⁴ For more on the P-R Act and early federal wildlife restoration efforts, see Wilson, 67-72 and Martin, 81-84. For more on early federal habitat management, see Michael W. Giese, *A Federal Foundation for Wildlife Conservation: The Evolution of the National Wildlife Refuge System, 1920-1968*, Ph.D. Diss (American University, 2008).

during the Progressive Era. Due to these constraints, in the mid-twentieth century, federal and tribal lands composed less than one percent of the area of Iowa, while western states often exceeded forty percent. Though the P-R Act enabled states to acquire their own habitat reserves, a key element of the federal policy framework that had developed over the preceding decades was the rehabilitation of game populations on wildlife refuges and other federal lands.¹⁵

Even with the availability of federal funds for land acquisition, the state government was limited in its ability to make these purchases. Demand for fertile agricultural land in Iowa grew along with the nation's population and economic prosperity in the postwar period, threatening habitat and hunting access on private lands and often increasing land prices beyond the means of the state. The commissioners acknowledged that this presented a particular hurdle for game management in Iowa. As they put it, the "general lack of public lands in this region of the country tends to require a different management philosophy from other regions in the United States."¹⁶ At the same time, the spike in demand for sport hunting in Iowa outpaced the national average in the postwar period, with the number of hunting and fishing licenses in the state doubling from 1945 to 1955.¹⁷ Without the ability to rely on FWS efforts, the ICC was forced into a race against the state's developing economy, seeking to acquire as much remaining habitat as possible in the face of continued agricultural and urban

¹⁵ United States Bureau of the Census, *Statistical Abstract of the United States*, (Washington: United States Government Publishing Office, 1980) 238. For more on settlement patterns in tallgrass prairie, see Smith, "Prairie restoration: Bridging the Past and Future." For a more general history of land development in the Midwest see William Cronon, *Nature's Metropolis: Chicago and the Great West*, (New York: W.W. Norton, 1992).

¹⁶ Quoted from Minutes of the Iowa Conservation Commission Meeting on May 7, 1974, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 79.

¹⁷ *Annual Report of the Iowa Conservation Commission*, 1964, IAO, 11.

development. Their efforts to ensure that public land purchases in Iowa would “maximize the public return on investment” led to an approach to land management that attempted to maximize the yield of game per acre of public land above all else.¹⁸

The ICC’s prioritization of game habitat management over other conservation concerns was also a product of the agency’s structure. Since its creation, the agency’s responsibilities had grown to encompass the management of all “conservation and recreation” in the state, including the regulation of forestry on public lands and the management of lakes, streams, and state parks, in addition to their oversight of sport hunting.¹⁹ However, much of the financial support for the agency’s payroll and its natural land acquisitions was tied directly to the number of hunters in Iowa, due to the fact that federal P-R funding depended on sales of hunting licenses in the state. In 1955, the state legislature exacerbated this focus through further restructuring of the agency. By delegating the management of local parks, waters, and other outdoor recreational facilities to newly created County Conservation Boards, employees of the State Commission were able to focus on the creation of state parks and the management of game and hunting throughout the state—a responsibility which required a state-wide perspective and knowledge of wildlife populations across Iowa.²⁰

At the same time, the internal culture of the ICC revolved around the concerns of sport hunters. The agency itself was largely composed of sportsmen: individuals who, like Leopold, Curtis, and other conservationists of their generation, grew up fishing and

¹⁸ Ibid.

¹⁹ “Iowa Conservationist.”

²⁰ Discussion of agency history and structural changes in Minutes of the Iowa Conservation Commission Meeting on April 1, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 263-4.

hunting for sport. Staff viewed themselves as “spokesmen for the sportsmen” of the state, expressing frustrations with the influence of “tourism” on public land management where it interfered with the activities of outdoorsmen.²¹ The agency was also closely associated with numerous sport hunting leagues and organizations. These groups enjoyed friendly relationships with commissioners, inviting them to annual banquets and presenting awards at Commission meetings for their services to the state’s game species. Groups like Pheasants Forever, the Iowa Sportsmen League, and the Wild Turkey Federation appeared regularly at monthly Commission meetings, lobbying for changes in hunting season dates, the purchase of specific sites for habitat preservation and hunting access, and favorable treatment of their game species of choice. International game groups like Ducks Unlimited sponsored Commissioners’ travel to conferences and workshops in Canada and the United States.²²

Shaped by this political, cultural, and scientific context, in the postwar years the Commission poured its efforts and funding into maximizing game production and access to public hunting sites through the protection and creation of game habitat. The ICC used funding from the P-R Act and revenue from state hunting licenses to acquire considerable habitat holdings during this period. In the 1960s alone, the total coverage of state Wildlife Management Areas (WMAs) grew from 20,000 to 43,000 acres.²³ Though agency staff sought existing woodland or wetland habitat for these acquisitions, they were generally

²¹ First quote from game biologist Richard Bishop, “Make Good Habitat a Habit,” May 1968, *Iowa Conservationist*, Vol. 27, N. 5, 62-63, BPC. Second quote from commissioner Jimmy D. Bixler in Minutes of the Iowa Conservation Commission Meeting on April 1, 1976, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 210.

²² Example of Ducks Unlimited from Minutes of the Iowa Conservation Commission Meeting on July 31, 1978, Conservation Minutes January 1974 – August 1979, Vol. 28, Commission/Council Meeting Minutes, RICC, 132.

²³ *Annual Report of the Iowa Conservation Commission*, 1964; “Federal Aid Award to Glen Yates,” June 1972, *Iowa Conservationist*, Vol. 31, No. 6, 13, BPC.

forced to acquire less desirable land or take advantage of opportune sales. As a result, much of this land required active management to establish viable habitat and maximize game production potential. In doing so, the ICC fixated on the “problem of wildlife cover.”²⁴ Based on the logic of game management science, the production of game was a matter of preserving and creating as much habitat as possible—a fact which led ICC staff to favor quantity of habitat over its quality. This led them to differ from contemporaneous conservation scientists like John Curtis and other Midwestern prairie ecologists, who advocated for the use of natural plant species for the creation of ground cover. Though ICC biologists experimented with the use of native grasses and shrubs as cover for upland game birds during this period, they preferred to continue a 1950s policy of planting nonnative shrubs such as honeysuckle and multiflora rose, which were more cost-effective and efficient as they continued to spread without intervention following introduction.²⁵ The agency continued to rely on nonnative shrubs to provide cover into the 1980s, even opposing attempts by legislative committees to ban the use of such “noxious plants” in land management.²⁶

Even with cover planting methods, direct habitat acquisitions were a drop in the bucket in the face of continued habitat loss on private lands in the state in the postwar decades. The Commission experimented with alternative strategies to supplement viable habitat on public and private lands. Experimental hunting regulations included arcane point systems, multi-part hunting seasons, and locally targeted regulations. State parks

²⁴ Denny Rehder, “The Problem of Wildlife Cover,” April 1962, *Iowa Conservationist*, Vol. 21, No. 4, 1-3, BPC.

²⁵ Alan L. Farris, Charles C. Schwartz, and Lyle W Asell, “Native Grasses,” August 1973, *Iowa Conservationist*, Vol. 32, No. 8, 12-15, BPC.

²⁶ Minutes of the Iowa Conservation Commission Meeting on February 1, 1977, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, RICC, 215.

established in the 1960s were often planned as “multi-use” areas, maximizing the amount of each dedicated to game habitat and alternating between hunters and other visitors depending on the season. In these and other acquisitions, staff preserved some existing cropland to provide food for wildlife and entice game species to nearby habitat areas.²⁷

The ICC also encouraged other institutions and private landowners to manage their land for game production. For instance, the agency occasionally acquired roadside land with grass cover or prairie remnants from the Department of Transportation, though much of the interaction between the agencies involved a years-long campaign by Commissioners to convince the DOT to forgo mowing roadsides until after the pheasant breeding season.²⁸ Through its magazine, the *Iowa Conservationist*, the ICC appealed to like-minded farmers and landowners, many of whom were themselves sports hunters. The publication frequently included pleas to farmers to leave brush piles intact rather than burning them, noting that, in a pinch, they served as habitat for several game birds and mammals.²⁹ The agency devoted even more effort to publicizing its Rural Environmental Assistance Program, which marketed wildlife seed mixes to private landowners and subsidized their purchase. The agency introduced several other programs intended to convince landowners to put fallow land into game production, often by planting the most efficient, though nonnative, ground cover plant species like

²⁷ Minutes of the Iowa Conservation Commission Meeting on August 16, 1974, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 136; Bob Barratt, “Canada Goose Enticing: An Experiment at Big Marsh,” October 1966, *Iowa Conservationist*, Vol. 25, No. 10, 76-77, BPC.

²⁸ Minutes of the Iowa Conservation Commission Meeting on June 28, 1978, Conservation Minutes January 1974 – August 1979, Vol. 28, Commission/Council Meeting Minutes, RICC, 109.

²⁹ Charles Schwartz, “Brush Piles are Habitat,” October 1972, *Iowa Conservationist*, Vol. 31, No. 10, 11, BPC.

honeysuckle and multiflora rose.³⁰ Articles advertised the approach as a way for landowners to create their own private hunting paradise as well as a public service.³¹

Restoring the Mississippi Flyway

In service to its primary constituency of sport hunters, in the decades following the Second World War, the ICC knit these programs into an approach to public land management based on maximizing cover, food, and other factors that could increase the production of game species. By the late 1960s, many of these efforts successfully stabilize the populations of several popular game species and even allowed the ICC to offer seasons on some additional species.³² However, the production of waterfowl—the state's most popular and diverse class of game species—proved more complex. During the twentieth century, national efforts to maximize waterfowl production required the federal government to explore new administrative structures and funding mechanisms. On the local level, the ICC's attempts to manage these species pushed the agency toward a policy of ecological restoration as they adapted to the regional environmental dynamics that dictated the vitality of waterfowl populations.

Encompassing the states of Iowa, Minnesota, and North and South Dakota and the Canadian provinces of Manitoba, Alberta and Saskatchewan, the Prairie Pothole region (PPR) had long provided crucial habitat for most waterfowl species that migrated through North America. During the summer, the region contained more than half of the

³⁰ “For Sale: Iowa’s Future,” January 1972, *Iowa Conservationist*, Vol. 31, No. 1, 1, BPC.

³¹ Carol Buckman, “Winter Plantings to Attract Birds,” February 1962, *Iowa Conservationist*, Vol. 21, No. 2, 12, BPC.

³² Including, for instance, a season on wild turkey first offered in 1973. Bob Sheets and Roger Sparks, “Wild Turkey Season Now Possible,” March 1973, *Iowa Conservationist*, Vol. 32, No. 3, 3-5, BPC.

continent's migratory birds. This was due to the biome's low-lying "potholes" or "kettles"—small marshes that were interspersed throughout tallgrass prairie.³³ As these wetlands fluctuated between wet and dry several times throughout the year, the diversity in size, soil type, and latitude of water bodies ensured that different species had habitat throughout the warm season. Dry, upland areas around each kettle provided ideal nesting sites for the birds.³⁴ Beginning in the nineteenth century, the colonization of the PPR devastated this habitat not only through development, but also by altering the hydrological processes of the region. The spread of commercial agriculture—a process which accelerated after the Second World War—required the installation of drainage tiles in low lying areas to prevent the flooding of croplands in the wet spring season. As farmers and land developers drained more marshes, the overall reduction in water and increased drainage capacity resulted in the shrinking and disappearance of intact marshes. By 1950, half of the total acreage of wetlands in the PPR had dried up.³⁵

This severe loss of habitat decimated duck, geese, and other waterfowl species over the course of the twentieth century.³⁶ North American governments quickly saw the need to intervene in this decline. However, managing highly mobile populations of migratory animals, which behaved independently of international or state borders, posed a unique challenge. The earliest attempt to stem the decline of waterfowl took the form of international law, when, in 1916, the governments of the United States and Canada signed the Migratory Bird Treaty. By requiring federal licensure for the take of protected

³³ Wilson, 21.

³⁴ Ibid.

³⁵ Carol A. Johnston and Nancy E. McIntyre. "Effects of Cropland Encroachment on Prairie Pothole Wetlands: Numbers, Density, Size, Shape, and Structural Connectivity." *Landscape Ecology* 34, no. 4 (April 2019), 838; Lonnie Williamson, "Wetlands Programs in Trouble," February 1982, *Iowa Conservationist*, Vol. 41, No. 2, 4-6, BPC.

³⁶ Wilson, 65-67

waterfowl, the approach had some success in increasing waterfowl populations in the near term. But it also established joint conservation goals between the two nations, with Mexico, Japan, and Russia joining throughout the remainder of the century. The United States pursued further federal waterfowl protection and restoration efforts with the 1934 Duck Stamp Act. A key component of the New Deal for Wildlife, this law created a waterfowl-specific hunting permit in the form of an illustrated stamp, which hunters were required to buy and display annually. Proceeds from the stamps went towards habitat management and restoration efforts intended to benefit waterfowl.³⁷

In the postwar period, the federal government accelerated its efforts to protect migratory waterfowl populations as hunting pressures increased and habitat declined at an even more rapid pace. Congress authorized the FWS to acquire small wetlands throughout the nation in 1958, while the passage of the Accelerated Wetlands Program in 1961 appropriated another \$105 million for that cause.³⁸ In its own waterfowl management efforts, the ICC cooperated on some large scale habitat creation projects with the FWS, including, for instance, the Missouri River Mitigation, a project intended to offset habitat loss from continued channelization of the river by the Army Corps of Engineers (ACOE).³⁹ Largely, though, the federal government limited their involvement in local wetland conservation to the dissemination of funds to the ICC through the P-R and Duck Stamp Acts.⁴⁰

³⁷ See chapters one and two of Wilson, *Seeking Refuge*, for the development of federal waterfowl protections in the United States.

³⁸ Williamson, 5.

³⁹ Minutes of the Iowa Conservation Commission Meeting on November 9, 1976, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, RICC, 155.

⁴⁰ Williamson, 5.

Instead, by the postwar period, emerging knowledge of the geography of waterfowl migrations made the day-to-day work of waterfowl population management a regional affair. In the 1920s and 1930s, ornithologist Frederick Lincoln and other scientists with the Biological Survey made breakthroughs in understanding waterfowl migration patterns and the role that habitat played in them. They determined that the migration of waterfowl did not follow a straight North-South path, but rather, that it occurred in broad columns that also encompass significant longitudinal distance. This knowledge allowed scientists to divide migratory birds based on their geographic ranges, resulting in the designation of the Pacific, Central, Mississippi, and Atlantic flyways in North America. These regions soon took on administrative significance with the formation of the Pacific Flyway Council in the 1930s.⁴¹ The creation of the Mississippi Flyway Council (MFC) in 1952 centralized the management of waterfowl habitat in the PPR—a change which brought habitat planning efforts into line with the behavioral characteristics of waterfowl themselves.⁴²

Though the task of providing waterfowl habitat on a large scale was often described as “enhancement” rather than restoration, this process involved elaborate efforts to recover historical ecological characteristics of the increasingly developed landscape of the PPR. Even in a region historically interspersed with wetlands, the removal of drainage tiles from farmland was not sufficient to restore the area’s complex hydrological dynamics or its degraded water table. In establishing waterfowl refuges, ICC technicians installed a variety of “water control structures” to create marshlands,

⁴¹ See chapter three of Wilson, *Seeking Refuge*, for the development of flyway concept.

⁴² Williamson, 5.

including dikes, dams, and artificial pools.⁴³ The ICC's Fish and Game staff refined these engineering efforts over time, and with it, the potential of refuges to provide quality hunting grounds. The agency's first refuge, California Bend, was constructed in 1956 by damming several oxbow lakes connected to the Mississippi river to create marshland.⁴⁴ By the late 1960s, the construction of the much larger Otter Creek Marsh employed far more sophisticated measures. After diverting the eponymous creek into a half-mile ditch surrounded by earthen dikes, ICC staff created a series of separate impoundments along the creek with banks reinforced by steel pilings. Each impoundment was equipped with gates to allow water to be released into seven artificial marshes, allowing for the replication of seasonal changes in water level, and "stop-log structures" that would "create a desilting action whenever they [were] pulled."⁴⁵

Though prairie restoration and Dust Bowl erosion control programs existed on a significant scale by this time, the creation of waterfowl habitat by the ICC and public agencies in surrounding states constituted the first coordinated attempt to restore the larger ecological processes of the region. Overseen by the MFC and informed by a regional framework for the restoration of the PPR, each waterfowl refuge contributed to the piecemeal restoration of not only a disappearing biome, but also the set of ecological relationships encompassed by the flyway concept. Yet, as with other ground cover-focused habitat management efforts in Iowa, these sites were designed to provide optimal hunting conditions as much as encourage waterfowl production. The ICC emphasized

⁴³ Minutes of the Iowa Conservation Commission Meeting on April 7, 1981, Conservation Minutes September 1979 – August 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 95.

⁴⁴ Jack Kirstein, "An Oasis in Iowa for Waterfowl," February 1964, *Iowa Conservationist*, Vol. 23, No. 2, 16, BPC.

⁴⁵ John A. Fish, "Otter Creek Marsh," November 1965, *Iowa Conservationist*, Vol. 24, No. 11, 86-87, BPC, 87.

features that would attract migratory waterfowl to public hunting areas and adjacent private lands for sport hunters. For instance, where the ICC had determined that maximizing ground cover would ensure the accessibility of other game species, they approached waterfowl management with a parallel emphasis on the availability of marshes and pools. Such features were essential to “induce local nesting of ducks and geese.”⁴⁶ Once hydrologic elements were constructed, ongoing management entailed only the planting of forage crops like corn as an additional means of attracting the birds. The resulting refuges resembled what Robert Wilson describes as “duck farms” in the context of the Pacific Flyway. By the ICC’s own admission, the resulting waterfowl refuges were intended first and foremost “to provide good field shooting of migratory birds during the hunting season in areas adjacent to the refuges themselves.”⁴⁷

Conservation in the Corn State

Intended to maximize yield of game per acre of publicly owned habitat, the Iowa Conservation Commission’s overarching approach to game management by the early 1970s presented a striking parallel to the agricultural economy of the state. It is perhaps unsurprising, then, that the ICC came into direct conflict with farmers as their efforts at habitat management shifted towards the acquisition and restoration of farmland. The resulting political conflict revealed Iowans’ deeper discontent with a model of public land management that catered to sport hunting. The impetus for this conflict was the increasing popularity of waterfowl as the preferred game for hunters in the state. The

⁴⁶ Kirstein, 16.

⁴⁷ Ibid. For an example of marsh management in the late 1980s, see Bob Kurtz, “Artificial Marshes: They Produce the Real Thing,” June 1988, *Iowa Conservationist*, Vol. 47, No. 6, 30, BPC. “Duck Farms” is the title of Wilson’s fourth chapter in *Seeking Refuge*.

number of duck hunters in Iowa had grown from around 40,000 in the early 1950s to a peak of 60,000 in 1970, remaining at that level for the rest of the decade.⁴⁸ The ICC redoubled its commitment to “the welfare of the resource and the duck hunter as a whole” through the continued acquisition and enhancement of waterfowl habitat in the 1970s.⁴⁹ The state legislature responded to heightened demand with the creation of an additional State Duck Stamp in 1971, funding, in theory, the protection and creation of waterfowl habitat on a larger scale.⁵⁰

Yet even with additional funding, habitat management efforts were increasingly constrained over the course of the decade. For the state’s agricultural economy, the 1970s brought an unprecedented surge in the value of crops, and with it, of land in the state. As the US population boomed in the 1950s and 1960s, technological changes in farming encouraged larger corporate farming operations that could achieve economies of scale—a national shift towards an industrialized “agribusiness.” The federal government accelerated this process in the early 1970s. To encourage surplus production, Earl Butz, Nixon’s Secretary of the USDA, organized massive grain sales to the Soviet Union, which drained the supply of common food crops, raised prices, and, in turn, drove land value in the state to new heights.⁵¹ In this frenzied climate, farming operations of all sizes

⁴⁸ Elwood M. Martin, *Draft Report: Summaries of Federal Duck Stamp Sales from 1934-2003 and of Estimated Waterfowl and Coot Hunting Activity and Success from U.S. Fish and Wildlife Service Surveys of Waterfowl/Coot Hunters from 1952-2001*, September 19, 2007, provided by FWS staff on request by author.

⁴⁹ Roger Sparks, “Waterfowl Management and the Iowa Duck Hunt,” September 1972, *Iowa Conservationist*, Vol. 31, No. 9, 2, BPC.

⁵⁰ Minutes of the Iowa Conservation Commission Meeting on January 4, 1983, Conservation Minutes September 1979 – August 1983, Vol. 31, Commission/Council Meeting Minutes, RICC, 112.

⁵¹ For more on farm consolidation and Butz, see Thomas Fleischman, *Communist Pigs: An Animal History of East Germany’s Rise and Fall*, (Seattle: University of Washington Press, 2020) 34-38. For more on the boom in Iowa agriculture in the 1970s, see chapter one of Pamela Riney-Kehrberg, *When a Dream Dies: Agriculture, Iowa, and the Farm Crisis of the 1980s*, (Lawrence, KA: University Press of Kansas, 2022). Figure comes from Pamela Riney-Kehrberg, “A Special and Terrible Irony: Hunger on Iowa’s Farms during the Agricultural Crisis of the 1980s,” *The Annals of Iowa* 78, no. 4: 362.

bought or planted acreage that was previously considered untillable. By the end of the decade, land prices in the state reached an all-time high. Where tillable land had gone for an average of \$419 an acre at the beginning of the decade, by the late 1970s that figure had grown to \$1,958.⁵²

This premium on land restricted the ability of the ICC to continue purchasing habitat and made farmers less willing to give up acreage that was not previously cost effective to plant. At the same time, rampant inflation throughout the decade limited the amount of money the agency could spend beyond basic operating costs.⁵³ Even as funding increased through the new state duck stamp, greater sales of hunting licenses and federal stamps, and increased allocation through the P-R program, the ICC's rate of acquiring new habitat fell.⁵⁴ Waterfowl refuges were most severely affected, as the sites required more space and labor for the creation of marshes. In addition, where other kinds of habitat could be managed through easements and cover-planting programs, the agency had to purchase these sites wholesale.

The ICC tried to overcome these barriers with new strategies for habitat acquisition and restoration. These included attempts to acquire more habitat through condemnation, in some cases classifying potential habitat areas as state parks and using federal funds to justify forced sales through eminent domain.⁵⁵ The Commission also attempted to meet heightened demand for waterfowl hunting with new management practices. For example, Habitat technicians experimented with new, less labor-intensive

⁵² "For Sale: Iowa's Future," 14.

⁵³ Minutes of the Iowa Conservation Commission Meeting on October 2, 1979, Conservation Minutes September 1979 – August 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 47.

⁵⁴ Minutes of the Iowa Conservation Commission Meeting on December 4, 1977, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, RICC, 404-405.

⁵⁵ Minutes of the Iowa Conservation Commission Meeting on February 5, 1974, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 34.

means of habitat restoration, including the use of explosives to re-create the characteristic potholes of the region. Where waterfowl refuges had earlier been intended to produce and attract waterfowl for hunting on private lands, more and more restored sites were directly opened to hunting. The ICC even outsourced waterfowl production to areas in the PPR with lower land values. In 1974, the state entered into an agreement with Ducks Unlimited—a nonprofit that had played a key role in efforts to restore the PPR since its founding in the 1920s—that granted 25% of the state duck stamp funds for the restoration of waterfowl habitat in Manitoba annually.⁵⁶

Despite their attempts to overcome financial constraints, the ICC’s Fish and Game budget was reduced to a trickle by the late 1970s. As it struggled to meet operating costs, the agency considered canceling its habitat programs altogether when, at the end of the decade, the farm bubble burst and the economic environment shifted dramatically.⁵⁷ The process began with the 1979 Congressional confirmation hearing of Paul Volcker, President Jimmy Carter’s pick for chair of the Federal Reserve. With inflation eating into Carter’s approval ratings, Volcker was sure to voice his intention to raise interest rates as a means of taming inflation. Over the preceding decade, as USDA Secretary Butz cautioned family farmers to “Get Big or Get Out,” many farmers had taken out sizable loans on equipment and farmland to compete with consolidating agribusiness operations. As a result of high crop prices, farming families had seen their incomes approach the national average for the first time in the postwar period by the end of the decade. Yet growing comfort with the accumulation of debt for regular operations—which was less of

⁵⁶ Minutes of the Iowa Conservation Commission Meeting on January 3, 1978, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, RICC, 485.

⁵⁷ Minutes of the Iowa Conservation Commission Meeting on October 2, 1979, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 50.

a burden in the high-inflation, low-interest rate environment of the 1970s—put many in tenuous financial positions as the Federal Reserve enacted its new policies. Matters were made worse when, as Cold War tensions flared in early 1980, Carter imposed a grain embargo on the Soviet Union—the buyer largely responsible for the soaring crop prices of the 1970s. Already struggling to pay off loans in a low-inflation environment, farmers now saw their revenue slashed. The resulting economic downturn, quickly coined the Farm Crisis, made it nearly impossible for farmers to secure additional loans for operating expenses, let alone pay off existing debt, and resulted in widespread foreclosures of family farms.⁵⁸

The dire economic conditions of the 1980s drove 25% of Iowa farms out of business by the end of the decade. But for the ICC, the farm crisis provided a windfall in opportunities for habitat acquisition. Agricultural land prices dropped by 70% in the first six months of 1980.⁵⁹ This presented an alluring prospect for the agency, which, prior to this point, had generally avoided acquiring cropland for game production because of the price and labor needed to convert it to habitat.⁶⁰ Yet, by this point, the Commission's approach to creating waterfowl refuges frequently involved reshaping the landscape of an acquired parcel, and, as the Chief of the Fish and Game division put it, the agency was "reaching the point where the only wetlands left are those owned by the state."⁶¹ He and other ICC staff viewed a turn towards the conversion of farmland as inevitable and,

⁵⁸ See chapters two and three of Riney-Kehrberg, *When a Dream Dies*.

⁵⁹ Riney-Kehrberg, "A Special and Terrible Irony," 326.

⁶⁰ For an example of an earlier project being disapproved, see Minutes of the Iowa Conservation Commission Meeting on March 7, 1978, Conservation Minutes January 1974 – August 1979, Vol. 28, Commission/Council Meeting Minutes, RICC, 40.

⁶¹ Minutes of the Iowa Conservation Commission Meeting on November 5, 1987, Conservation Minutes January 1984 – December 1987, Vol. 34, Commission/Council Meeting Minutes, RICC, 371.

because “the best wildlife populations are produced on the best land,” a positive step in game management practice.⁶²

To facilitate this change in policy, in late 1980 the ICC altered its procedure for rating potential acquisitions, changing its “Habitat Quality” criteria to “*Potential Habitat Quality*,” while also weighting the category more heavily.⁶³ This subtle change had profound implications for the kinds of acquisitions the agency pursued. Where earlier purchases included, at most, a dozen or so acres of cropland, the ICC began to acquire parcels that exceeded 50% active cropland. In the years immediately following the grain embargo, some acquisitions even included 150 or more acres of tillable land, composing 70-90% of the total purchase.⁶⁴ These properties often included farms that adjoined refuges and public hunting areas, enabling the expansion of existing habitat complexes. While the agency purchased most of this land at auction following foreclosures or from farmers directly, some sport hunting organizations—the agency’s longtime collaborators in game management—also bought up cheap farmland, selling or donating the parcels to the agency.⁶⁵ By 1987, when prices began to rise again, the Fish and Game section of the ICC managed 233,711 acres of publicly owned wildlife habitat management areas—much of which had been farmland only a few years before.⁶⁶

⁶² Minutes of the Iowa Conservation Commission Meeting on November 5, 1981, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 262.

⁶³ In a 100-point system, potential habitat quality was worth 30 points compared to the 20 points given for habitat quality in the earlier system. Minutes of the Iowa Conservation Commission Meeting on October 7, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 436.

⁶⁴ Several examples can be found in Minutes of the Iowa Conservation Commission Meeting on September 3, 1981, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 212-231.

⁶⁵ An example of a gift from the Mississippi Flyway Waterfowl Association in the Minutes of the Iowa Conservation Commission Meeting on December 2, 1980, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 18.

⁶⁶ “DNR Annual Report for Fiscal Year 1987,” IAO, 14.

Making Restoration Ecological

For ICC staff, a policy of restoring farmland was a way to meet the needs of its most influential constituents. Every acre of habitat and public hunting lands increased the accessibility of sport hunting in the state, and the availability of funding for game management activities was directly tied to the popularity of the activity. But for a growing number of Iowans, efforts to buy and restore farmland were the latest in a series of actions that demonstrated to them that the ICC served a limited constituency. Agency staff downplayed opposition to their acquisition policy, writing off critics as “old-timers” who “fought the water all their lives” and found it “tough to talk of plugging up a tile.”⁶⁷ Many of those farmers actually considered themselves pro-conservation. But often saddled with debt and facing considerable financial hardship, the prospect of competing against a public institution that supposedly served their needs felt like a deep betrayal. As one farmer put it, “further depletion of Iowa’s agricultural land base... will make it even harder for beginning farmers to get a toehold.”⁶⁸ He suggested that “agricultural districts [that] allow farmers to take the initiative on future land use in a community” would allow for a more collaborative and productive approach to conservation.⁶⁹

Even before the farm crisis, resentment towards the ICC and its programs prompted the state’s farmers to advocate for political change. This included individuals like Robert Leonard, who lobbied the ICC directly and pushed for new laws to protect farmers from the perceived threat of the agency’s acquisitions. In 1978, these efforts led to the proposal of a bill to revoke the ICC’s power of condemnation for Fish and Wildlife

⁶⁷ Larry Stone, “The Goal is to Flood Corn Fields,” August 6, 1989, 5D, *Des Moines Register*, HN.

⁶⁸ Herb Pike, “Local Land Use Control Is No Control at All,” June 1981, *Iowa Conservationist*, Vol. 40, No. 6, 15, BPD.

⁶⁹ Ibid

areas in the state.⁷⁰ In the early 1980s, farmer advocacy groups that formed after the farm crisis lobbied the legislature about their land use concerns. State lawmakers created a Temporary Land Preservation Commission to investigate different solutions for the need to preserve agricultural land, and with it, the state's capacity to produce "food and fiber."⁷¹ Following the Commission's 1982 report, the legislature passed the County Land Use Act. The act included a provision for the establishment of local agricultural preservation areas by farmer petition and required the agency to gain additional approval for projects from newly created county land use boards.⁷² These concerns flared up again in 1985, when a group of farmers blocked the road to their condemned land at the Rathbun habitat complex, arguing that they were not paid a fair price in the forced sale.⁷³

Farmers were not alone in voicing their displeasure with the ICC. Homeowners who feared hunting on nearby lands, those in favor of safer recreation areas, and even disgruntled officials joined farmers in testifying against the ICC's pro-hunting policies at Commission meetings. At the same time, an expanding coalition of environmentalists in the state had grown wary of the ICC's tendency to favor sport hunting over other environmental concerns. In a 1979 guest opinion piece in the *Des Moines Register*, "Commission accused of neglecting conservation to promote hunting," Governor's Committee on Conservation members Larry Ladin and Addison Parker voiced similar concerns. Though they facetiously suggested that the ICC's internal list of objectives must be "habitat, artificial lakes, habitat, artificial lakes, and habitat," Ladin and Parker

⁷⁰ Minutes of the Iowa Conservation Commission Meeting on March 2, 1976, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 389.

⁷¹ Minutes of the Iowa Conservation Commission Meeting on February 3, 1983, Conservation Minutes September 1979 – December 1983, Vol. 31, Commission/Council Meeting Minutes, RICC, 128.

⁷² Ibid.

⁷³ Paul Leavitt, "Ex-owners Block Access to Rathbun" February 16, 1985, 16A, *Des Moines Register*, HN.

noted serious discrepancies in ICC spending.⁷⁴ They pointed out that, in addition to P-R and duck stamp funds, the ICC frequently drew on funds intended for the creation of recreation and scenic areas to establish public hunting sites. They also noted that, in contrast to funding for Fish and Game, the Wildlife Preserve program consisted of one ecologist, with a budget of \$28,000, and 4,000 acres of preserves, half of which had been opened to hunting. It seemed to them that so-called wildlife programs and multi-use areas benefited few animals other than popular game species or people other than hunters.⁷⁵ Others echoed these complaints in the following issues. One resident of the state agreed that it had “been quite a while since the conservation commission could number many true conservationists as members.”⁷⁶

As a growing chorus of Iowans expressed their frustration with the agency’s limited view of conservation, several Indigenous nations in the PPR posed legal challenges to the ICC’s position as the sole body responsible for resource management in the state. As with federal lands, few Native nations retained control of territory in Iowa during the twentieth century. The reservation of the Sac and Fox Tribe of the Mississippi remains the only sovereign nation within the boundaries of the state. Largely within Nebraska, the lands of the Winnebago and Omaha Nations share Iowa’s western border along the Missouri River. In the late 1970s, as Native nations throughout the country asserted their treaty rights through the courts, all three nations challenged the authority of the ICC to manage natural resources on treaty territory.⁷⁷ The Sac and Fox case was the

⁷⁴ Lawrence Ladin and Addison Parker, “Commission Accused of Neglecting Conservation to Promote Hunting” May 29, 1979, 12A, *Des Moines Register*, HN.

⁷⁵ Ibid.

⁷⁶ “Guest Opinion,” June 13, 1979, 11A, *Des Moines Register*, HN.

⁷⁷ See chapter three of this volume for more Indigenous resource sovereignty and legal challenges to public agencies in the Midwest.

most sweeping, contending that the tribe had the right to manage fishing, hunting, and trapping on its own reservation lands in the central part of the state, known as the Meskwaki settlement. The Omaha Nation filed suit in federal court regarding control of 3,000 acres of land that had been cut off from their reservation by the ACOE's channelization of the Missouri River and which now fell within ICC jurisdiction.⁷⁸ The Winnebago contended that the condemnation of their land on the Missouri River for a planned wildlife habitat complex—a joint channelization mitigation project between the ICC and the ACOE—violated the nation's sovereignty.⁷⁹ The ICC fought all three challenges fiercely. In the case of the Sac and Fox suit, the agency maintained that any “special privileges”—their view of the nation's treaty rights—ought only to be granted by federal courts.⁸⁰ As one commissioner put it, to enter a settlement directly with the nation—and thus acknowledge its status as a sovereign government—would be “giving up everything we have been fighting for.”⁸¹ The ICC won the case against the Sac and Fox, depriving them of resource management autonomy on their reservation lands. However, after several appeals by the ICC and nearly a decade of litigation, the Omaha Nation secured control of their Missouri River lands in the early 1980s.⁸²

One farmer and former state official, Jim Riordan, encapsulated the political mood in Iowa when he warned the commissioners that there were “people all over the state who [were] frustrated and angry with the commission,” and that they needed to

⁷⁸ Minutes of the Iowa Conservation Commission Meeting on February 5, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 198.

⁷⁹ Minutes of the Iowa Conservation Commission Meeting on March 11, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 233.

⁸⁰ Minutes of the Iowa Conservation Commission Meeting on November 9, 1976, Conservation Minutes January 1974 – August 1979, Vol. 27, Commission/Council Meeting Minutes, RICC, 132.

⁸¹ *Ibid*

⁸² *United States v. Wilson*, 707, F.2d, 304 (8th Cir. 1982)

overcome their “siege mentality” and “find a way to start resolving their problems.”⁸³ In the early 1980s, the ICC did begin to yield to pressures and make some attempts to manage concerns regarding its policies. After its defeat in the Omaha case, the ICC and ACOE redesigned their mitigation project and retracted the condemnations of the nearby Winnebago lands. They added more signage to hunting reserves to clarify the borders between public and private land and frequently reminded readers of the *Conservationist* to seek permission to hunt on private farmland.⁸⁴ The Commissioners personally refuted many of Ladin and Parker’s accusations in an official response in the *Des Moines Register*.⁸⁵

Yet these efforts did little to appease the agency’s detractors in the long run. What appeared to be a public relations problem portended a larger shift in American environmental values that the agency would have to reckon with on a fundamental level. The environmental movement of the preceding two decades had inspired a sense of environmental citizenship among many Americans. This included a heightened level of concern for a greater range of environmental issues beyond wilderness preservation and game conservation. Problems of multispecies conservation and industrial pollution became the bread and butter of environmental advocacy groups. While the federal government responded to this shift with the passage of new environmental policies in the

⁸³ Minutes of the Iowa Conservation Commission Meeting on February 5, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 197.

⁸⁴ See, for example, Al Bull, “Get Farmers Permission,” January 1972, *Iowa Conservationist*, Vol. 31, No. 1, 12, BPC.

⁸⁵ Minutes of the Iowa Conservation Commission Meeting on June 5, 1979, Conservation Minutes January 1974 – August 1979, Vol. 28, Commission/Council Meeting Minutes, RICC, 405.

early 1970s, state agencies like the ICC lagged, retaining a focus on game management as its primary concern into the 1980s.⁸⁶

In Iowa, this emerging culture of environmental citizenship manifested in new environmental concerns and increased political engagement. New environmental interests primarily came in the form of multispecies and ecosystem conservation. A proliferation of bird watching organizations in particular forced the ICC to more seriously consider nongame conservation. Citizens found new ways to interact with the state's environments, including growing interests in mushroom collecting, foraging, and rare plant collecting on public lands, that forced the ICC to consider additional regulations.⁸⁷ This greater interest in the array of plants and animals represented by Iowa's environments—all of which had their own specific environmental tolerances—brought with it new standards of what constituted good habitat.⁸⁸ A key feature of this demand was a greater level of literacy and concern regarding the protection and restoration of functional ecosystems. Over the course of the 1980s, Iowans began to express this ecological consciousness through the desire for more precise and ecologically sophisticated restorations of the kind pursued by prairie restoration ecologists in the preceding decades.

⁸⁶ For more on changing environmental values in the 1960s and early 1970s, see Adam Rome, *The Genius of Earth Day: How a 1970 Teach-in Unexpectedly Made the First Green Generation* (New York: Hill and Wang, 2013). For a broader overview of the beginning of the environmental era in the United States see Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985* (Cambridge: Cambridge University Press, 1987).

⁸⁷ See the ICC's policy for foraging on public lands, Minutes of the Iowa Conservation Commission Meeting on February 3, 1976, Conservation Minutes January 1974 – August 1979, Vol. 26, Commission/Council Meeting Minutes, RICC, 375.

⁸⁸ Including, for instance, a great number of public comments and private donations regarding the establishment of prairie habitat for birds, rare plants, insects, etc. Minutes of the Iowa Conservation Commission Meeting on July 2, 1985, Conservation Minutes January 1984 – December 1987, Vol. 33, Commission/Council Meeting Minutes, RICC, 44.

Popular interest in the governance of public lands grew alongside these new environmental attitudes. Nationally, many on the political right had become disillusioned with the growing number of federal executive agencies produced by environmental regulations in the early 1970s, as laws like the ESA and the NEPA imposed strict regulations on industry and land development. These tensions erupted in the Sagebrush Rebellion of the late 1970s and early 1980s, a conservative political movement which advocated for the transfer of federal lands in the west to state control. At the same time, environmentalists grew frustrated with increasingly complex bureaucratic structures that prevented agencies from carrying out the work of environmental protection laid out in federal law. Many felt that “captured” federal agencies had become so mired by interest groups and red tape that public environmental protection was impossible.⁸⁹

In Iowa, citizens across the political spectrum sought a more active role in public land management decision-making. This culture resulted in policies like the County Land Use Act, which tempered conservation, development, and other forms of land use in favor of farming. At the same time, echoing the critiques of Ladin and Parker, a diverse array of environmentalists attempted to hold the ICC accountable to the spirit of state legislation that focused on conservation concerns beyond game management. New conservation groups, including, for instance, local chapters of the Audubon Society and prairie conservation organizations, along with a stronger local presence of the Nature Conservancy, diluted the dominance of sport hunting organizations as lobbyists to the ICC.⁹⁰ Previously uncontroversial plans for state parks faced new levels of scrutiny,

⁸⁹ Woodhouse, 321-324.

⁹⁰ Example of lobbying by new organizations in Minutes of the Iowa Conservation Commission Meeting on October 5, 1982, Conservation Minutes September 1979 – December 1983, Vol. 31, Commission/Council Meeting Minutes, RICC, 59.

contention, and debate. Public comment sessions at Commission meetings, often forgone entirely in the preceding decades due to low attendance, were now filled with Iowans seeking to air their complaints and advocate for new policies and protections.⁹¹

In the 1980s, the ICC began responding to these political pressures by bringing its image in line with current environmental attitudes. Where it had long presented itself as an agency led by and for sportsmen, it began to reinvent itself as a body that represented a larger variety of environmental concerns and constituents. A new generation of public servants helped usher in these changes. During the era of Leopold and Curtis, the conservation profession was dominated by sport hunters who often lived in rural settings. Conservation professionals who came of age in the postwar period were more likely to live in growing urban areas and, as the environmental movement progressed, were attuned to a broader view of environmental concerns that included pollution issues and multispecies conservation. Earlier state agency officials might have been more likely to work with and support industry—a model Terence Kehoe describes as “cooperative pragmatism.” But in the wake of the landmark environmental regulations of the early 1970s, officials were more accustomed to an adversarial relationship with industry and a more complex regulatory environment.⁹²

For the ICC, the most important figure in this generational change was the agency’s new director, appointed in late 1981 after controversies over farmland acquisitions had pushed the previous director into an early retirement. Critics urged the

⁹¹ Minutes of the Iowa Conservation Commission Meeting on February 6, 1979, Conservation Minutes January 1974 – August 1979, Vol. 28, Commission/Council Meeting Minutes, RICC, 281.

⁹² For more on the conservation professionals after the Second World War, see Sellers. *Crabgrass Crucible*. For more on the transition from cooperative pragmatism to a regulatory framework, see Terence Kehoe, *Cleaning Up the Great Lakes: From Cooperation to Confrontation* (DeKalb: Northern Illinois University Press, 1997).

commissioners to choose a replacement “from outside the agency” to inspire greater public trust and disrupt the culture of the ICC.⁹³ The Commission heeded the advice, hiring Larry Wilson from a position with the state government of Utah. Beginning his career in the mid-1960s, Wilson represented a new kind of environmental management professional, trained in the technicalities of conservation and land management, but also an effective communicator and political operator. Upon joining the agency, he made a point of extending an olive branch to those who had grown suspicious of the ICC’s efforts in the preceding years. He quickly commissioned a new mission statement for the agency. Featuring “a notable shift of emphasis from the earlier statements,” the new version lacked any mention of game or hunting but explained in detail the ICC’s commitment to “assistance and cooperation” with “all levels of the government and private sector.”⁹⁴ Within his first year of employment, Wilson undertook a tour of local television news stations in “an effort to acquaint the public with the broad scope of [the] agency’s concerns.”⁹⁵

Throughout the 1980s, the ICC supported its new approach to environmental management with considerable efforts to increase transparency and create more collaborative procedures. By the latter part of the decade, staff reported more information about land acquisitions in Commission meeting minutes, including specific addresses, each parcel’s score in the habitat quality rating system, and, perhaps most importantly,

⁹³ Minutes of the Iowa Conservation Commission Meeting on February 5, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 197.

⁹⁴ Minutes of the Iowa Conservation Commission Meeting on July 7, 1981, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 173.

⁹⁵ Minutes of the Iowa Conservation Commission Meeting on March 3, 1981, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 81.

the proportion of each acquisition made up by cropland.⁹⁶ New language surrounding the proper use of funds cleared up doubt as to which financial pools hunting and game habitat management activities drew from.⁹⁷ Where the Commission had usually held public hearings only for the creation of state parks, they scheduled them more frequently and for a greater variety of projects and policymaking decisions.⁹⁸ The agency assumed a more cooperative stance in seeking private land for habitat development, encouraging landowners to will land to the agency or to create land trusts for the preservation of habitat.⁹⁹

This generational change also involved hiring more scientific experts in areas of public concern. In the early 1980s, the department received a barrage of complaints regarding the fact that almost all the department's biologists worked on fish and game issues. The agency responded by hiring specialists in endangered species, nongame ornithology, and additional staff for the State Preserves program. They also devoted large portions of the wildlife fund, previously committed to habitat acquisition, to the research efforts of the agency's own scientists and to fund several professorships in nongame biology at Iowa State University.¹⁰⁰ These hirings were one of several new conservation policies that the agency enacted to appease the more vocal, ecologically conscious public of the period. For instance, as interest in biodiverse prairie and wetland restorations

⁹⁶ Minutes of the Iowa Conservation Commission Meeting on January 9, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 165.

⁹⁷ Minutes of the Iowa Conservation Commission Meeting on July 1, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 325.

⁹⁸ Minutes of the Iowa Conservation Commission Meeting on April 3, 1984, Conservation Minutes January 1984 – December 1987, Vol. 32, Commission/Council Meeting Minutes, RICC, 105.

⁹⁹ Minutes of the Iowa Conservation Commission Meeting on September 3, 1981, Conservation Minutes September 1979 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 227.

¹⁰⁰ Minutes of the Iowa Conservation Commission Meeting on July 2, 1985, Conservation Minutes January 1984 – December 1987, Vol. 33, Commission/Council Meeting Minutes, RICC, 50.

increased in the late 1970s and the 1980s, largely as a source of habitat for songbirds and rare plant species, the state began to regularly incorporate such developments into plans for new parks and prioritize their addition to existing sites.¹⁰¹ The creation of habitat for waterfowl and other game species had been a form of ecological restoration insofar as the logic of game management relied on basic ecological ideas—the notion that meeting habitat needs of different game species allowed their populations to grow. Yet in response to a shifting environmental consciousness among its constituents, the ICC pursued some restoration efforts that were intended to reconstruct the ecological relationships between a greater variety of plant and animal species.

Though the ICC made considerable changes to its staff, policies, and procedures in the 1980s, much of the process of reinventing the agency was rhetorical. A host of public materials throughout the 1980s portrayed the agency as committed to a broader set of environmental concerns and a greater swathe of Iowans themselves. The striking transformation of the *Iowa Conservationist* demonstrates this shift. Since its creation in 1941, the magazine had been all-but explicitly addressed to sportsmen.¹⁰² Each issue featured a different game species, often encouraging readers to try hunting a species that was having a particularly good year. Articles sided with sportsmen on contentious issues, lamenting the “anti-hunting set” who acted on “misguided emotion without factual basis.”¹⁰³ ICC staff contributed romanticized depictions of their memorable hunting moments, secret hunting locations, and recipes for game meat.¹⁰⁴ In the 1980s, however,

¹⁰¹ Minutes of the Iowa Conservation Commission Meeting on July 5, 1983, Conservation Minutes September 1979 – December 1983, Vol. 31, Commission/Council Meeting Minutes, RICC, 250.

¹⁰² For an example, see Roger Sparks, “A First Look at Huns,” October 1973, *Iowa Conservationist*, Vol. 32, No. 10, 1, BPC.

¹⁰³ Jon Gibson, “The Truth,” November 1973, *Iowa Conservationist*, Vol. 32, No. 11, 4, BPC.

¹⁰⁴ Glenn Moravek, “Man the Hunter,” January 1972, *Iowa Conservationist*, Vol. 31, No. 1, 3-4, BPC.

the content of the *Conservationist* underwent an abrupt shift. Articles began to reflect a broader range of conservation issues, including, for instance, articles on the pros and cons of ethanol and solar energy. Issues highlighted rare plants and endangered nongame species as well as whichever game species the agency wished to promote among hunters. Native and restored prairies, the biodiversity they supported, and the additional ecosystem services they provided became a common subject of the magazine.¹⁰⁵ One issue focused entirely on the Loess Hill region of the state, including various articles on the flora, fauna, geology, and history of the area, and explained the role that various programs played in the holistic preservation of the region's ecological integrity.¹⁰⁶ By the 1980s, the content of the magazine framed ICC programs as an ecologically coordinated service for all Iowans.

The reimagined *Conservationist* was one part of the ICC's larger push to rebrand its existing management practices as fulfilling multiple environmental and public needs. The agency was most concerned with re-framing its ongoing game habitat management efforts. For instance, in the early 1980s, as the Fish and Game division became Fish and Wildlife, the ICC began to emphasize the importance of ongoing habitat management efforts for wildlife beyond popular game species. The legislature pushed for this move, creating, in 1980, a separate wildlife habitat fund to aid in the pursuit and to make clearer to the public which funds were contributing to land acquisition.¹⁰⁷ Throughout the 1980s, though, the ICC used the fund almost exclusively in tandem with federal P-R and state

¹⁰⁵ Including, for example, Steve Lekwa, "Restoring and Managing Iowa's Prairies," February 1982, *Iowa Conservationist*, Vol. 41, No. 2, 7-9, BPC.

¹⁰⁶ *A Special Loess Hills Issue*, April 1984, *Iowa Conservationist*, Vol. 43, No. 4, BPC.

¹⁰⁷ Roger Sparks, "Stamp Money Buys Land," February 1982, *Iowa Conservationist*, Vol. 41, No. 2, 7-9, BPC.

duck stamp funds to acquire and create wetlands. ICC staff understood that the program continued to favor game, admitting that “nongame will lose if you start a serious cost accounting effort.”¹⁰⁸

Other instances suggested that the ICC’s new rhetoric of ecological management had little to do with the agency’s practices. For example, in 1982, commissioners released a public apology for their widespread use of nonnative multiflora rose, which they had continued to plant for wildlife cover and sell to landowners into the early 1980s. The apology responded to a growing popular concern over introduced non-native plants and their impact on native species and ecosystems. But the ICC stopped short of addressing the issue head on because it would impede game management priorities. The commission “recognize[ed] the right of landowners to control multiflora rose on their own property,” but, because it provided “valuable wildlife habitat on public lands” they would make no effort to remove or control the plant.¹⁰⁹

New kinds of programs brought together this shifting approach to public relations and a greater emphasis on ecosystem processes and public participation. This included the agency’s ongoing efforts to develop game habitat on private land. Earlier programs in this vein relied on convincing landowners to support game populations by planting cover species like honeysuckle and multiflora rose. Developed in the early 1980s, the ICC’s switchgrass program reflected ecological best practices by encouraging the use of only native grasses to establish game cover on private land. Earlier programs also relied on the fact that many of landowners were sportsmen or were at least sympathetic to the cause,

¹⁰⁸ Minutes of the Iowa Conservation Commission Meeting on February 5, 1980, Conservation Minutes September 1979 – December 1983, Vol. 29, Commission/Council Meeting Minutes, RICC, 203.

¹⁰⁹ Minutes of the Iowa Conservation Commission Meeting on August 6, 1982, Conservation Minutes September 1979 – December 1983, Vol. 31, Commission/Council Meeting Minutes, RICC, 13.

but by the 1980s, this was less often the case. The proportion of hunters in Iowa had decreased as the state's population continued to grow and urbanize. Hunting had become a less common pastime and, by this point, farmers like Robert Leonard had even become hostile to the activity. The Switchgrass program took a more collaborative approach by attempting to address the widespread financial need among farmers while also providing valuable environmental services. Rather than requesting that landowners plant subsidized seed mixes, the new program included a cost-sharing agreement through which the ICC leased the land from landowners and paid them directly for their participation. Program staff emphasized the benefits of such plantings for erosion control and soil fertility, and livestock farmers had the option to hay the land at the end of the season. Due to its success, the agency expanded the program after only its first year.¹¹⁰ The ICC was successfully able to pursue its longstanding priority of game habitat creation in a less favorable political environment by designing a more ecologically minded and mutually beneficial program.

The switchgrass program demonstrates both the ingenuity of and larger tensions in the ICC's habitat restoration policies in the 1980s. Crafting an approach to the restoration of Iowa's environments in this period meant developing new means of dealing with a more complex and diverse set of public interests. While new policies resulted in important procedural and practical changes, attempts to re-frame existing practices allowed the ICC to continue its program of game habitat restoration while satisfying this broader set of interests. Even more fundamental changes to the agency at the end of the

¹¹⁰ Minutes of the Iowa Conservation Commission Meeting on July 2, 1986, Conservation Minutes January 1983 – December 1987, Vol. 33, Commission/Council Meeting Minutes, RICC, 381; Minutes of the Iowa Conservation Commission Meeting on August 6, 1981, Conservation Minutes September 1981 – December 1983, Vol. 30, Commission/Council Meeting Minutes, RICC, 188.

decade reflected this trend. In 1986, the agency ceased to be altogether as the state legislature combined it with the Department of Water, Air, and Waste Management, the Geological Survey, and part of the Energy Policy Council. The new Department of Natural Resources represented the codification of a more holistic approach to environmental management that Iowans had called for in the preceding years.¹¹¹

At the same time, waterfowl populations in the state had their worst year on record in 1986. The late 1980s brought more funding for habitat restoration and land acquisition than ever before, supported by new federal programs like the North American Waterfowl Plan and regional projects like Ducks Unlimited's "MARSH" land acquisition grant program.¹¹² Now president of the Iowa chapter of the Sierra Club, longtime critic of the ICC Larry Ladin argued that the creation of this new agency only distracted from the continued prioritization of game management over other priorities. As Ladin noted, though the Fish and Wildlife division remained the largest department in the newly formed DNR, "only a handful" of its 250 employees "work for non-game species and non-game habitat."¹¹³ For Ladin, the creation of an entirely new, more comprehensive environmental authority was only the latest in a series of rhetorical changes that made more Iowans amenable to the creation of wildlife habitat, despite a lack of material changes in its conservation policies.

New national programs applied this same logic on larger scales, facilitating the creation of more palatable wildlife restoration policies in Iowa and across the nation.

¹¹¹ Minutes of the Iowa Conservation Commission Meeting on April 1, 1986, Conservation Minutes January 1984 – December 1987, Vol. 33, Commission/Council Meeting Minutes, RICC, 303.

¹¹² Lowell Washburn, "A Memory of Duck Hunting," September 1988, *Iowa Conservationist*, Vol. 47, No. 9, 29-31, BPC.

¹¹³ Lawrence Ladin, "Iowa's Natural Heritage is a Treasure to be Preserved." February 16, 1986, C1, *Des Moines Register*, HN.

Conservation agencies across the United States shared the ICC's challenges as they navigated new political pressures in the final decades of the twentieth century. Federal funds tightened in the inflationary environment of the late 1970s and faced even greater threats as the Reagan administration cut agency funding as part of a program of federal austerity. Federal and state conservation agencies felt pressure to develop new approaches to habitat preservation and restoration. As FWS director Lynn Greenwalt put it, public servants would need to pursue forms of wildlife management in "the most innovative and imaginative ways possible" to make headway in this hostile environment.¹¹⁴ This push resulted in federal programs that paired habitat restoration with the needs of more constituents and a greater variety of ecosystem services.

The most significant windfall in funding for habitat management efforts came from the Conservation Reserve Program, which provided federally funded easements for farmers to plant portions of their farms in wildlife cover or soil-stabilizing grasses for ten-year periods. As a measure of Reagan's farm bill, it was framed as a mechanism for assisting struggling farmers with the lingering economic concerns of the farm crisis and reducing erosion on their lands. But the program was also successful as conservation policy, making significant contributions to the ongoing efforts to create wildlife habitat across the country. In Iowa, the ICC emphasized that "all Iowans benefit from this agricultural program." By 1988, farmers in Iowa had enrolled 1.4 million acres in the program, leading the ICC's Chief Biologist to predict that pheasant harvests would climb from 800,000 in 1986 to 1.5 million by 1990.¹¹⁵ Other states adopted the logic of the

¹¹⁴ Lynn Greenwalt, "Welcome Address," in *Classification, Inventory, and Analysis of Fish and Wildlife Habitat*, (Washington DC: Biological Services Program, 1978) 3.

¹¹⁵ Discussion of the importance for the plan for the state's habitat goals in Richard Bishop, "Putting Life Back in Wildlife," April 1988, *Iowa Conservationist*, Vol. 47, No. 4, 25-28, BPC.

Farm Bill in creating programs that were more suited to their environmental conditions. In Minnesota, the DNR developed the 1986 Reinvest in Minnesota program to provide “a better easement program for the state” by focusing on more appropriate ecosystems and ecosystem services.¹¹⁶ Soil erosion was a less pressing issue in the state, so the program targeted the creation of wetland habitat and emphasized the importance of the practice for maintaining water quality. Whether through changes in appearance or practice, a more holistic and ecological form of restoration—in a political and environmental sense—allowed the ICC and other public agencies to address the increasingly urgent need to restore wildlife habitat. At the close of the twentieth century, restoration had to be ecological to be politically viable.

Conclusion

Though fields of environmental management that could now be described as ecological restoration developed throughout the twentieth century, the language and concept of the framework only crystalized in the 1980s. The political conditions that spurred the ICC to adopt the language and logic of ecological restoration in these years makes clear why. Emphasizing the benefits of habitat restoration for ecosystem conservation appealed to a broader range of constituents—the key to appeasing a more environmentally knowledgeable public that had grown suspicious of the close ties between state conservation and hunters in the preceding years. The ICC needed to frame its practices in terms of the ecosystem to convince Iowans that restoration activities were a public good.

¹¹⁶ For more on the history and design of the program, see <https://bwsr.state.mn.us/reinvest-minnesota-overview>.

The ICC's changing approach to restoration also reveals key differences in environmental policymaking and regulation at various scales in the United States. Though habitat restoration was a challenge defined by the regional environmental conditions of the PPR, the state policies intended to address it were shaped by economic, cultural, and political conditions in Iowa. At the same time, the notion of citizen advocacy driving government action is a familiar one in the history of American environmentalism, but the course of events in Iowa did not simply mirror the national story. Though it resembled and borrowed from the national popular environmentalism of the late 1960s and early 1970s, Iowans' increased engagement in state environmental affairs was a distinct political and cultural movement defined by the unique environments and political economy of Iowa. Likewise, US environmental historians have well-developed narratives regarding the federal response to environmental advocacy in the 1960s and 1970s, but the changing policies and perspectives of state agencies are less well understood. The ICC only began to pursue its new approach to environmental management in the 1980s, over a decade after the period of concentrated federal action in the early 1970s and during a lapse in new federal environmental policy brought about by the Reagan administration. A detailed account of the structural, cultural, and epistemic shifts in the ICC in the 1980s elucidates the political realities that drove the adoption of frameworks like ecosystem management in the period—politics that reflected national trends, but which were particular to conditions at the state level.

Restoration itself—and the public view of it—played a key role in this period of political and institutional change. Indeed, as with the scientific networks and institutions of Midwestern plant ecology in the mid-twentieth century, the need to restore the region's

environment spurred fundamental shifts in the structures and policies of Iowa's environmental agencies. But even as the ICC experimented with the creation of a politically popular form of ecological restoration, Ojibwe governments on the shore of Lake Superior began to conceive of restoration in yet another, entirely different form—as a means of cultural renewal and a tool for the reclamation of resource management authority.

CHAPTER THREE

The Minnesota Chippewa Tribe, Wild Rice, and the Ongoing Struggle for Environmental Sovereignty

In 2018, the six bands of the Minnesota Chippewa Tribe (MCT) unanimously rejected Minnesota Governor Mark Dayton’s proposal for an inter-governmental “Wild Rice Task Force.” At issue was not the goal of the governor’s initiative. The task force was intended to foster “collaboration among state agencies, Tribal Nations, wild rice harvesters, industry, conservation advocacy groups, and scientists” in seeking an “understanding of the water quality and habitat conditions necessary for restoration and protection of naturally occurring wild rice.”¹ Over the preceding decades, Ojibwe governments and their natural resource management agencies had already devoted significant attention to the protection and restoration of this culturally important resource. They had also demonstrated their willingness to do so in partnership with the state on several occasions. Rather, the MCT took issue with the fact that Dayton had neglected the political and cultural autonomy of the tribal governments with which he sought to collaborate. In his proposal, Dayton allotted only one of the thirteen seats to a representative for the MCT—the sole Native voice on the task force. Following backlash from Dakota and Ojibwe communities, he added a seat to jointly represent the four Dakota communities in the state and another for the Red Lake Ojibwe Nation. But the new positions increased Native representation in the task force to only three of fourteen seats. At the same time,

¹ Office of Governor Mark Dayton, “Executive Order 18-08: Establishing the Governor's Task Force on Wild Rice,” May 30, 2018, Executive Orders, Minnesota Legislative Reference Library website. <https://www.lrl.mn.gov/execorders/execorders>.

Dayton maintained his allotment of a single representative to the MCT, neglecting the fact that the body is a political alliance between six autonomous Ojibwe nations.

Responding with its own resolution, the MCT explained that the “proposed composition of the Governor’s Task Force on Wild Rice does not respect the sovereignty of the eleven federally-recognized Native American Tribes, Bands, and Communities in the State of Minnesota or the unique status of federally-recognized Tribes” and that the lack of adequate representation “minimizes the technical expertise, knowledge, and interests of the Tribes” in the management of wild rice.² In a show of kinship and solidarity, the bands of the MCT chose instead to apply their expertise in a Tribal Wild Rice Task Force.

The fallout over the task force hints at the political significance of wild rice restoration for Ojibwe communities in Minnesota. For the Ojibwe, ecological restoration of this kind is not a distant or abstract environmental issue. It is not a problem that can be solved by scientific or technical advances, like maintaining game populations or preserving rare plant species. Instead, the restoration of wild rice is inextricably tied to the legal, political, and cultural renewal of Ojibwe communities. This chapter demonstrates that initiatives to preserve and restore wild rice by bands of the MCT outline a framework for restoration that addresses key historical pitfalls of the approach. Even as their practitioners attempted to reverse the environmental degradation wrought by settler colonialism in the Midwest, the practices of prairie restoration and game habitat management contributed to processes of Indigenous dispossession. Informed by

² Minnesota Chippewa Tribe Tribal Wild Rice Task Force, “Tribal Wild Rice Task Force Report,” December 15, 2018, Minnesota Chippewa Tribe website, <https://mnchippewatribe.org/pdf/TWRTF.Report.2018.pdf>.

traditional knowledge but adaptive to Western scientific techniques, the MCT's stewardship of wild rice regards the object of restoration—*manoomin*, in the Ojibwe language—not as a problem of empirical understanding or political appeal, but as a fundamental element of Ojibwe culture, economy, and identity. Efforts to promote and maintain healthy wild rice populations over the past three decades contributed to key priorities of tribal governance: cultural renewal, the development of new frameworks for tribal public health, and the exercise of authority over ceded territory through the creation of resource management programs. For bands of the MCT, the restoration of wild rice is decolonization, the assertion of natural sovereignty and treaty rights, and the creation of a form of modern tribal governance built on traditional values and knowledge.

Historians, restoration ecologists, and Indigenous studies scholars have begun to consider the lessons of Indigenous-led restoration initiatives for restoration ecology in the past fifteen years. In her analysis of sturgeon restoration efforts by Anishinaabeg communities in the Great Lakes region, US environmental historian Nancy Langston emphasizes the role of both traditional ecological knowledge (TEK) and western science in developing effective and sustainable restoration practices. The notion that these distinct empirical systems can complement one another when applied to environmental management issues in tandem, known as Two-eyed seeing, has become a core theme of this literature. Writing on Anishinaabe restoration of sturgeon and wild rice, Potawatomi environmental philosopher Kyle Whyte emphasizes the role of Anishinaabe cultural traditions and spirituality in shaping these restoration efforts.³ Potawatomi ecologist

³ See chapter four of Langston, *Climate Ghosts*, on two-eyed seeing and sturgeon restoration. Whyte, "Settler Colonialism, Ecology, and Environmental Injustice." Whyte, along with Marty Holtgren and Stephanie Ogren, make similar arguments regarding sturgeon restoration in "Renewing Relatives: One Tribe's Efforts to Bring Back an Ancient Fish." *Earth Island Journal* 30, no. 2 (Autumn 2015): 54-56.

Robin Wall Kimmerer extends core elements of Anishinaabe environmental culture and stewardship practices into a framework for “ecological restoration as an act of reciprocity, where humans exercise their care-giving responsibility for ecosystems.”⁴ This chapter explores how Ojibwe governments and intertribal agencies in Minnesota have developed methods of wild rice management which draw on TEK and Ojibwe cultural customs but incorporate Western scientific methodologies and the regulatory structures of resource management agencies in the United States. It also considers how, in building partnerships with state and federal agencies over the past three decades, the bands of the MCT have pushed the government of Minnesota and federal agencies to acknowledge the fact that ecological restoration practices are shaped by political and cultural factors as well as technical considerations.

While several studies have considered wild rice restoration and its role in Ojibwe cultural renewal, this chapter relates the development of rice management initiatives to the political and legal dimensions of Ojibwe resurgence since the 1980s. Historians have only recently recognized the importance of restoration practices in the political revitalization Native American Nations in the second half of the twentieth century. For instance, David Tomblin argues that the White Mountain Apache in the American West appropriated knowledge of restoration practices and techniques, as well as the framework itself, to reclaim authority over resources and lands that they traditionally managed. Other scholars, including legal historian Charles Wilkinson, identify developing legal knowledge and increased willingness to litigate treaty rights since the 1970s as a key

⁴ Kimmerer, “Restoration and Reciprocity,” 257. See also *Braiding Sweetgrass*.

element of the broader political resurgence of Indigenous nations in the United States.⁵

Such legal strategies enabled Ojibwe bands in Minnesota to break away from paternalistic regimes of state resource management and establish their own autonomous environmental agencies in the 1980s. This chapter aims to demonstrate that wild rice restoration has facilitated this process by providing grounds for Ojibwe political resurgence in the late twentieth and early twenty-first centuries.

Manoomin and the Lake Superior Ojibwe

The Ojibwe have harvested and cared for wild rice as long as they have lived in the land now called Minnesota. As the Lake Superior Ojibwe tell it, their ancestors migrated from the eastern coast of North America to the central Great Lakes region as early as 900 CE. They were led by a series of seven prophecies, one of which instructed them to “go to the place where the food grows on the water.”⁶ As they continued migrating west, the Ojibwe split from the Ottawa and Potawatomi, their Anishinaabe kin and close allies, and developed a distinct ethnic identity. By the early-seventeenth century, they arrived on the western shore of *Gichigami*—known as Lake Superior to settlers. Seeing the rice on the shores of the lake and in the waters of the region, they recognized that they had come to their prophesized homeland.⁷

⁵ Tomblin, “Managing Boundaries, Healing the Homeland: Ecological Restoration and the Revitalization of the White Mountain Apache Tribe, 1933 – 2000.” Charles F. Wilkinson, *Blood Struggle: The Rise of Modern Indian Nations* (New York: Norton, 2005). On wild rice restoration in Minnesota, see Emily Hicks and Melody R. Stein, “Wild Rice Waters.” *Places Journal* (June 2021). A more general perspective is offered by Robin Wall Kimmerer, *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* (Minneapolis: Milkweed Editions, 2013).

⁶ Thomas D. Peacock, “The Ojibwe: Our Historical Role in Influencing Contemporary Minnesota,” *MNopedia* (November 2013).

⁷ Jessica Milgroom, “Wild Rice and the Ojibwe” *MNopedia* (July 2020).

As the Ojibwe settled in the region, wild rice became central to the diet, culture, and economy of their communities. The only grain Indigenous to North America, the grass *Zizania palustris* has a historical range encompassing the Great Lakes region.⁸ However, wild rice is most ubiquitous in the glacial topography to the west, south, and north of Lake Superior, growing abundantly in the region's numerous shallow lakes and its slow rivers and streams. Each spring, rice seed takes root in the rich, soft beds of these waters, cultivated by the seasonal floods and storms that push the seeds into the mud. By June, the shoots of the plant break the surface of the water as they reach the floating leaf stage. Following wind pollination, the mature stalks—which extend up to 8 feet above the water surface—begin to grow fruit, ripening from mid-August through September.⁹

Though their 500-year westward migration had come to an end on the shores of Lake Superior, most Ojibwe families remained semi-nomadic—a lifestyle adapted to the biology of wild rice. They spent much of the fall and winter inland from the lake, tracking deer and woodland game and, in the colder months, supplementing their stores of dried venison by trapping and ice fishing. In March, they moved north to tap maples for sugar, and by June, began planting corn, squash, and potatoes, gathering fruit, and collecting birch bark for canoes, baskets, and other uses. As they anticipated the harvest season in August and September, the Ojibwe moved to their ricing camps nearer the shores of the lake. Though they planted, hunted, and gathered diverse food sources, wild rice was the staple of the Ojibwe diet, especially in the region off the western tip of Lake

⁸ The genus *Zizania* includes several other species of grasses, but the Great Lakes *palustris* is the only to have been served as a key food source historically. Thomas Vennum Jr., *Wild Rice and the Ojibway People* (St. Paul: Minnesota Historical Press, 1988) 12. As the most comprehensive monograph on wild rice and its spiritual, economic, cultural, and historical importance to the Ojibwe, this chapter relies heavily on primary research from Vennum.

⁹ Darren Vogt, phone interview with author, February 1, 2023; 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*, YouTube Video, March 10, 2021; Vennum, 15-17.

Superior that remains the territory of several bands of the MCT. During the harvest, families had to stock enough rice to accompany all other sources of food and last through the next year.¹⁰

Known as *Manoominike Giizis*—the wild rice moon—the harvest season in August and September remains sacred to the Lake Superior Ojibwe.¹¹ Ricing camps continue to provide important gathering spaces for families and communities. Beyond being a key food source, rice also continues to hold deep cultural and spiritual meaning for the Ojibwe. For example, in Ojibwe *izhitwaawin*—their “traditional beliefs and lifestyles”—resource gathering plays a central role in structuring society.¹² Traditionally, men are tasked with hunting, trapping, and fishing and women harvest rice, farm, and gather. In addition to these gender roles, the relationship between the Anishinaabe and their environment is governed by what Kimmerer calls a “culture of gratitude.”¹³ Harvest methods emphasize a reciprocal gift-giving relationship between humans and natural resources. Ojibwe women traditionally accessed manoomin with birchbark canoes and push poles that propelled them through rice beds without disturbing the stalks. The rice is gently bent over the canoe and tapped with a knocker, releasing only ripe grains from the plant’s inflorescence. The act is intentionally imprecise, allowing some grains to fall into the boat and others to land in the water. There, they will take root in the waterbed and contribute to the next year’s stock. At the same time, cultural custom dictates a limited harvest spread evenly across water bodies, ensuring that sufficient rice remains for

¹⁰ Vennum, 3-5.

¹¹ Winona LaDuke, “The Long and Honorable Battle of the Ojibwe to Keep Their Wild Rice Wild,” *Indian Country Today* (September 2011).

¹² Douglas P. Thompson, *The Right to Hunt and Fish Therein: Understanding Chippewa Treaty Rights in Minnesota’s 1854 Ceded Territory* (Duluth: 1854 Treaty Authority, 2017) 7.

¹³ Kimmerer, “Restoration and Reciprocity,” 256.

waterfowl feed, muskrat nesting, fish cover, and other ecological relationships. The technique of rice harvesting ensures the well-being of humans, rice, and other organisms, all of which the Ojibwe view as relatives and independent actors in a web of responsibilities.¹⁴

Translating to the “good berry” or “wondrous grain,” the Ojibwe word *manoomin* alludes to its central role in the cultural and spiritual life of the Ojibwe. In contrast, the colonial phrases “wild rice” or “Indian rice,” inaccurately identify the grain with unrelated Asiatic white rice.¹⁵ This term emerged in the eighteenth century as European colonizers made contact with Ojibwe communities, who were just settling on the western shores of Lake Superior. The expansion of the French fur trade in the period encouraged the Lake Superior Ojibwe to settle further along the lakeshore and in the lands to the west and south of the lake as they served as guides and translators for the French and brokers in the fur trade. This process introduced some European technologies that were useful to the Ojibwe, including guns that facilitated hunting and cast-iron kettles that sped up the process of finishing rice.¹⁶ Participation in the fur trade was also largely beneficial for the Ojibwe, allowing for the inland expansion and displacement of the Fox and the easternmost Dakota, for whom rice had been a staple before the Ojibwe arrived.¹⁷

But as the pace of colonization increased in the region, so did its negative effects on Ojibwe communities. In the late eighteenth century, the newly formed government of the United States of America hoped to promote settlement of the western Great Lakes

¹⁴ For more on traditional harvest methods see chapter four of Vennum.

¹⁵ Though the precise etymology and meaning of the word is contested. See Vennum, 5-7. *Saveur* (August 2019).

¹⁶ Amy Thielen, “The True Story of Wild Rice, North America’s Most Misunderstood Grain,” *Saveur* (August 2019).

¹⁷ Anton Treuer, *Ojibwe in Minnesota* (St. Paul: Minnesota Historical Society Press, 2010) 17-23. Treuer provides an excellent introduction to the history of the Ojibwe in Minnesota.

region and gain access to its resources. Encouraged by the Land Ordinance of 1785, the influx of settlers in the early nineteenth century devastated the Ojibwe economy as a glut of furs caused the value of the commodity to plummet. Struggling economically and seeing their land stolen by settlers, Ojibwe leaders were amenable to the federal government's offers to buy their lands. Four successive treaties determined the fate of the Ojibwe communities on the US side of the border. Agreements in 1836, 1837, 1842, and 1854 collectively ceded millions of acres of land to the federal government, providing access to pine forests and lucrative copper and iron deposits surrounding Lake Superior.¹⁸ The Ojibwe approached negotiations with the goal of establishing tribal homelands and securing access to usufructuary rights in the face of settlement pressure. They succeeded in preserving rights to hunt, fish, and gather resources on "ceded" lands. In many cases, the terms stipulated the transfer of money and supplies from the federal government to Native residents of the ceded territory. Along with a series of Supreme Court decisions in the 1820s and 1830s, the treaties recognized the fact that the tribes existed as sovereign nations, which entered into agreements with the United States as independent and diplomatically equal political bodies.¹⁹

The treaties also laid the foundation for the further dispossession of Ojibwe lands and resources over the subsequent two centuries. In the late nineteenth century, the lands ceded by these treaties were incorporated into the states of Minnesota, Wisconsin, and Michigan. As the states in the region grew in population and developed more robust

¹⁸ For more on the nineteenth century history of the Ojibwe economy, see Treuer, *Ojibwe in Minnesota*, 23-28. For more on the cession of resources to the federal government, see David R. Wrone, "The Economic Impact of the 1837 and 1842 Chippewa Treaties," *American Indian Quarterly* 17, no. 3 (1993): 329-40.

¹⁹ Thompson, 5; Rachel Kurkee Walker and Jill Doerfler, "Wild Rice: The Minnesota Legislature, a Distinctive Crop, GMOs, and Ojibwe Perspectives," *Hamline Law Review* 32 (2009): 506; Patty Loew and James Thannum, "After the Storm: Ojibwe Treaty Rights Twenty-Five Years after the Voigt Decision," *American Indian Quarterly* 35, no. 2 (2011): 162-163.

political institutions, the federal and state governments began eroding the Ojibwe treaty rights that they had agreed to only decades before. In Minnesota, settler colonialism took several forms. This included acts of genocide like the Sandy Lake Tragedy of 1850, in which hundreds of Ojibwe tribal members starved to death after being forced to relocate from their homelands in the Minnesota Territory.²⁰ Later in the nineteenth century, the federal government and the state of Minnesota (following its creation in 1858) transitioned from the use of violence and forced relocation to a policy of assimilation. The Ojibwe and other Native American peoples were coerced into a mainstream, white American set of values and lifestyles. Governments pursued this by establishing a variety of policies and institutions intended to erase Indigenous cultures and identities.

One means of doing so was the dissolution of already diminished tribal homelands. Passed by the federal legislature in 1887, the General Allotment Act (or Dawes Act) divided most reservations into parcels of private property, which were distributed among the members of each tribe.²¹ This included six of the seven Ojibwe reservations in the state that had been designated by the earlier treaties (the same six which now compose the MCT). The Dawes Act was intended to diminish the “Indian-ness” of the Ojibwe and other Indigenous groups by forcing them into a system of private land tenure instead of communal agriculture. However, the result was the sale of reservation lands to non-native owners and, ultimately, the loss of a third of Ojibwe

²⁰ Thompson, 9.

²¹ A number of tribes were exempted: “the provisions of this act shall not extend to the territory occupied by the Cherokees, Creeks, Choctaws, Chickasaws, Seminoles, and Osage, Miamies and Peorias, and Sacs and Foxes, in the Indian Territory, nor to any of the reservations of the Seneca Nation of New York Indians in the State of New York, nor to that strip of territory in the State of Nebraska adjoining the Sioux Nation on the south.” The Red Lake Band of the Chippewa, the other Ojibwe nation in the state, also successfully resisted approval of the Act on their reservation. *An Act to Provide for the Allotment of Lands in Severalty to Indians on the Various Reservations (General Allotment Act or Dawes Act)*, Statutes at Large 24, 388-91, NADP Document A1887.

property in the state.²² Paternalistic federal policies and the federal agency which oversaw them, the Bureau of Indian Affairs (BIA), flouted the autonomy of the reservations. Through the BIA, the United States appointed “Indian Agents” who effectively governed in the place of Tribal Chieftains and banned traditional religious practices and other cultural customs.²³ Other strategies included forced re-education. Beginning in the late-nineteenth century, Ojibwe children in Minnesota were required to attend boarding schools in the state. Usually operated by Christian religious orders, these institutions sought to strip children of traditional spiritual beliefs and their native Ojibwe tongue in favor of Christianity and English. Many children experienced sexual and physical abuse and some were punished for speaking Ojibwe.²⁴

The erosion of Ojibwe culture and treaty rights in the region was also tied to the degradation of the environment. Colonization in the region brought with it development and industry that caused sweeping changes to the landscape. Increasing hunting pressure and the inability to follow game threatened Ojibwe subsistence hunting and trapping.²⁵ Hydrological changes like those in the PPR destroyed habitat for wild rice, waterfowl, and other plants and animals that were key to the lifestyles of the Ojibwe. Farmers drained many of the shallow lakes where rice beds were situated. Settlers redirected water into major lakes and rivers with dams and dikes, flooding other rice beds. At the same time, the decreased variability in the water levels of many lakes and streams—to which rice is adapted—encouraged the growth of species that occupied a similar niche. By the

²² For more on the Dawes Act the “checker” of Ojibwe reservations, see chapter six of LaDuke, *All Our Relations*.

²³ Treuer, 29-31.

²⁴ Dan Gunderson, “A Reckoning: St. Benedict nuns apologize for Native boarding school,” *MPR News* (October 2021); Treuer, 31-33; Thompson, 10.

²⁵ Treuer, 28.

mid-twentieth century, many rice beds had been replaced by mats of *ginoozeagoons* (pickerelweed). Where Northern Minnesota had once been a landscape covered in shallow bodies of water—ideally suited to the sensitive requirements of manoomin—the watershed was increasingly concentrated, channelized, and stripped of ecological complexity.²⁶

In the second half of the twentieth century, Minnesota’s iron mining industry introduced toxic contaminants to the state’s waters that further diminished wild rice populations and endangered Ojibwe communities near Lake Superior. In part a response to the Sandy Lake Tragedy, the Second Treaty of La Pointe in 1854 created the Bois Forte and Grand Portage reservations and ceded 5.5 million acres of land along the western shore of Lake Superior to the federal government. Like earlier treaties, the US government hoped to gain access to resources in the territory. In the case of the 1854 treaty, they hoped to free up deposits of copper and iron in the mountains off the western shore of the lake, known in Ojibwe as *Misaabe-wajw*, or “Giant Mountain.” By the 1860s, these precious metals began to attract settlers to the newly created state of Minnesota. Not only was the renamed “Iron Range” rich in ore, but its proximity to Lake Superior provided easy shipping to the East, where it was transformed into steel. By the 1920s, investment by the Carnegie business empire and other mining giants transformed the region into a key supplier of raw material for the expanding nation. High demand for steel during the Second World War carried the industry through the mid-twentieth century, but by this time deposits of the high-grade hematite ore upon which the industry

²⁶ For examples of hydrologic changes to wild rice waters in Minnesota, see National Oceanic and Atmospheric Administration (NOAA), “Lake Superior Manoomin Cultural and Ecosystem Characterization Study,” final report (May 2020). A more general discussion of the process is offered by Vennum, 27-30.

was built began to wane. Mines switched to the less concentrated but bountiful taconite ore as an alternative. This ore required vast amounts of water to refine, again enabled by the proximity of Lake Superior. Tailings from the purification process, high in heavy metals, asbestos, and toxic sulfates, were dumped directly into the lake. Wild rice populations in the St. Louis River watershed—composing much of the 1854 ceded territory—began to die off in the 1950s. They are still threatened by the acidic conditions created by high sulfate concentrations.²⁷

Potawatomi environmental philosopher Kyle Whyte argues that the erosion of the relationships between the Anishinaabe and the environments of the Great Lakes has been both a core injustice and mechanism of settler colonialism in the region. Anishinaabe ways of being are based on what Whyte describes as key values of “interdependence, systems of responsibilities, and migration.” He combines these in a concept of “collective continuance,” which “refers to a society’s capacity to self-determine how to adapt to change in ways that avoid reasonably preventable harms.”²⁸ This framework explains not only how settler colonialism altered the relationship between the Ojibwe and wild rice, but also how limited access to rice contributed to the collapse of Ojibwe communities. Without access to rice on off-reservation or uncaded land, many families were unable to access the waters and rice camps they had traditionally used, disconnecting them from the reciprocal and interdependent practices of harvesting that had sustained both the Ojibwe and wild rice populations for centuries before. At the same time, the hardening of

²⁷ For a history of mining in Minnesota and the taconite industry, see Jeffrey T. Manuel, *Taconite Dreams: The Struggle to Sustain Mining on Minnesota’s Iron Range, 1915-2000* (Minneapolis: University of Minnesota Press, 2015). For more on the decline of wild rice and other toxic consequences of taconite mining see chapter six of Nancy Langston, *Sustaining Lake Superior: An Extraordinary Lake in a Changing World* (New Haven: Yale University Press, 2017).

²⁸ Whyte, 7.

property boundaries and allotment of land resulted in a loss of mobility and resource flexibility that had characterized the semi-nomadic practices of the Ojibwe in the pre-colonial period. Rights to hunt, fish, and gather—guaranteed in most treaties—became impossible to practice as settlers flooded into and laid claim to ceded territory. The structure of Ojibwe society had revolved around responsibilities to and relationships with wild rice and other plants, animals, and non-human relatives. Thus, the decline of the ability to maintain a traditional diet was directly related to the degradation of social organization and loss of resilience among Ojibwe communities.

The Political and Legal Resurgence of Native Nations

US colonial domination in the nineteenth and twentieth centuries pervaded all facets of Ojibwe life, but the Ojibwe resisted the process in a number of ways. Though rare, this occasionally escalated into armed conflict. In the 1898 Battle of Sugar Point, for example, warriors of the Leech Lake Ojibwe defended Chief Hole in the Day from an US army regiment that intended to arrest him for his political opposition to federal policies.²⁹ More commonly, the Ojibwe relied on forms of cultural and economic adaptation. This included the adoption of strategies that enabled the continued exercise of usufructuary rights even as resources and land became scarce. For example, some wild rice harvesters began using aluminum canoes—introduced by settlers in the mid-twentieth century—to sustain traditional harvesting methods as quality birchbark of a sufficient size became more difficult to find. In the same period harvesters began to sell rice as a commercial

²⁹ Treuer, 39.

product in greater volumes, providing a means of economic as well as nutritional subsistence.³⁰

Though resistance was multifaceted, the most impactful efforts taken by the Minnesota Ojibwe and other Native nations in the United States in the twentieth century occurred in the political arena. Strategies of political resistance have allowed Native American communities to stem land and resource dispossession, exercise treaty rights, and secure more autonomy from the federal government. Following his appointment in 1933, BIA Commissioner John Collier facilitated this process by spearheading a set of reforms to federal Native American policy known as the “Indian New Deal.” The centerpiece of the changes was the Indian Reorganization Act of 1934 (IRA), which ended allotment and reduced BIA oversight to the self-governance of Native nations. For many nations, this enabled the creation of natural resource management bodies and other kinds of political institutions. This included the MCT, which formed in 1934 as a political alliance between the bands of the Lake Superior Ojibwe in Minnesota (and includes all but one Ojibwe band, the Red Lake Band, in the state). Though each band governed itself independently, the MCT served as a powerful central body and collective political voice for the Ojibwe within the state of Minnesota and nationally.³¹

The IRA kickstarted a transition from paternalistic control by the federal government to a more independent form of self-governance. But it was only a first step in an ongoing struggle for political autonomy. In the 1950s, the situation became more dire as Congress enacted a series of termination policies. These laws dissolved the semi-

³⁰ See chapter four of Vennun for more on the evolution of harvesting techniques and chapter six on the economic importance of the crop for the Ojibwe.

³¹ See chapter two of Tomblin for more on the IRA. Treuer explores the Ojibwe experience of this period on 40-46.

independent status of Native nations under federal law. Where enacted, the policy made tribal land subject to federal and state taxation and nullified any tribal laws that conflicted with those in the states—codifying the assimilationist stance of many in the federal government. By the late 1960s, Native advocacy groups like the National Congress of American Indians (NCAI), formed in the 1940s, succeeded in lobbying Congress to end termination policies and reverse existing laws.³²

After dealing with the threat of termination, many Native activists turned their attention to the continued struggle for greater political autonomy. The issue flared when, in 1967, Secretary of the Interior Stewart L. Udall proposed the Indian Resources Development Bill as a measure of Lyndon Johnson's Great Society. Aimed at providing opportunity for economically depressed Indigenous communities, the law would have granted additional governing powers to tribal governments, including the ability to condemn reservation lands, form corporations, and designate zoning.³³ Yet the NCAI and other Native organizations fought against the bill because it repeated problematic aspects of the earlier IRA. Though the IRA had granted some powers of self-governance to Native nations, it had forced their governments into a Western mold, with democratically elected officials and bureaucratic departmental organization, rather than respecting the traditional political values and governing structures of Native communities. For the Ojibwe, governance had long been based on a system of clan-based leadership, whereby only members of specific patrilineal clans were eligible for tribal leadership roles.³⁴

³² Christopher K. Riggs, "American Indians, Economic Development, and Self-Determination in the 1960s," *Pacific Historical Review* 69, no. 3 (2000): 431–63; Doug Kiel, "Rebuilding Indigenous Nations: Native American Activism and the Long Red Power Movement" *Expedition* 55, no. 3 (Winter 2013): 8–11.

³³ Riggs, 431–433.

³⁴ Treuer, 42.

Further, many communities were ineligible to form independent governments under the IRA. Among the Ojibwe in Minnesota, the law forced several discrete communities on the Mille Lacs reservation to form a single, reservation-wide government.³⁵ Though beneficial in some respects, the IRA had eroded Ojibwe political customs and strengthened paternalistic oversight by the federal government over Native nations.

Though Udall's bill would have entrusted Native governments with additional powers and offered the prospect of much-needed economic relief, it required tribal governments to gain approval from the BIA to use any of the new powers—perpetuating a paternalistic system of federal oversight to tribal governance. Udall and his staff failed to consult the NCAI and other Native organizations when developing the measures. Had they done so, they would have realized that, by this time, Native activists had articulated a more concrete vision of Indigenous sovereignty under US federal law. Described as a policy of “self-determination,” it focused on core priorities of economic self-sufficiency, preservation and assertion of treaty rights, and input on federal policy changes.³⁶ Along with high-profile demonstrations in the early 1970s, the result of this shift in advocacy was the eventual passage of the Indian Self-Determination Act in 1975—a policy which has restored a new level of autonomy to Native nations in the United States.³⁷

In the era of self-determination, Native governments continued to expand their authority and address a range of priorities beyond economic and cultural survival. But, by this time, methods of Native political advocacy were shifting. Starting in the 1960s, a

³⁵ For more on the Indian New Deal and Native American resource management, see chapter two of Tomblin.

³⁶ See Riggs for elaboration on this argument.

³⁷ For more on the impact of the 1975 Self-Determination Act, see the Harvard Project on American Indian Economic Development, *The State of the Native Nations: Conditions under U.S. Policies of Self-Determination* (Oxford: Oxford University Press, 2008).

new generation of Native activists had begun to reject the NCAI's preference for collaboration with the federal government. The more radical Red Power movement was defined by a militant approach to lobbying, relying on demonstrations and civil disobedience to influence federal policy. It included organizations like the American Indian Movement (AIM), which Lake Superior Ojibwe activists Dennis Banks and Clyde and Vernon Bellecourt formed in 1968 to monitor and oppose police brutality against Native people in Minneapolis. In 1973, AIM joined the Lakota residents of Pine Ridge reservation in South Dakota in an armed occupation of the village of Wounded Knee.³⁸ Though criticized at times for their militancy, AIM and other Red Power organizations played a central role in the cultural and political renewal of Native nations. As Oneida historian Doug Kiel puts it, Native activism in the 1960s and 1970s laid the foundation for "the grassroots work of rebuilding Indigenous nations through the assertion of rights to self-government, cultural revitalization, the protection of natural resources, tribal control of education, and the development of reservation economies."³⁹

In addition to new political resistance strategies, Charles Wilkinson emphasizes the importance of "an emerging legal capacity" among Native governments in efforts to secure treaty rights in this period.⁴⁰ Beginning in the 1970s, a growing number of nations took to the courts to secure the property, rights, and powers that had been guaranteed by nineteenth-century treaties. These cases largely sought to address the systematic and illegal suppression of harvesting rights over the previous century. Collectively, they forced courts to clearly distinguish the division of resource management powers between

³⁸ Peacock.

³⁹ Kiel, 11; For more on the founding and goals of AIM, see Peacock.

⁴⁰ Wilkinson, 242. See chapters six to eight for more on the development of Native American legal expertise.

Native nations and state and federal agencies. The 1974 resolution to *United States v. State of Washington* set a precedent in this regard. Native communities in the state had long been assured the right to harvest salmon, but in the 1960s, as the state sought to mitigate pressure from commercial fishing, state officers began to arrest and charge off-reservation Native fishers who violated more stringent conservation laws. Adopting the civil disobedience methods of the Red Power movement, Native communities and their allies risked arrest by hosting “fish-ins,” several of which were met by brutal retaliation from the state. The federal government, as trustee for seven tribal nations, sued the state of Washington for violating federal treaties. Handed down by US District court Judge George Boldt, the decision in the case reasoned that, as the original but only partial grantors of the fishery resources, Native communities in the state of Washington were entitled to fifty percent of the harvest that flowed through their reservation and ceded territory. Boldt stipulated that fisheries management in Washington therefore had to be a collaborative enterprise between the state government and all nineteen tribes in the state.⁴¹

The *Boldt* decision signaled that, where Congress proved difficult to sway, federal courts tended to be supportive of Native claims to authority over traditional resources. Native governments across the country, including the Sac and Fox, Winnebago, and Omaha in Iowa, began to sue state governments. Though these rulings resulted in a variety of legal arrangements, they granted many Native nations greater autonomy and direct authority over the management of economically and culturally significant resources off reservation land. For Anishinaabe peoples of the Great Lakes Region, this process

⁴¹ See chapter six of Wilkinson and LaDuke, *All Our Relations*, 122.

was set in motion by a 1974 suit against the state of Wisconsin by Ojibwe spearfishers who, as in Washington, were being held subject to state fish conservation laws. The resulting 1983 *Voigt* decision clarified that, regardless of state conservation law, Ojibwe fishers could exercise harvesting rights in the ceded territory that composes the Northern third of Wisconsin.⁴² Yet even backed by federal courts, settlers continued to resist the exercise of treaty rights by the Ojibwe. White Earth Ojibwe writer and activist Winona LaDuke points out that the legal movement for food and resource sovereignty incurred considerable backlash against the Minnesota Ojibwe in the 1970s and 1980s.

Immediately following the *Voigt* decision in 1983, one Republican legislator in Minnesota went so far as to propose the White Earth Land Settlement Act (WELSA), which would have dissolved the White Earth reservation entirely.⁴³ Across the upper Midwest, the backlash was most intense among sport hunters and anglers, who blamed Ojibwe harvesters for declines in fish and game population. In some instances, anti-tribal protests turned violent, and sport hunters even shot at Ojibwe spearers in Wisconsin for their perceived violation of state hunting restrictions.⁴⁴ In 1991, escalations of this kind prompted the federal court to clarify that the Lac Oreilles Band—the plaintiffs in the *Voigt* case—had the authority to regulate the exercise of off-reservation treaty rights and that tribal conservation law would precede state law.⁴⁵

By creating a precedent for the affirmation of treaty harvesting rights and the establishment of tribal conservation bodies, legal decisions in the 1970s and 1980s laid

⁴² Lac Courte Oreilles Band of Lake Superior Chippewa Indians v. Voigt, 700 F.2d 341; For more analysis of the case and its aftermath, see Leow and Thannum, 161–91 or Thompson, 14.

⁴³ LaDuke, *All Our Relations*, 123.

⁴⁴ Leow and Thannum, 170.

⁴⁵ Thompson, 15

the groundwork for Ojibwe governments in Minnesota to begin restoring wild rice populations. The pivotal case for the MCT came in the mid-1980s. Over the preceding decades, the state of Minnesota had cultivated a lucrative tourism industry that revolved around fishing, hunting, and canoeing in the “Boundary Waters” near the Canadian border. Though much of this region is composed of the 5.5 million acres of land ceded by the Ojibwe in the 1854 Treaty of La Pointe—encompassing the city of Duluth and the mineral rich Iron Range—the Minnesota Department of Natural Resources enforced conservation laws on both ceded and public lands to regulate pressure on game. Tensions over this arrangement escalated in 1983, when a member of the Grand Portage Band shot a moose near the reservation border. State Game Wardens confiscated the moose and issued the man a citation for hunting out of season. In 1985, the other 1854 treaty signatories, the Bois Forte and Fond du Lac Bands, joined the Grand Portage Band in filing suit against the state. Citing precedent from earlier cases, the bands sought a declaration from the US District court of their rights to hunt, fish, and gather independent of state regulation. In 1988, the state granted the request and settled with the bands. But, as in the case of the later 1991 Lac Oreilles band ruling, the resulting memorandum of agreement also created a body to manage those rights and the resources on which they depended. The newly created Tri-Band Authority was entrusted with regulating culturally sensitive resources in 1854 ceded territory. The agency was renamed the 1854 Treaty Authority (TA) when the Fond du Lac Band withdrew from the agreement the next year.⁴⁶

⁴⁶ “Memorandum of Agreement,” *Grand Portage v. Minnesota*. No. 4-85-1090 (1988); Thompson, 17-18.

Natural Resource Management and the Reclamation of Ceded Territory

With several cases reaffirming their treaty rights and their authority to manage resources, in the 1990s the TA and several Ojibwe governments turned their attention to the continued decline of wild rice in the waters around Lake Superior. Throughout the twentieth century, there had already been some efforts to maintain and enhance threatened rice stands in Minnesota. Even as their subsistence practices were threatened, Ojibwe harvesters had continued to serve as stewards of the rice waters to which they still had access. The state of Minnesota passed its first conservation laws related to the plant as the popularity of rice as a commercial crop increased among Ojibwe and non-Indigenous harvesters in the early twentieth century. An initial 1931 law made it “unlawful wantonly or unnecessarily to break down or otherwise injure or destroy any wild rice plants in any public waters of this state.”⁴⁷ Even with the regulation, Ojibwe ricers brought attention to ongoing harmful harvesting practices and overuse of the crop during the 1930s. In 1939, the Minnesota legislature passed a more robust conservation bill. This law prohibited the harvest of unripe rice, limited ricing on reservations to residents (Indigenous or non-Indigenous), and implemented a licensure requirement for harvesting the plant.⁴⁸ Though it may have relieved some harvesting pressure, the Ojibwe resisted this form of conservation. Many communities felt that it replaced their traditional sociocultural system of regulating the rice harvest with paternalistic state control. Though the law was quickly amended to grant free licenses for Ojibwe harvesters, some continued to view it as a cash grab by the state.⁴⁹

⁴⁷ *Session Laws of the State of Minnesota* (St. Paul: Minnesota Secretary of State, 1931), 480. Also quoted in Vennum, 268-281, which contains more discussion of the legal history of wild rice in Minnesota.

⁴⁸ Vennum, 269-270.

⁴⁹ Vennum, 270

By the 1990s, it was clear that efforts by the state of Minnesota and other nearby state governments had done little to stem the decline of rice populations around Lake Superior. When several bands of the MCT and other Ojibwe nations undertook their own rice conservation efforts, they approached the issue on their own terms. Some of the earliest projects focused on reseeded lakes that once hosted significant stands of manoomin. For example, in the early twentieth century heavy metals from the tailings of a copper processing plant decimated wild rice populations in Sand Point Sloughs, a bay of Lake Superior in the Upper Peninsula of Michigan of great cultural importance to the Keweenaw Bay Indian Community (KBIC). In 1991, the KBIC began re-seeding the site and, by 1999 had reestablished populations robust enough for tribal members to resume harvesting.⁵⁰ In 1995, the Fond du Lac Band partnered with the TA, Bois Forte Band, and Minnesota DNR on a project to reseed the entire watershed of the St. Louis River—an inlet to Lake Superior on the 1854 ceded territory near Duluth, Minnesota. Sulfate byproducts from taconite mining had wiped out wild rice stands in the watershed during the 1960s and 1970s. In 1995, band member Larry Schwarzkopf testified before a US House subcommittee to request \$225,000 to fund the restoration initiative.⁵¹

In some instances, tribes aimed to restore the hydrology of traditionally harvested wild rice waters. Over the course of the 1990s, the Fond du Lac Band spent hundreds of thousands of dollars of its own funds to restore rice on its reservation and other tribal

⁵⁰ Evelyn Ravindran, Pamela Nankervis, Kyle Seppanen, “Keweenaw Bay Indian Community Waterfowl Index and Wild Rice Index Report: Results for 2014,” Keweenaw Bay Indian Community Natural Resource Department (February 2014); NOAA Office for Coastal Management, 24-27.

⁵¹ United States Congress House Committee on Appropriations Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related. *Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations for 1996: Hearings Before a Subcommittee of the Committee on Appropriations, House of Representatives*, One Hundred and Fourth Congress, First Session, (Washington DC: US Government Printing Office, 1995), 1148-1155.

properties. In 1998, the Band built new water control structures on Perch Lake, where the construction of a concrete dam in 1936 had flooded out wild rice, and on Rice Portage Lake, which had been reduced from 634 to 161 acres by agricultural drainage over the preceding century.⁵² In regulating water levels, especially in areas with less hydrological development, resource managers from several nations regularly removed beaver dams that were flooding rice lakes. Other management measures included the suppression of plants that compete with wild rice. By the early 2000s, both the Fond du Lac Band and the TA devoted significant resources to the mechanical removal of ginoozagoons where they displaced rice beds.⁵³

Many of these early wild rice restoration efforts resembled conventional forms of ecological restoration in that they relied on physical interventions to increase the abundance of a target species. Indeed, these methods—seeding, hydrological alterations, and species control—remain important elements of tribal wild rice management. Yet, for Ojibwe governments and tribal agencies, restoring wild rice has also involved activities tied to larger priorities of Ojibwe communities, including the exercise of treaty rights, assertion of tribal sovereignty, and efforts to sustain traditional subsistence culture. For the TA, the management of wild rice has primarily involved the assessment and monitoring of the extent of the resource in a territory over which the agency only recently regained legal authority. Darren Vogt, the Resource Management Division Director of the agency, has been on the frontline of this work. Though he is responsible for a swath of issues related to the exercise of treaty rights on ceded lands, wild rice management has

⁵² Fond du Lac Band, “2018 Integrated Resource Management Plan,” *Resource Management Division Report* (October 2017), 24.

⁵³ For more on early wild rice restoration efforts, see NOAA Office for Coastal Management. For more on species control efforts, see 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

been his focus since he joined the TA in 1996. At that time, Vogt says, “the agency was still fairly new. When thinking about which resources to work on, rice was obvious” because of its “extreme cultural and spiritual importance.” “Starting from scratch” in their efforts to manage the resource, they settled on a basic survey of wild rice waters in the ceded territory as a crucial first step.⁵⁴

Though the 1854 Treaty of La Pointe guaranteed members of the Bois Forte and Grand Portage Bands the rights to hunt, fish, and gather, settlement had limited the exercise of treaty rights in ceded territory. To assist the members of the bands in exercising those rights, TA staff needed to develop an understanding of where the rice could even be found on the territory after two centuries of environmental change.⁵⁵ Vogt recalls that, in 1996, “there were no lists of where wild rice was found, historically or currently.”⁵⁶ The agency hired a graduate student at the University of Minnesota-Duluth, who combed historical records from the Minnesota DNR and other state and federal agencies for “any mention of wild rice.”⁵⁷ Since compiling this initial list, agency staff have continued to incorporate new records and have even stumbled upon unrecorded waters. To date, the agency has identified 524 waters in the 1854 ceded territory which have, at some point, contained wild rice. Shortly after compiling the list, the agency began visiting a subset of the sites each year to determine whether they still contained harvestable wild rice. When surveying each site, staff assess the depth and clarity of the water, the abundance of rice and other vegetation, the level of development, and other characteristics of the water body and the rice population. Many of these sites are difficult

⁵⁴ Vogt, phone interview.

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Ibid.

to access, and efforts continue after nearly three decades. To date, TA staff have visited about 400 of the 524 waters on their list at least once. Comparing the modern distribution of rice to a historical baseline, this “master inventory” amounts to a detailed assessment of the damages wrought by settler colonialism on this vital cultural resource.⁵⁸

Yet colonization continues to impact rice populations today. Knowing that threats to the crop continued, in 1998 Vogt and his team set about supplementing this initial survey with a monitoring system to track ongoing changes in the abundance and health of rice populations in the ceded territory. They selected ten key ricing lakes as the sites for annual data collection. Agency staff measure several aspects of rice health and habitat quality over the course of the growing season. As soon as the water thaws in the spring, they install depth gauges in each of the lakes. They visit every other week for the remainder of the season to measure changes in the water level—one of the most important determinants of manoomin viability. In June, as the plants enter the floating leaf stage, they begin to track the density and height of the stands for that time of year. In July, staff take samples for their long-term monitoring of water quality across the territory. The “big push” comes in mid-to-late August, just before harvest, when Vogt and his colleagues measure the abundance of mature rice stalks on each of the lakes. Initially, they sampled random plots on the lakes, but since the early 2000s they have used GPS coordinates to survey rice at about forty designated sites in a grid across each lake. They count the number of plants within a survey quadrat at each site, measure the height of the stalks, and note any traces of fungal disease. Afterwards, these data are used

⁵⁸ Ibid

to estimate wild rice biomass on each lake—the single most important metric in the agency’s rice management work.⁵⁹

These two programs function in tandem to provide a foundation for the management and restoration of wild rice on the 1854 ceded territory. But they also allow the Lake Superior Ojibwe to exercise their hard-won legal authority. While the 1988 settlement with the state of Minnesota recognized the usufructuary rights of Ojibwe communities on the ceded territory, truly exercising those rights requires a knowledge of where those resources are found. Developing a detailed understanding of the historical and contemporary extent of rice is therefore a necessary first step to the effective governance of ceded territory, insofar as governance for the TA is facilitating the exercise of treaty rights. Developing this knowledge is itself a form of restoration. For centuries, the Ojibwe have been cut off from the deep knowledge of wild rice that enabled their close, reciprocal relationship to the resource. Now, the TA incorporates Western scientific techniques—including methods of plant ecology—to recover a deep understanding of rice and rebuild systems of Ojibwe stewardship once again. In these ways, assessing and monitoring the distribution of wild rice across the 5.5 million-acre 1854 territory is both an exercise of Ojibwe sovereignty and an act of cultural restoration.

Restoration ecologists might view the assessment of the historical loss of rice as providing a useful baseline for restoration activities. But this is not how Vogt and the TA think about their work. They are not aiming for the complete restoration of healthy rice stands in each of the 524 historical wild rice waters in the ceded territory. Vogt and other

⁵⁹ For descriptions of this protocol, see 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*. Or, for a more technical discussion of methods and results, see Darren J. Vogt, “Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998-2022),” 1854 Treaty Authority Technical Report 23-06 (February 2023).

tribal resource management experts are confident that the abundance and extent of wild rice has declined across the state—some estimate that as much as a third has been lost. But determining a precise historical baseline for the resource, let alone restoring it to that extent, is nearly impossible.⁶⁰ Nor is the goal of the program to maximize the abundance of existing wild rice stands year over year. Vogt warns that “it can be easy to get hung up on a short-term view,” but that the amount of rice within a single lake can and should fluctuate drastically from year to year. It is “not realistic or even good to have a bumper crop every year,” and the rice stands need to have occasional “resting years.”⁶¹

Instead, Vogt sees the mission of the program as “maintaining healthy, sustainable wild rice” in ceded territory, and just as importantly, “getting people out there harvesting wild rice.”⁶² The heart of his work is not the restoration of manoomin itself, but an effort to sustain and strengthen the mutually beneficial relationship between tribal members—and other responsible ricers—and the resource. The numbers of non-tribal, licensed “state” harvesters has declined precipitously since the 1960s. Though Vogt estimates that over 10,000 tribal members partake in the harvest annually, he suspects that they have declined significantly as well.⁶³ This is in part due to the emergence of commercial rice and the subsequent glut in the market. But part of the problem is also the loss of harvesting traditions in Ojibwe communities. For this reason, Vogt devotes much of his time to education and community engagement. He hopes that the TA can serve as “the go-to source for harvesters on how rice is looking each year.”⁶⁴ As the agency staff

⁶⁰ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

⁶¹ Vogt, phone interview.

⁶² Vogt, phone interview.

⁶³ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

⁶⁴ Vogt, phone interview.

monitor rice waters throughout the season, they provide “condition updates” on their website, which communicate to harvesters which lakes are most promising for harvest. The agency also publishes and distributes a resource guide, with information about wild rice waters on the ceded territory, the biology of the plant, harvest regulations, and instructions for harvesting and finishing rice. In recent years, they have begun hosting events intended to encourage more ricing.⁶⁵ The flagship program is an annual wild rice camp that the TA organizes with several partners. The event is open to the public and lets anyone try wild rice harvesting and processing for themselves. The agency also organizes workshops to pass on the skills of crafting traditional harvesting tools like wooden knockers and push poles. Vogt and other agency staff give talks to the community and the wider public about wild rice, its history, and threats to Ojibwe harvesting rights.⁶⁶

The work of restoring wild rice stewardship also requires ensuring that harvesting practices reflect traditional Ojibwe knowledge and stewardship of the resource. Among the Ojibwe, rice harvests have traditionally been regulated through a series of cultural customs. For instance, families often marked the lakes they harvested by placing sweetgrass braids on the shore. Rice on many lakes was often clearly managed, appearing in neat rows that also signaled to other harvesters that they should avoid those beds.⁶⁷ In some communities, a committee came together each year to collectively determine when the waters were ready to be harvested. On some reservations, where harvesting is typically restricted to tribal members, these customs persist.⁶⁸ However, they are no

⁶⁵ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

⁶⁶ Vogt, phone interview. Also discussed in 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*. For more discussion of the notion of relational restoration, see Kimmerer, *Braiding Sweetgrass*.

⁶⁷ Vennum, 266-267.

⁶⁸ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*. On the White Earth reservation, for example, ricing lakes are distributed by lottery every year. LaDuke, “The Long and Honorable Battle of the Ojibwe to Keep Their Wild Rice Wild.”

longer sufficient on ceded territory, where much of the harvesting is performed by state harvesters. In enforcing harvesting regulations, the TA draws on Ojibwe customs to ensure that people “harvest in a good way” on the 1854 ceded territory. Harvesters are required to use canoes and traditional equipment, which are designed to protect the rice from damage.⁶⁹ The season is limited from mid-August to the end of September—the traditional wild rice moon—when most of the rice has ripened and the threat of premature harvest is minimized. Harvesting is also limited from 9am to 3pm each day. There are various views as to the traditional reason for this. According to Vogt, allowing the rice to rest in the afternoon and overnight may allow it to stand back up after harvesters have boated through. Others believe that prohibiting harvests at night allows the spirits to harvest rice and that violating this tradition will result in a bad harvest the next day.⁷⁰ Regardless of the exact reason, the TA’s regulations draw on traditional harvesting knowledge to sustain the systems of reciprocity that have characterized the Ojibwe relationship with rice for centuries.

Ojibwe Ecology and the Sulfate Standard

Restoring wild rice has also been a process of remediating long-standing environmental damages to the waters that provide their habitat. When taconite mines began to open throughout the Iron Range in the late 1940s, mining companies and industry boosters convinced the Minnesota Department of Conservation (reorganized as the DNR in 1970) that it was safe to dump mineral and rock wastes from the sites directly into Lake

⁶⁹ 1854 Treaty Authority, *Wild Rice Resource Guide*, fifth edition (Duluth: 1854 Treaty Authority, 2020), 3-4.

⁷⁰ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

Superior. They reasoned that these tailings would be immobilized upon sinking to the bottom of the lake. As the industry boomed and more mines opened in the 1960s, it became clear to fisherman, environmental groups, and state and federal scientists that toxic compounds in the tailings did have a high degree of mobility. State regulators suppressed or ignored clear evidence of concentrated heavy metals and asbestiform fibers in the lake for a decade. The situation was not addressed until citizens raised concerns regarding the presence of asbestos in the water supply of the city of Duluth. The newly created Environmental Protection Agency quickly sued one of the largest taconite mining companies. The resulting 1973 *Reserve Mining Company v. United States* federal case, a landmark legal victory in the early years of the environmental era, banned the dumping of tailings in Lake Superior, but only after a decade of litigation and a quarter century of polluting the lake.⁷¹

The toxic byproducts of mining that began poisoning rice beds and people in the mid-twentieth century have continued to threaten the waters surrounding Lake Superior. When the reserve case barred mines from dumping directly into Lake Superior, mining companies began to dump tailings in ponds and small lakes near the extraction sites. These pits mitigate some risks, but they do not solve the problem of sulfate contamination. Sulfates and mercury leech from the pits into watersheds upstream of habitat for wild rice and fish. Though sulfates were not a direct concern in the *Reserve* case, evidence of their source in taconite tailings and their effects on the state's waters was already clear when the case began. In the 1940s, Minnesota Department of Conservation biologists began to document the impacts of sulfates on manoomin and

⁷¹ For more on debates over taconite tailings and the 1973 case see chapter three in Langston, *Sustaining Lake Superior*.

other waterborne plants and animals. In 1973, the Minnesota Pollution Control Agency (MPCA) was compelled by the 1972 Clean Water Act to institute a sulfate standard for the state's waters. Though this imposed a legal limit for sulfate concentration of 10 parts per million (PPM), the standard has never actually been enforced. The MPCA has attempted to force only a single taconite mine to comply, but quickly dropped the enforcement action when the company sued.⁷²

The issue has reemerged in the past two decades with the proposal of two new copper-nickel mining sites in the 1854 ceded territory. Historically, copper-nickel mining has proven even more toxic than taconite mining.⁷³ Though several Ojibwe bands have voiced opposition, the Fond du Lac Band has been one of most the vocal opponents. In the 1990s, the 1854 treaty signatory had led seeding efforts in the St. Louis River estuary—one of the areas most affected by sulfate contamination. Yet efforts to seed the sites and manage treaty rights are essentially meaningless without effective enforcement of pollution standards upstream. For the Fond du Lac Band, restoring rice requires confronting the toxic consequences of mining that have subtly undermined resource management jurisdiction on their own lands.

To that effect, the Band has spent the last 15 years advocating for the enforcement of the MPCA sulfate standard. They have written numerous comment letters and questioned review processes and draft permits for existing mines. In many of these sites, Ojibwe ricers recall healthy rice populations that no longer exist, and the Fond du Lac

⁷² On the sulfate standard see Water Legacy, “Rulemaking: Wild Rice Sulfate Standard,” Water Legacy website, n.d. or Minnesota Center for Environmental Advocacy (MCEA), *A conversation with Nancy Schuldt, the Fond du Lac Band's Water Projects Coordinator*, YouTube Video (October 2020). See also Langston, *Sustaining Lake Superior*, 153.

⁷³ Lorraine Boissoneault, “Conflicted Over Copper: How the Mining Industry Developed Around Lake Superior,” *Great Lakes Now* (June 2020).

Band's own water quality research shows that the sulfate standard has been exceeded. The Band has also requested that the EPA compel the MPCA to enforce its standard. In 2010, the federal agency notified the MPCA that it was in violation of the Clean Water Act. The state's mining industry and Republican legislature immediately pushed back. When the EPA barred the legislature from directly repealing the standard in 2011, the pro-mining faction pressured the MPCA to revise the rule. Over the next six years, the MPCA conducted a rulemaking process with multipronged lab and field studies. Though industry supporters assumed science from the 1940s would not hold up, the initial findings supported keeping the standard. According to the Fond du Lac Band, continued pressure from the industry forced the MPCA to "massage" the numbers and develop a new, more mathematically complex rule. When it was finally announced in 2017, the rule was so arcane as to be unenforceable and administrative law judge struck it down the next year.⁷⁴

With the original 10 PPM standard still sitting idle on the books, the draft permits for new copper-nickel mines are all the more egregious to the Fond du Lac Band. In 2019, the Band filed a suit against the ACOE as a "downstream state" liable to damages from the PolyMet facility—the first use of the legal designation in a suit by a Native nation. Following a successful ruling in the US district court, the ACOE suspended the permit in March of 2021.⁷⁵ For the Fond du Lac Band, creating a hospitable environment for wild rice had been a process of asserting its authority in relation to state and federal agencies as an independent and sovereign body. But as with the TA, their concerns

⁷⁴ Water Legacy, "Rulemaking: Wild Rice Sulfate Standard"; MCEA, *A conversation with Nancy Schuldt, the Fond du Lac Band's Water Projects Coordinator*; Boissoneault.

⁷⁵ Emily Levang, "Tribes', Activists' Fight Against Proposed Minnesota Copper Mine Bolstered by Legal Victories," *Earth Island Journal* (October 2021).

extend beyond wild rice populations themselves. For the Ojibwe, the waters of the Great Lakes Basin are themselves sacred. They not only provide habitat for essential resources, but play a key role in tribal spirituality, culture, and memory. They exist as a nexus of the relational network on which Ojibwe spirituality is based. As Fond du Lac elder Ricky DeFoe puts it, “we know that the waterways are connected. It’s like in the human body all the veins are connected, so it is with the waterways.”⁷⁶ For the Fond du Lac Band, concerns over the sustainability and restoration of wild rice are tied to this water-based cosmology and its inherent emphasis on ecological interconnection.

This is demonstrated by the work of Nancy Schuldt, who has been leading the Fond du Lac’s efforts to enforce the sulfate standard since she began working as Water Project Coordinator for the Band in 1997. Trained as an aquatic ecologist, she came to assist the Band in developing a water quality monitoring and standards program for reservation waters (the Fond du Lac Band is now one of the 50 or so Native nations with federally approved water quality standards). But Schuldt’s view of water quality quickly expanded. She found that it was impossible to work only on waters in reservations, and her advocacy and monitoring work has since “turned into a much broader, regional approach.”⁷⁷ Since starting with the Fond du Lac government, she has worked on mercury and methylmercury bioaccumulation in freshwater fish—another consequence of taconite mining. Mercury concentrations have prevented the Lake Superior Ojibwe from harvesting sturgeon and other culturally important species.⁷⁸ Simultaneously, she has

⁷⁶ As quoted in Levang, “Tribes’, Activists’ Fight Against Proposed Minnesota Copper Mine Bolstered by Legal Victories.”

⁷⁷ MCEA, *A conversation with Nancy Schuldt, the Fond du Lac Band's Water Projects Coordinator*.

⁷⁸ Ibid. See also Holtgren, Ogren, and Whyte, “Renewing Relatives” and chapter four of Langston, *Climate Ghosts*.

been “trying to understand the threats to manoomin and to understand what we can do to protect, preserve, and in some places, restore wild rice.” As issues of habitat toxicity and regional water quality, these concerns are linked in obvious ways. Yet, beyond that, they are both elements of a broader restorative effort focused on role of the region’s waters in providing spiritual, cultural, and nutritional sustenance to the Ojibwe.⁷⁹

Schuldt’s perspective on this work also emphasizes the importance of Two-Eyed Seeing in the Fond du Lac’s holistic view of restoration. With her background in aquatic ecology, Schuldt “appreciates wild rice not only as a phenomenal food grain” but also “respects the role that it plays in the unique ecosystems of Northeastern Minnesota.”⁸⁰ Indeed, she notes that the plant’s “exceptional sensitivity” to water level and acidity provides a window into the health of the aquatic ecosystem. As “the habitat is being improved and contaminated sediments are being remediated, part of what will indicate a healthier, restored St. Louis River estuary will be more wild rice.”⁸¹ At the same time, as a non-tribal member and settler, she resonates with a traditional Ojibwe view of women as keepers of the water. She explains that having “always felt drawn to the water,” she has “taken the role to heart.”⁸² Recently, Schuldt and the Fond du Lac Band have explored new ways of foregrounding the connections between the well-being of the wild rice, human health, communal vitality, and traditional Ojibwe knowledge. Schuldt and other Fond du Lac staff developed a 2018 Health Impact Assessment entitled “Expanding

⁷⁹ Ibid. See also Nancy Schuldt, “What Happens in the Headwaters: Mining Impacts in the St. Louis River Watershed,” presentation abstract in *Proceedings of the St. Louis River Estuary Summit* (February 2013).

⁸⁰ Ibid.

⁸¹ Ibid.

⁸² Ibid.

the Narrative on Tribal Health: The Effects of Wild Rice Water Quality Rule Changes on Tribal Health,” which illustrates this relationship:

The primary purpose of this HIA is to clearly and simply articulate the importance of manoomin to the health of the Ojibwe people. Our intent is to support the implementation and enforcement of broadly protective wild rice water quality regulations, and make additional recommendations for sustaining manoomin in Minnesota because of the fundamental importance of manoomin to tribal health. Subsistence living and maintaining cultural practices, through the exercise of treaty rights, are how modern tribal members preserve links to their ancestral generations. Within the Anishinaabe worldview, the health of manoomin and the health of the people are inseparable. Any disruption in indigenous land, place or culture clearly has a potentially harmful effect on indigenous health and wellness, which then may persist for generations to come.⁸³

The report makes clear that, for the Fond du Lac Band, the enforcement of the sulfate standard is as much an issue of tribal health, food sovereignty, and spiritual and cultural renewal as it is environmental justice and remediation. By advocating for the sulfate standard, the Fond du Lac Band’s pursuit of wild rice restoration and protection draws together Ojibwe spirituality and TEK, Western environmental science, and concerns over tribal cultural and public health.

Keeping Rice Wild

For many Ojibwe communities, the protection and restoration of wild rice has also been viewed as an issue of securing the economic viability of their traditional way of life. In addition to its cultural, spiritual, and nutritional importance, wild rice has provided a financial lifeline to Ojibwe families as they have been forced to adapt to the settler economy. The annual harvest of wild rice took on this economic importance as soon as

⁸³ Fond du Lac Band, “Expanding the Narrative of Tribal Health: The Effects of Wild Rice Water Quality Rule Changes on Tribal Health,” *Fond du Lac Band of the Lake Superior Health Impact Assessment* (2018).

the Ojibwe began trading with the French in the eighteenth century.⁸⁴ But since that time, the commodity value of the grain has also been appropriated by white communities, who began commercially harvesting the crop in the late-nineteenth century. Pressure from commercial harvest motivated Minnesota's first wild rice conservation laws in the 1930s. By the early 1950s, the harvest and sale of rice in the state was a multi-million-dollar industry.⁸⁵ The sale of state rice licenses peaked at over 16,000 in the late 1960s as demand for the crop soared.⁸⁶ Overharvesting throughout the decade damaged crops and even endangered some genetic varieties, but rice continued to serve as an essential source of income for the Ojibwe.⁸⁷ But the viability of commercial harvesting for the Ojibwe abruptly ended as farmed "paddy rice" came onto the scene in the 1970s.

Cultivated in large, flooded fields and harvested mechanically, paddy rice quickly saturated markets for the crop. The development of this agricultural industry is part of the longer history of colonial domination of the Ojibwe. As soon as European settlers encountered the Ojibwe, they began mistaking their stewardship of wild rice as "underproduction" of a potentially lucrative crop.⁸⁸ Farmers in the Upper Midwest suggested farming rice as a field crop as early as the mid-nineteenth century and, in 1950, a small group of farmers in the northern part of the state first constructed flooded paddies using earthen dikes. Though these early operations did little to influence the market, they did demonstrate the viability of farmed wild rice. This prompted corporations like Uncle

⁸⁴ Vennum, 199-211. For more on the role of rice harvesting in the Ojibwe economy in the first half of the twentieth century, see Brenda Child and Will Shakes, *My Grandfather's Knocking Sticks: Ojibwe Family Life and Labor on the Reservation, 1900-1940* (St. Paul: Minnesota Historical Society Press, 2014).

⁸⁵ Bernard Coleman, "The Ojibwa and the Wild Rice Problem," *Anthropological Quarterly* 26, no. 3 (1953): 79-88.

⁸⁶ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

⁸⁷ Milgroom, "Wild Rice and the Ojibwe."

⁸⁸ For more on the tendency of settlers to accuse the Ojibwe of rice underproduction, see Vennum, 217-218.

Ben's and Green Giant to invest in new paddies in the mid-1960s. From 1968 to 1973, paddies in the state grew from 900 to 18,000 acres. Paddy production first exceeded the rates of natural harvest in 1971.⁸⁹ By the mid-1980s, farms accounted for 95% of the commercial wild rice produced in the state. But, by this point, Minnesota's total rice production paled in comparison to Northern California, where large corporations now focused their efforts. In the late 1980s, a drastic oversupply of rice caused prices to plummet, devastating Ojibwe harvesters who still relied on sales for income.⁹⁰

Throughout the twentieth century, the state of Minnesota and its public scientific institutions supported the emergence of the paddy rice industry. In the 1950s, state agencies like the Department of Conservation and Geological Survey encouraged residents in the northern part of the state to develop means of cultivating the plant.⁹¹ In 1977, the state legislature designated the plant as the state grain, appropriating it as a symbol of settler identity and disregarding its cultural significance to the Ojibwe. The most significant contributions to the domestication of rice came from UM's Department of Agronomy and Plant Genetics. In 1951, as soon as they recognized the viability of paddy rice, the university held its first conference on the cultivation and breeding of the plant. With the support of food corporations, they soon developed research programs into the siting, planting, and harvesting of rice paddies. The university's Agricultural Extension service published this research in accessible pamphlets for rice farmers in the

⁸⁹ Figures from Ervin A. Oelke, Janis Grava, David Noetzel, Donald Barron, James Percich, Cletus Schertz, John Strait, and Robert Stucker, "Wild Rice Production in Minnesota," *University of Minnesota Extension Bulletin* 464 (May 1982), 5. For more on the commercialization of rice, see chapter six of Vennun.

⁹⁰ LaDuke, "The Long and Honorable Battle of the Ojibwe to Keep their Wild Rice Wild."

⁹¹ George M. Schwartz, *Development Possibilities of the Indian Reservation Lands in Minnesota*, 1961, report to Governor Elmer Anderson, box 1, folder 7, George M. Schwartz Papers, University of Minnesota-Twin Cities Archive, Minneapolis, Minnesota. For more on the role of the MGS, see Andrew Hoyt, "What Minnesota's Mineral Gaze Overlooks," *Edge Effects Digital Magazine* (July 2022).

state.⁹² In the 1960s, researchers like Ervin Oelke began breeding new strains of wild rice designed for harvest by industrial agricultural equipment. Funding from the Wild Rice Growers' Association and other developing professional organizations facilitated these efforts. In the early 1970s, the state legislature appropriated an additional \$150,000 to establish a Wild Rice Breeding and Genetics program.⁹³ Developing new strains of rice became the focus of research on the crop. As one USDA researcher put it, "the increasing conversion of wild rice to a domestic state hold much promise of making this crop one of increasing economic importance."⁹⁴ By 1989, UM researchers had produced and sold seven strains of the plant with a variety of desirable traits for paddy cultivation.

Ojibwe harvesters did not sit back while the paddy rice industry and UM scientists decimated a crucial source of income. As with resource management suits in the 1970s and 1980s, some looked to the courts for recourse. In 1988 *Wabizii v. Busch Agricultural Resources*, two Ojibwe harvesters sued a Californian producer which was shipping its product to Minnesota for packaging and labeling the product as "Natural Wild Rice," complete with an image of Ojibwe ricers in a canoe. Busch settled out of court, but the suit and the accompanying outcry prompted the Minnesota legislature to pass a law requiring cultivated rice to be labeled as "paddy rice."⁹⁵ Opposition escalated as Oelke's genetic research on wild rice at the UM progressed in the 1990s. In 1998, MCT president Norman Deschampe expressed growing concerns in an open letter to UM

⁹² Including, for example Oelke et al. "Wild Rice Breeding at University of Minnesota Timeline," memorandum, May 2002, box 4, Wild Rice controversy, RPP.

⁹³ Oelke, curriculum vitae, n.d., biographical files, Oelke, Ervin, University of Minnesota-Twin Cities Archives, Minneapolis, Minnesota.

⁹⁴ R.A. Anderson, "Wild Rice: Nutritional Review," *Cereal Chemistry* 53, no. 6 (1975): 949. See also P. M. Hayes, R. E. Stucker, and G. G. Wandrey, "The Domestication of American Wild rice (*Zizania Palustris*, Poaceae)," *Economic Botany* 43, no. 2 (1989): 203–14.

⁹⁵ Winona LaDuke, "Ricekeepers," *Orion Magazine* (July 2007).

president Mark Yudof. Deschampe informed Yudof that the Minnesota Ojibwe “object to anyone exploiting our wild rice genus for pecuniary gain.” He warned that “should any party be allowed to genetically manipulate the rice and mass produce the rice in paddies, that would result in harm to our reservations and our membership just as surely as if the rice were stolen directly from our rice camps.” Regardless of the intended use of the genetic information, the Ojibwe feared that “if introduced through intentional or natural means, the altered rice could prove stronger, and replace the original strains in their current habitat.” He pointed out that “rights to the rice has been the subject of treaty, and is a resource that enjoys federal protection.”⁹⁶

The UM responded to the letter by promising not to engage in genetic engineering. But the university declined to halt basic genetic research on wild rice. The following year, UM announced a new project intended to map the genome of the plant. After the lab of plant geneticist Ronald Philips completed the project in 2000, the MCT responded with another open letter demanding transparency on the project and ongoing rice research. Along with activists like White Earth member Joe LaGarde, Ojibwe opponents requested that, if the researchers insisted on studying the rice genome, that the university at least enter into an open dialogue with Ojibwe communities as “it relates to treaty rights, civil rights, federal trust responsibility, economic dislocation, and intellectual property rights of indigenous people.”⁹⁷ When they had received no response

⁹⁶ Norman W. Deschampe, letter to Mark G. Yudof, September 8, 1998, box 4, Paddy Rice Controversy 1998-2002, Ronald L Philips papers, University of Minnesota-Twin Cities Archive, Minneapolis, Minnesota (hereafter RPP).

⁹⁷ “Native Groups Criticize U of M’s Wild Rice Genome Research,” *Institute for Agriculture and Trade Policy* (May 20, 2002).

by May 2002, the White Earth Nation held a rally at a conference hosted by the College of Agricultural, Food, and Environmental Sciences.⁹⁸

By the mid-2000s, Philips and other university scientists broke the university's promise and began pursuing efforts to genetically engineer the plant. Their work with initiatives like RiceCAP, funded by the paddy rice industry, attempted to isolate specific genes that could be altered to make rice plants more amenable to large-scale cultivation and harvest.⁹⁹ When the Ojibwe continued to object, researchers and industry representatives attempted to lump their criticism in with a broader, anti-genetically modified organism reactionary backlash. University scientists argued that the concerns had "little scientific merit, and might well do harm to the maintenance of this genetic resource."¹⁰⁰ They relied on abstract and general concerns over the sustainability of the food supply, warning that without genetic crop research "food production may not increase in proportion to population growth."¹⁰¹ But wild rice had never served as a staple for any populations other than the Ojibwe and other longtime residents of Northern Minnesota, who continued to harvest the plant by hand and largely opposed the research. UM spokespeople also downplayed the adequacy of Ojibwe traditional knowledge as a way of knowing the plant. Dean of the agricultural college Charles Muscoplat argued that "the academic view and perhaps the view of Western science is one of curiosity and

⁹⁸ "Native Groups Criticize U of M's Wild Rice Genome Research."

⁹⁹ "Adaptation of Rice SSR Markers for Wild Rice Molecular Genetics and Breeding," research proposal, November 2003, box 4, Wild Rice Controversy, RPP.

¹⁰⁰ Email from Ronald Philips to Centennial United Methodist Church, May 2005, box 4, Wild rice controversy, RPP.

¹⁰¹ Ronald L. Philips, "interview Questions for '1984 Forum' TV Newsclip, box 4, Interview Forum Newsclip, RPP.

research, and the need to learn as much as you can. The Native American view is different. They don't need to understand wild rice.”¹⁰²

Though his comments diminished the validity of Ojibwe traditional knowledge as a way of knowing the resource, Muscoplat was at least correct in noting that the conflict stemmed from a fundamental difference in worldview. Ojibwe activists like LaDuke and LaGarde argued that it was precisely their way of knowing rice that justified their concerns over genetic research. Learning from generations of ricing experience, Ojibwe harvesters had a fine-tuned sense of subtle differences in varieties of rice, some of which are endemic to specific lakes and streams in the state.¹⁰³ A major concern was that engineered strains might replace natural ones diminish the biodiversity of wild rice. Though the university claimed that it would not engineer the plant, researchers like Oelke had been producing new strains since the 1960s using conventional breeding techniques. And though Philips and other researchers downplayed fears of cross-pollination from new strains developed in Minnesota, evidence suggested that there had already been isolated incidents of contamination in the 1990s.¹⁰⁴ Regardless, the university was training the scientists who would go on to genetically engineer the plant at other institutions. Agronomists and genomics researchers from the Philips lab moved onto companies like DuPont and Monsanto—known for their exploitative use of patented crop varieties in the 1990s.¹⁰⁵ Philips himself had contributed his expertise to national industry

¹⁰² As quoted by Richard Mertens, “Fight to Save Wild Rice from Destruction,” *Maquah Native American Press/Ojibwe News* (April 26, 2002).

¹⁰³ LaDuke, Ricekeepers.

¹⁰⁴ “Statewide Threats,” summary of research on cross-pollination in rice, n.d., box 4, Wild Rice Research and Legislative Testimony, RPP.

¹⁰⁵ “List of Graduate Student Advisees,” 2012, box 4, R. Philips Graduate Advisees, Post Docs, Technicians for Retirement Party, RPP.

organizations and operations in California since the 1980s.¹⁰⁶ And genetic research conducted by NorCal—another agribusiness giant—had already allowed the corporation to file patents on wild rice strains.¹⁰⁷ As bioethicist Robert Streiffer argued at the time, Ojibwe concerns over genetic research on rice were “validated by the problematic history of similar technologies, mirror many of the concerns discussed in the larger public debate about the application of biotechnology to food and to genetic resources, and are by no means limited to those who share the belief that wild rice is sacred.”¹⁰⁸ Far from an anti-scientific backlash, this skepticism was born from historical precedent and justified concern for the economic, nutritional, and cultural vitality of Ojibwe ways of living.

Some Minnesota Ojibwe also viewed the domestication of wild rice through genetic engineering as an extension of earlier assimilationist policies. LaDuke points out that early state scientific interest in the domestication of rice paralleled racialized study of the Ojibwe. In the early 1900s, anthropologist Aleš Hrdlička—a key figure in the American Eugenicist movement—visited the White Earth reservation to develop a pseudoscientific test that the BIA used to determine “Indianess” and dispossess some Ojibwe of their reservation lands.¹⁰⁹ He was assisted by fellow anthropologist and University of Minnesota researcher Albert Jenks, who later argued that dependence on wild rice “held [the Ojibwe] back from further progress.” At the same time, he recognized its potential as a commodity once separated from Ojibwe culture, for “with

¹⁰⁶ His contributions include interviews in the California Rice Report and other consulting work. “Genetic Engineering: Does it hold the key to increased yields?” in the 1982 California Rice Report, box 4, Newspaper Articles Bioengineering 1981-1990, RPP.

¹⁰⁷ Ibid.

¹⁰⁸ Robert Streiffer, “An Ethical Analysis of Ojibway Objections to Genomics and Genetics Research on Wild Rice,” *Philosophy in the Contemporary World* 12, no. 2 (January 2005): 43.

¹⁰⁹ Jill Doerfler, “An Anishinaabe Tribalography: Investigating and Interweaving Conceptions of Identity during the 1910s on the White Earth Reservation,” *The American Indian Quarterly* 33, no. 3 (June 22, 2009): 295–325.

them it was incapable of extensive cultivation.”¹¹⁰ As LaDuke puts it, these early-twentieth-century anthropologists “might not have been able to domesticate the Ojibwe, but they were determined to domesticate the wild rice.”¹¹¹ Where assimilationist policies attempted to “kill the Indian” and instill white European values and culture, later efforts to study and alter wild rice attempted to transform an Indigenous food source into a model settler cereal grain. P.G. Anderson argues that state-backed domestication of wild rice as a waterfowl feed grain in Canada was used to “undermine Indigenous claims to the land by importing hierarchies that influenced which plants should properly be considered food.”¹¹² In Minnesota, manoomin in its uncultivated form was not legible to UM agronomists as a proper cereal grain. Not unlike the federal assimilation policies toward Native Americans a century before, the domestication of wild rice through genetic manipulation was necessary to adapt it to a settler food culture and economy.

Where university scientists saw their work as contributing to the abstract problems of food production, Ojibwe opposition to the research was fueled by acute concerns over the resource and concrete, lived experiences of colonial dispossession and racism. Ojibwe resistance eventually yielded legislative and economic results. In 2005 and 2006, the state legislature considered but ultimately rejected bills that would have prohibited the growth or sale of genetically modified wild rice in Minnesota. The bills were continuously negotiated during this period, and in 2006, the MCT passed a resolution in favor of the language and measures in the ultimate version. The bill finally

¹¹⁰ Quoted by LaDuke in “The Long and Honorable Battle of the Ojibwe to Keep their Wild Rice Wild.”

¹¹¹ Ibid.

¹¹² For more on breeding of wild rice and settler colonialism see P.G. Anderson, “Grasses Tame and Wild: Imperial Entanglements in Settler Colonial Cereal Breeding and Botany,” *Environment and Planning E: Nature and Space* 1, no. 4 (December 2018): 539–60.

passed in an environmental omnibus package in 2007.¹¹³ In addition to these legal changes, the Minnesota Ojibwe have worked to secure the economic viability of the resource by creating a market for hand-harvested wild rice. In 1989, LaDuke founded the White Earth Land Recovery Project (WELRP), which seeks to reclaim Indigenous reservation lands following their loss from the Dawes Act. In the 2000s, WELRP established Native Harvest Ojibwe Products, which distributes wild rice harvested by White Earth members and seeks to restore the central role of wild rice in the Ojibwe economy. The organization was also a leading force in the passage of the 2007 bill. Other Ojibwe communities in the state, including the Fond du Lac Band, have begun selling their own “Native Wild Rice.” This economic perspective has also been incorporated into broader frameworks for wild rice restoration that emphasize its many benefits for Ojibwe communities. For example, the 2020 strategic plan for the White Earth Food Sovereignty Initiative considers ongoing traditional harvesting as a key asset in the nation’s progress towards a “strong, affordable localized food system rooted in Anishinaabe traditions.”¹¹⁴

The MCT and the State of Minnesota in the Twenty-First Century

The protection and restoration of wild rice over the past thirty years has been driven by and contributed to a multifaceted resurgence of Ojibwe society, culture, and economy. It has also provided grounds for Ojibwe nations in Minnesota to take their place as sovereign, independent bodies coequal with, rather than subordinate to, the state and its agencies. In the twenty-first century, concerns over wild rice have been the subject of

¹¹³ Walker and Doerfler, 502-503.

¹¹⁴ Zachary Paige, “White Earth Nation Food Sovereignty Initiative Five-Year Strategic Plan,” 2020, report accessed from the White Earth Nation website, <https://whiteearth.com/assets/files/natural%20resources/2020WEFSI-StrategicPlan.pdf>.

multiple Ojibwe-led partnerships with state and federal agencies, which are driven by Ojibwe knowledge, science, and tribal kinship. Since the early 2000s, the wild rice survey and monitoring program pioneered by Darren Vogt and the TA has become “the standard protocol across the Great Lakes region.”¹¹⁵ Other Ojibwe nations, including the Fond du Lac and Red Lake Bands, have modeled their own management efforts after the approach.¹¹⁶ Vogt celebrates this sharing of knowledge and has personally assisted several nations in developing their own versions of the protocol. In fact, in 2015, the TA program served as a model for the development of a standardized handbook on wild rice monitoring.¹¹⁷ The accessibility of the protocol not only empowers other tribes to better manage their ricing waters, but also facilitates the formation of intertribal initiatives. The TA and other intertribal agencies, like the Great Lakes Indian Fish and Wildlife Commission, play a central role in coordinating these efforts.¹¹⁸ The result of “an invitation for the other federally recognized Native American Tribes in Minnesota to participate in gathering and reviewing information, preparing documents, and making recommendations utilizing their own expertise,” the MCT’s 2018 Tribal Wild Rice Task Force demonstrates that tribal kinship, coordination, and knowledge sharing are necessary to manage wild rice waters in the face of apathy from the state.¹¹⁹

At the same time, over the last three decades, the TA’s methods have also shaped how Minnesota’s public agencies approach resource management. The 2007 law that

¹¹⁵ Vogt, phone interview.

¹¹⁶ Red Lake Band of the Chippewa, “Red Lake Department of Natural Resources,” n.d., brochure accessed from the Red Lake DNR website, <https://www.redlakednr.org/wp-content/uploads/15815-Brochure-PROOF-Red-Lake-DNR.pdf>.

¹¹⁷ Vogt, phone interview.

¹¹⁸ For example, the 1854 Treaty Authority website is intended to serve as a repository for reports, data, information, etc. from the many organizations involved in wild rice management (<https://www.1854treatyauthority.org/wild-rice/other-wild-rice-information.html>).

¹¹⁹ Minnesota Chippewa Tribe Tribal Wild Rice Task Force, “Tribal Wild Rice Task Force Report.”

barred the sale of genetically engineered rice also stipulated that the Minnesota DNR compile a report on the extent and health of wild rice populations in the state and potential actions to remedy its decline. A key component of the report was an account of “the current location and estimated acreage and area of natural stands.”¹²⁰ This project was only possible with the knowledge and methodology developed by the TA from its own historical research and survey work over the preceding ten years. While working on the report, the DNR also adopted a methodology for the aerial monitoring of wild rice stands which the TA had been using for its long-term monitoring program since 1999. Working with several other tribal and state partners, the DNR updated its statewide inventory in 2013. Since 2017, the MCPA has also been developing a list of wild rice waters to monitor for sulfate levels. As of 2021, the Collaborative State and Tribal Wild Rice Monitoring Program has identified approximately 2,350 wild rice waters across the state and monitors rice in 80 lakes annually.¹²¹ The DNR’s efforts to manage a resource under the purview of Ojibwe knowledge has required the agency to collaborate with Ojibwe resource managers and draw on their expertise.

These collaborative surveys of wild rice waters reflect a larger shift in the political authority of tribal resource management in the state. As Nancy Schuldt puts it, “tribal agencies have always focused on working with the DNR to ensure treaty rights are maintained, but [the DNR] has been more active in tribal led projects in the past twenty years.”¹²² Vogt agrees that “those relationships have improved in the last twenty years.”

¹²⁰ Minnesota DNR, “Natural Wild Rice in Minnesota: A Wild Rice Study document submitted to the Minnesota Legislature by the Minnesota Department of Natural Resources February 15, 2008,” report accessed from the MN DNR website.

¹²¹ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

¹²² MCEA, “A conversation with Nancy Schuldt, the Fond du Lac Band’s Water Projects Coordinator.”

They have also come with a greater appreciation of the ecological and cultural importance of rice. “Wild rice has always been important to the tribes. But state agencies and the Minnesota DNR have had more interest in improving wild rice for harvesters and for waterfowl.”¹²³ This enthusiasm is not limited to state agencies. According to Vogt, interest in partnership has increased dramatically in the past five years or so. Since then, the TA and Fond du Lac Band have worked extensively with the National Oceanic and Atmospheric Administration, the EPA, and the US Forest Service.¹²⁴ Even private entities and nonprofit groups, including Ducks Unlimited, have taken up the cause of wild rice restoration and followed Ojibwe leadership in the realm.¹²⁵

This shift is demonstrated most clearly by the ongoing restoration of the St. Louis River Estuary. In the mid-1990s, reseedling in the estuary involved a few tribal partners and the DNR, but in the past ten years, it has evolved into a flagship collaborative restoration project. Formed in 2014, a coalition of a dozen partners coordinates the effort, including tribal, municipal, state, and federal agencies as well as nonprofit organizations like the Nature Conservancy. The restoration work itself involves a division of responsibilities according to agency expertise. The TA monitors rice populations while the Fond du Lac Band—active in reseedling efforts since the 1990s—continues to source and distribute rice seed in the waters.¹²⁶ Public agencies contribute their own resources and expertise. For instance, NOAA has provided the software and coastal data to digitally

¹²³ Vogt, phone interview.

¹²⁴ This includes the St. Louis River Estuary wild rice restoration projects and ongoing monitoring efforts.

¹²⁵ Patty Murray, “A Potential Wild Rice Comeback in Green Bay” *Wisconsin Public Radio* (November 2016.) Ducks Unlimited was also a partner on the 2008 MN DNR study “Natural Wild Rice in Minnesota.”

¹²⁶ Darren Vogt, “St. Louis River Estuary Wild Rice Restoration Monitoring (2015-2022),” November 2022, technical report from the 1854 Treaty Authority website.

map the estuary and potential restoration sites.¹²⁷ But despite the impressive degree of agency buy-in, success in the St. Louis Estuary has been mixed. According to Vogt, heavy grazing from waterfowl has suppressed the recovery of wild rice populations.¹²⁸ But the structure of the program has been a positive step in the relationship between Ojibwe communities and the state. For Vogt, enthusiasm surrounding wild rice management is “great to see, as long as it’s done in the right way.”¹²⁹ Tribal leadership and open communication are key to the success of collaborative resource management projects.

Alongside rice management efforts, Ojibwe activists have also worked to build trust between researchers and Ojibwe communities in the state following the contention surrounding the genetic modification of rice. Joe LaGarde has played a key role in this process. As one of the most active opponents of genetic modification in the early 2000s, he continued to look for ways to start an open dialogue between researchers and Ojibwe communities. This included a project with the Department of Rural Sociology at UW-Madison, which was intended to “investigate and facilitate the dialogue about wild rice on and near the White Earth Reservation in Minnesota” from 2004 to 2005.¹³⁰ The 2007 omnibus bill advanced this process by requiring the DNR to convene a regular research group with tribal and state agencies. But these efforts did not foster direct communication with UM researchers until LaGarde and other collaborators convened the inaugural *Nibi* (water) Symposium in 2009. Entitled “People Protecting Manoomin: Manoomin

¹²⁷ NOAA, “Efforts to Restore Native Wild Rice in the St. Louis River Estuary,” *NOAA Fisheries News* (June 2022).

¹²⁸ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

¹²⁹ Vogt, phone interview.

¹³⁰ Kaelyn Stiles, “Honoring the Third Fire: Investigating Claims to Ownership of Seeds as Reproducible Property,” December 2007, final report for graduate student project accessed from the Sustainable Agriculture Research and Education Projects website.

Protecting People,” the symposium focused on arriving at core values for respectful and productive conversation between the university and tribal partners. The event culminated with a 2011 white paper, “Preserving the Integrity of Manoomin in Minnesota,” which “proposes that the UM and Anishinaabe nations of Minnesota embark upon building an informed relationship founded on mutual respect and reciprocity with particular regard to manoomin (wild rice).”¹³¹

As the Nibi Symposium has continued on a biennial basis, it and other efforts at relationship building have fostered more collaborative and mutually beneficial research on manoomin in Minnesota.¹³² The most significant milestone came in 2018, as a host of tribal partners and UM researchers established *Kawe Gidaa-Naanaagadawendaamin Manoomin* (“First We Must Consider Manoomin”) or the Psin (Dakota for wild rice) Collective.¹³³ The Psin Collective represents a form of research that not foregrounds Ojibwe voices, but incorporates Ojibwe values into the discursive process by emphasizing trust, relationship building, and traditional knowledge of rice. The initiative is structured to provide the tribes with oversight and open communication regarding any university research on wild rice. For example, the group works with the university to publish lists of research projects relating to rice and the faculty involved in them.¹³⁴ The Collective’s efforts have shaped ongoing genetic research that is beneficial to natural as well as paddy rice. One example is the work of Dr. Jennifer Kimball and her UM lab (the

¹³¹ “Preserving the Integrity of Manoomin in Minnesota,” 2011, white paper accessed from the Psin collective website.

¹³² For more information on the ongoing Nibi Symposium see <https://cfans.umn.edu/about/diversity-inclusion/american-indian-initiatives/nibi-miinawaa-manoomin-symposium>.

¹³³ Laura Matson, G.H. Crystal Ng, Michael Dockry, Madeline Nyblade, Hannah Jo King, Mark Bellcourt, Jeremy Bloomquist, et al., “Transforming Research and Relationships through Collaborative Tribal-University Partnerships on Manoomin (Wild Rice),” *Environmental Science & Policy* 115 (January 2021): 108–15.

¹³⁴ List available at <https://manoominpsin.umn.edu/>.

current iteration of the Wild Rice Breeding and Genetics Program). Though Kimball continues to breed new strains of cultivated rice, she also works with the tribes to assess and monitor the genetic diversity of natural wild rice stands throughout the state, ensuring the protection of the same natural sub-varieties that earlier UM research endangered.¹³⁵

Conclusion

The creation of the Psin Collective and resource management partnerships like it is the result of tireless Ojibwe advocacy over the past three decades. In that time, Ojibwe activists and governments in Minnesota have fought for recognition as independent and coequal entities with full political autonomy. But they have also shaped Minnesota's regulatory agencies and scientific institutions. Providing the substrate for this growing political authority is just one of the ways that the protection and restoration of wild rice has contributed to the renewal of Ojibwe nations in Minnesota. In fact, the meanings of wild rice restoration for tribal priorities are just as complex as the plant's role in Ojibwe life. In addition to the establishment of political authority, wild rice restoration has been a process of cultural revival, ensuring economic sufficiency, addressing concerns over tribal public health, and protecting traditional lands and resources.

In encompassing these multiple meanings, the restoration of wild rice helps reveal the path towards and meaning of Indigenous sovereignty in the twenty-first century. Lumbee political scientist David Wilkins defines tribal sovereignty as “the intangible and dynamic cultural force inherent in a given Indigenous community, empowering that body toward the sustaining and enhancement of political, economic, and cultural integrity. It

¹³⁵ Matson et al.; More information about the Kimball lab can be found at <https://wildricebreedingandgenetics.umn.edu/conservation-research>.

undergirds the way tribal governments relate to their own citizens, to non-Indian residents, to local governments, to the state government, to the federal government, to the corporate world, and to the global community.”¹³⁶ For the Minnesota Chippewa, restoring wild rice has not been a process of establishing sovereignty—it is inherent to the social fabric of Indigenous nations and is reflected, but not forged, in their treaties with the United States. But the fight to maintain healthy, sustainable wild rice populations and the networks of reciprocity that surround them has been core to the re-assertion of Ojibwe sovereignty and the cultural, political, and environmental resurgence of the Minnesota Ojibwe over the past thirty years.

¹³⁶ David E. Wilkins, *American Indian Politics and the American Political System*, 2nd edition (Lanham, Maryland: Rowman & Littlefield, 2007), 51.

CONCLUSION

The Past, Present, and Future of Ecological Restoration

Twelve-Mile Lake in far northwest Iowa is typical of the Prairie Pothole Region today. Nestled among the rows of corn and soybeans that cover Emmet County, its shallow, marshy waters provide habitat for waterfowl, muskrats, and other wildlife. As a result, local Iowans have long considered the lake and the surrounding wildlife areas excellent grounds for hunting and fishing. The state has regulated these activities and managed the site since it was posted for bass, pheasant, waterfowl, and dove in 1917. Yet though the lake continues to support an array of wildlife species, other of its characteristics differ drastically from less than a century ago. Since creating the Iowa Lakes Restoration program in 2010, the DNR has been busy removing drainage tiles to revert the permanent open-water lake to its pre-1950 status as a seasonal wetland.¹ These efforts are supported by a combination of public funds allocated for the program, hunting stamps, and direct assistance from Ducks Unlimited.

Residents of Emmet County are largely supportive of the ongoing restoration of the PPR's natural features, but they have taken issue with some details of the management of Twelve-Mile Lake. Only a few years ago, a grove of trees enveloped the wetlands—a buffer grown between surrounding farmland and the lake for much of the twentieth century. Surrounded by this awning of foliage, many local residents viewed the wetlands as an oasis amidst the unbroken expanse of farmland in the region, enjoying the

¹ Rex R. Johnson and Mark Gluick, "The History and Management of Shallow Lakes in the Prairie Pothole Region of Iowa," report from the Iowa DNR, 2016, provided on request from the Iowa DNR.

waters as a secluded, shady site for kayaking and fishing. But in July of 2022, the DNR abruptly removed the dozens of trees surrounding the lake, some more than a century old, as it embarked on long-term management plans for the site. In response to a wave of complaints from local residents, the DNR argued that, though they had been present for years, the trees conflicted with the historical conditions of a wetland at the heart of the PPR. To support their rationale, they provided aerial photography from before the tree line developed. They also made ecological arguments, pointing out that the trees provided perches for birds of prey and enabled them to suppress mammal, songbird, and game populations. But local residents were not convinced. In their comments and conversations with DNR officials, they noted the recreational value the tree line added to the site and the fact that the trees had long occupied the location. Though they did not match the DNR's specific baseline, they were historical features in their own right that provided material benefits to the area's human population.

The DNR's removal of the groves at Twelve-Mile Lake did nothing to remedy the fact that, in this part of the state, many remain skeptical of the agency's habitat management efforts. It seemed to residents that, in attempting to restore the region, the agency ought to consider the people affected by management actions as much as the ecological or historical evidence. This thesis began by making the case that ecological restoration is essentially a broad framework for—even an attitude towards—environmental management. What the widespread adoption of the logic and language of ecological restoration has amounted to, then, is a choice to frame environmental management in terms of history. Though historical baselines can be convincingly and rigorously constructed, restoration remains a deeply contingent practice. Numerous

arguments can be made about the appropriate goals for a restoration project, focusing on scientific definitions, practical needs and limitations, and a variety of cultural and political factors. For residents of Emmet County, Iowa, the notion that historical conditions ought to be the sole guide for the restoration of Twelve-Mile Lake looks like blatant disregard for the humans who are part of any environmental restoration.

In the grand scheme of things, the fate of the trees surrounding Twelve-Mile Lake has a relatively minor impact on the human and nonhuman inhabitants of the Midwest. In cases like these, the DNR counts on the fact that the controversy will blow over after a few years—the eventual aftermath of their farmland acquisitions in the early 1980s. But the contingency of restoration becomes a clear problem when we recognize that to pursue ecological restoration on a large scale is to exercise significant political power.

Historically, the ability to determine the aims of restoration projects has not been without consequences. This fact is evidenced by the Midwestern environments that have received the most attention over the course of the twentieth century. Public funding for restoration initiatives has overwhelmingly privileged sport hunting and the habitats that support it—a form of restoration driven almost entirely by the political influence of one group. But using ecological baselines as the sole basis for restoration can be equally problematic.

Though often framed as a clear-cut scientific question, practitioners have had a wide latitude in determining what is and is not a natural feature of the land in the first place.

Further, the notion that restoration even ought to focus on the most natural conditions of a site disregards the legitimate and longstanding human subsistence, economic, and cultural uses which need to be incorporated into, rather than excluded from, restored landscapes.

In the Midwest, where these kinds of political and scientific justifications supported the

restoration of game habitat and tallgrass prairie in the twentieth century, wild rice populations declined with little intervention from the state or its experts.

Decisions of this kind about the environmental features and amenities most worth restoring have shaped the landscapes of the Midwest in the twentieth century. The proliferation of waterfowl and game habitat restoration efforts across the region has created a matrix of refuges amidst a highly developed landscape. It is both a wildlife restoration success story and a testament to the narrow-mindedness of American conservation. In the years since the first Prairie Restoration Symposium at Knox College, prairie restoration has emerged as a widespread form of environmental management practiced by communities and local conservation groups as well as universities, states, and large NGOs like the Nature Conservancy. Only in the past few decades have scientists and state agencies, through Ojibwe-led partnerships and initiatives, turned their attention toward wild rice and a view of restoration as a form of cultural renewal. Attempts to restore and manage wild rice populations have expanded restoration efforts in the region to include the remediation of environmental toxicity, repatriation of Ojibwe authority over ceded territory, and even the early stages of decolonizing agricultural science.

For scientists and public agencies, these recent efforts amount to a slow but explicit acknowledgment of the importance of people in ecological restoration. They might have never come around to this realization if Ojibwe nations in the region had not brought to bear their own political authority and knowledge in developing a new vision of what ecological restoration can be. This is just one example of the ways in which ecological restoration has also profoundly changed the environmental institutions of the

Midwest. Following a century of development in the American grasslands and the resulting disaster of the Dust Bowl, the need for a restorative approach to plant ecology revived and altered the discipline in the region. Its practitioners adopted a more conservation-minded attitude and activated dormant professional networks to remake a regional community of practitioners that had declined in the preceding decades. Prairie restoration facilitated an empirical rebirth of the discipline, allowing ecologists to address new questions and ground their research in more sophisticated experimental methods. Yet Midwestern plant ecology also became entrenched in the problematic ideas that undergird settler identities in the region. For the ICC, restoration became an essential tool for recovering habitat in a highly developed region. It molded the agency around the economy and culture of sport hunting, until changing values in the 1980s forced ICC staff to think about restoration as a holistic, ecological process rather than a tool for the manufacture of game. At the same time, this new vision of environmental management and what it ought to do for Iowans ushered in a new generation of officials and a restructuring of the agency itself. Restoration has facilitated even more significant changes for Indigenous nations in the region. For the Minnesota Ojibwe, wild rice restoration since the 1990s has become a key part of a larger process of cultural, political, and economic renewal.

As a region with distinct historical, political, and environmental identities, characteristics of the Midwest itself have shaped these institutional changes. A Midwestern ecology developed in the mid-twentieth century because it encompassed, in addition to the tallgrass prairie biome, a set of networks among environmental professionals and scientific experts that connected the region's universities, public

agencies, and other environmental organizations. At the same time, a regional view elucidates the ways that environmental policy is shaped and enacted at the state, regional, and federal levels in the United States. Restoration may often be conceived of as a problem of national policy, but it plays out in the context of local culture, political economy, and environmental conditions. Even the specific history of settler colonialism in the region has shaped attempts to restore the resulting environmental damage. For the Ojibwe, freshwater systems have immense spiritual and nutritional significance. As a result, regional issues like waterborne toxicity from iron and copper-nickel mining present particular challenges to Ojibwe efforts at environmental restoration and cultural renewal. Ecological restoration in the Midwest—or in any politically, culturally, or environmentally significant region—must be examined in light of that geographic context.

The historical study of practices of ecological restoration thus provides an important window into larger changes and continuities in the history of the American Midwest since the beginning of the twentieth century. But attempts to restore the ecosystems and resources of the region also reveal much about how ecological restoration has been understood and where the framework has failed. By examining different management practices that can be grouped under this umbrella, we begin to see more clearly the assumptions around which restoration knowledge and practices are constructed. For Midwestern plant ecologists, restoration was driven by new concepts in plant ecology that dictated the precise species and conditions a restoration ought to emulate. But the restoration practices and language employed by the ICC differed in striking ways from earlier prairie restoration efforts. As a public agency beholden to sport

hunters, the ICC's restoration efforts since the midcentury had taken a more practical approach, relying on the methods which most effectively increased game populations. As citizen action laid bare the political dimensions of restoration in the latter part of the century, the ICC turned to ecological language—an expanded notion of the benefits of habitat restoration—to convince a more engaged and skeptical public that wildlife restoration policy was not special treatment, but a public good. In both cases, settler colonial ideas underlaid new techniques and approaches to land management, and these practices reinforced processes of Indigenous dispossession in the region. In short, for both prairie restoration ecologists and ICC staff, political and cultural imperatives drove the development and goals of restoration practices as much as new scientific knowledge or technical considerations.

By defining ecological restoration in this vein—as a problem of methodology and technical expertise—restoration ecologists have often limited markers of success to the abundance of one or even a few species. Modern Ojibwe stewardship of wild rice is also a form of restoration focused on one species, but one which explicitly views that species in light of its broadest possible relations to culture, history, and ecology. Indeed, one of the most important lessons of Ojibwe restoration is that we must view the process as a cultural and political issue as well as a technical one—and be honest about that fact. Though it is a single plant, manoomin encompasses much of the history and struggle of the Ojibwe people. And its restoration represents far more than an effort to stabilize populations of a native plant. While this framing is new in the sense that it differs from conventional notions of restoration, it builds on traditions of Anishinaabe culture and knowledge. The Ojibwe have long viewed wild rice as a close relative and independent

being with its own agency—a belief incorporated into management practices like the TA’s harvest regulations or the Fond du Lac Band’s tribal public health advocacy. Recently, the White Earth nation was one of several Native governments to recognize the rights of nature, granting wild rice its own legal status.² Where restoration ecologists have historically viewed the object of restoration as a distinct element of the natural world separate from humans—whether a species, ecosystem, or even ecological process—this view is alien to an Ojibwe perspective. To view the restoration of any kind of resource or ecological feature as independent of social, cultural, and economic forces is to repeat the mistakes of twentieth-century American conservation.

Additionally, the restoration of wild rice does not provide the same luxury of historical or cultural distance for Ojibwe practitioners as, say, the restoration of waterfowl habitat or tallgrass prairie by public agencies and restoration ecologists in the Midwest. The weight of cultural survival is felt in vastly different ways than the loss of biodiversity or sport game. Likewise, it is easy to historicize the North American prairie or abundant waterfowl populations of the pre-colonial period. But threats to wild rice—consequences of ongoing settler-colonial processes—are more serious than they have ever been. While agencies like the TA have made significant progress with their wild rice management, monitoring, and restoration efforts in recent years, they continue to face daunting challenges. For one, state cooperation is by no means assured in the future. As evidenced by the need to form the Tribal Wild Rice Task Force in 2018, part of the problem is that the exact meanings of and best paths towards tribal sovereignty are contested. At the same time, Ojibwe governments remain rightfully wary of efforts that,

² Dan Gunderson, “Advocates hope White Earth wild rice case will boost ‘rights of nature,’” *Minnesota Public Radio News* (September 2021).

as in this case, may be intended as political maneuvers rather than good faith attempts at reconciliation. The danger of being used as a political instrument is ever present, and in some cases, tribes are wary of being associated with some environmentalist positions. This is a concern for Nancy Schuldt. She stresses that though the Fond du Lac Band “advocates for clean land, air, water and health resources,” it “is not anti-mining or anti-industry or anti-development.”³ The advocacy of nations like the Fond du Lac Band can lead to the perception that they share the beliefs and priorities of environmentalist groups, but, as sovereign nations and independent peoples, their concerns are more complex, nuanced, and experienced in different ways.

Concerns about the future of wild rice go beyond the relationships between the Ojibwe, the state, and other organizations. For Darren Vogt, “knowledge, acceptance, appreciation of wild rice” among the public is key to the future of the resource. “A lot of people’s view of what a lake should be is different. Maybe they prefer open waters for boating, fishing, swimming, or jet skiing. We’re starting to see development on historically less-desirable lakes. What a lot of people see as a ‘weedy lake’ is a lake full of wild rice.”⁴ As a result, dealing with continued threats to wild rice in the 1854 ceded territory means educating the public. For this reason, the agency’s many workshops and presentations are open to everyone. The annual rice camp is particularly important to “raise awareness and give people an opportunity to try harvesting wild rice.” Even when

³ 1854 Treaty Authority, *Wild Rice: Culture and Science Virtual Program*.

⁴ Vogt, phone interview. While recreational development on wild rice lakes in 1854 territory is a relatively recent issue, it has been the subject of considerable controversy in Ontario. See *Cottagers and Indians*, documentary film, 2020, directed by Drew Hayden Taylor, accessed on the Canadian Broadcasting Corporation website, <https://gem.cbc.ca/cbc-docs-pov/s04e01>.

rice field work dies down in the winter, Vogt is kept busy with communication, report writing, and presentations to school groups, youth groups, and the wider public.⁵

Perhaps the most significant threats to manoomin are the ongoing environmental reverberations of settler colonialism. Though the mining industry continues to endanger the resource, the most pressing concern is now climate change. The Ojibwe have contributed relatively little to global carbon emissions, but they bear a disproportionate burden of the consequences of a shifting climate. Already the TA and other tribal agencies see the effects on wild rice. Warmer temperatures encourage waterfowl to consume rice at higher rates earlier in the season. More frequent and more severe storms often wipe out an entire year's harvest on a lake. Mostly, though, climate change has introduced uncertainty into the future of the resource and efforts to manage it. For Vogt, it raises challenging questions: "What does a changing climate do to the growing season? How does that impact rice and other competing vegetation? How does a warmer, wetter season affect pests and fungal diseases? The big unknown is understanding how these fit together."⁶ In this context, his work will only become more important over time. Surveying and monitoring the extent of this vital resource has been key to understanding and addressing the problematic history of wild rice in Minnesota. These same efforts can help sustain wild rice and the Ojibwe in a changing environment.

Another lesson we can take from the Minnesota Ojibwe, then, is that ecological restoration must ultimately be framed in terms of the future, despite the ease with which we associate it with the environmental past. Restoration ecologists, environmental managers, and policymakers will continue employing the framework as a means of

⁵ Ibid.

⁶ Ibid.

combatting the ongoing degradation of ecosystems and their processes globally. As we continue to do so, we ought to remember that restoration is not only powerful as a tool for imagining better environmental futures. It offers a framework for restoring the relationships between people and the non-human world. In the four decades since restoration ecology developed into a professional community and distinct field of environmental management, practitioners have moved towards such a view of restoration. The historical fidelity model is giving way to a focus on restoring ecosystems and their functions in the face of their inevitable coexistence with human society. At the same time, restoration ecologists have made strides in refining restoration techniques, producing ever more convincing replicas of the environments that humans have spent so long learning to alter. But like Vogt, they must take pains to avoid getting caught in the weeds—the technical problems of restoration. At the end of the day, the most pressing questions for practitioners are what kind of world we should live in and who—human and nonhuman beings alike—that world is for.

BIBLIOGRAPHY

Archival and Periodical Collections

- Arboretum Collection, Series 38/1, University of Wisconsin-Madison Archives, Madison, Wisconsin.
- Christiansen, Paul Papers, Cornell College Archives, Mount Vernon, Illinois.
- Curtis, John T. Papers, Series 7/5, University of Wisconsin-Madison Archives, Madison, Wisconsin.
- Historical Newspapers, Des Moines Public Library, Des Moines, Iowa.
- Green Oaks Collection, Knox College Archives, Galesburg, Illinois.
- Books and Periodicals Collection, Des Moines Historical Library, Des Moines, Iowa.
- Kendeigh, S. Charles Papers, 1919-1985, Series 15/24, University of Illinois-Urbana Champaign Archives, Urbana, Illinois.
- Philips, Ronald L. Papers, University of Minnesota-Twin Cities Archive, Minneapolis, Minnesota.
- Publications by those Associated with NEIU, Northeastern Illinois University Archives, Chicago, Illinois.
- Schramm, Peter Papers, Knox College Archives, Galesburg, Illinois.
- Schwartz, George M. Papers, University of Minnesota-Twin Cities Archive, Minneapolis, Minnesota.
- Shepard, Paul Papers, Knox College Archives, Galesburg, Illinois.
- Records of the Iowa Conservation Commission, RG022, State Archives of Iowa, Des Moines, Iowa.

Interviews

- Vogt, Darren. Phone interview with author. February 1, 2023.

Court Cases and other Government Documents

- An Act to Provide for the Allotment of Lands in Severalty to Indians on the Various Reservations (General Allotment Act or Dawes Act)*. Statutes at Large 24, 388-91, NADP Document A1887.
- “Memorandum of Agreement.” Grand Portage v. Minnesota. No. 4-85-1090 (1988).
- Office of Governor Mark Dayton. “Executive Order 18-08: Establishing the Governor’s Task Force on Wild Rice.” May 30, 2018. Executive Orders, Minnesota Legislative Reference Library website.
<https://www.lrl.mn.gov/execorders/execorders>.
- United States Congress House Committee on Appropriations Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related. *Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations for 1996: Hearings Before a Subcommittee of the Committee on Appropriations, House of Representatives*. One Hundred and Fourth Congress, First Session. Washington DC: US Government Printing Office, 1995.
- United States v. Wilson. 707, F.2d, 304. Eighth Circuit Court of Appeals, 1982.
- Session Laws of the State of Minnesota*. St. Paul: Minnesota Secretary of State, 1931.

Published Primary Sources

- 1854 Treaty Authority. *Wild Rice: Culture and Science Virtual Program*. YouTube Video. March 10, 2021.
- . *Wild Rice Resource Guide*. Fifth edition. Duluth: 1854 Treaty Authority, 2020.
- Anderson, R.A. “Wild Rice: Nutritional Review.” *Cereal Chemistry* 53, no. 6 (1975): 949-955.
- Anderson, M. Rebecca and Grant Cottam. “Vegetational Change on the Greene Prairie in Relation to Soil Characteristics.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 42-45. Galesburg: Knox College Biological Field Station, 1970.
- Archibald, David “Keynote Address: Man-Environment Collision.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 7-12. Galesburg: Knox College Biological Field Station, 1970.
- Bland, Marilyn K. “Prairie Establishment in the Michigan Botanical Gardens.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 46-48. Galesburg: Knox College Biological Field Station, 1970.
- Boissoneault, Lorraine. “Conflicted Over Copper: How the Mining Industry Developed Around Lake Superior.” *Great Lakes Now* (June 2020).
- Bullington, Robert A. “Competition Between Forest and Prairie Vegetation in Twenty Years of Secondary Succession on Abandoned Land in Ogle County, Illinois.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 20-24. Galesburg: Knox College Biological Field Station, 1970.
- Clements, Frederic E. *Plant Succession: An Analysis of the Development of Vegetation*. Washington DC: Carnegie Institution of Washington, 1916.
- Coleman, Bernard. “The Ojibwa and the Wild Rice Problem.” *Anthropological Quarterly* 26, no. 3 (1953): 79–88.
- Cottagers and Indians*. Documentary film. 2020. Directed by Hayden Taylor. Accessed on the Canadian Broadcasting Corporation website. <https://gem.cbc.ca/cbc-docs-pov/s04e01>.
- Cottam, Grant and H. Cameron Wilson. “Community Dynamics on An Artificial Prairie.” *Ecology* 47, no. 1 (January 1966): 88-96.
- Coukos, C. J. “Seed Dormancy and Germination in Some Native Grasses.” *Agronomy* 36, no. 4 (April 1944): 337-345.
- Curtis, John T. “A Prairie Continuum in Wisconsin.” *Ecology* 36, no. 4 (October 1955): 558–566.
- . “The Modification of Mid-Latitude Grasslands by Man.” In *Man’s Role in Changing the Face of the Earth*, edited by William L. Thomas. 721-736. Chicago: University of Chicago Press, 1955.
- . *The Vegetation of Wisconsin: An Ordination of Plant Communities*. Madison: University of Wisconsin Press, 1959.
- Curtis, John T. and H. C. Greene, “A Study of Relic Wisconsin Prairies by the Species-Presence Method.” *Ecology* 30, no. 1 (January 1949): 83-92.
- Curtis, John T. and Max L. Partch. “Some Factors Affecting Flower Production in *Andropogon Gerardi*.” *Ecology* 31, no. 3 (July 1950): 488–89.
- . “Effect of Fire on the Competition Between Blue Grass and Certain Prairie Plants.” *The American Midland Naturalist* 39, no. 2 (March 1948): 437-443.

- Curtis, John T. and Robert P. McIntosh, "An Upland Forest Continuum in the Prairie-Forest Border Region of Wisconsin." *Ecology* 32, no. 3 (July 1951): 476–496.
- Ehrenfeld, Joan G. "Defining the Limits of Restoration: The Need for Realistic Goals." *Restoration Ecology* 8, no. 1 (2000): 2-9.
- Fond du Lac Band. "2018 Integrated Resource Management Plan." Resource Management Division Report (October 2017).
- . "Expanding the Narrative of Tribal Health: The Effects of Wild Rice Water Quality Rule Changes on Tribal Health" *Fond du Lac Band of the Lake Superior Health Impact Assessment* (2018).
- Gleason, Henry A. "The Individualistic Concept of the Plant Association." *American Midland Naturalist* 21, no. 1 (January 1939): 92-110.
- Greene, H.C. and John T. Curtis. "Germination Studies of Wisconsin Prairie Plants." *American Midland Naturalist* 43, no. 1 (January 1950): 186-194.
- . "The Re-establishment of Prairie in the University of Wisconsin Arboretum." *Wild Flower* 29, no. 4 (May 1955): 77-88.
- Gunderson, Dan. "Advocates hope White Earth wild rice case will boost 'rights of nature'." *Minnesota Public Radio News* (September 2021).
- . "A Reckoning: St. Benedict nuns apologize for Native boarding school." *MPR News* (October 2021).
- Hayes, P. M., R. E. Stucker, and G. G. Wandrey. "The Domestication of American Wild rice (*Zizania Palustris*, *Poaceae*)." *Economic Botany* 43, no. 2 (1989): 203–14.
- Hoover, M. M. *Seed for Regrassing Great Plains Areas*. Washington DC: US Department of Agriculture, 1947.
- Hobbs, Richard J. and David A. Norton. "Towards a Conceptual Framework for Restoration Ecology." *Restoration Ecology* 4, no. 2 (1996): 93-110.
- Johnson, Rex R. and Mark Gluck. "The History and Management of Shallow Lakes in the Prairie Pothole Region of Iowa." Report from the Iowa DNR. 2016. Provided on request from the Iowa DNR.
- Kilburn, Paul D. "Hill Prairie Restoration." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 50-52. Galesburg: Knox College Biological Field Station, 1970.
- Kucera, Clair L. "Ecological Effects of Fire on Tallgrass Prairie." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 12-13. Galesburg: Knox College Biological Field Station, 1970.
- Landers, R.Q., Paul Christiansen, and Terry Heiner. "Establishment of Prairie Species in Iowa." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 48-49. Galesburg: Knox College Biological Field Station, 1970.
- Leopold, Aldo. *Game Management*. New York: Scribner, 1933.
- Levang, Emily. "Tribes', Activists' Fight Against Proposed Minnesota Copper Mine Bolstered by Legal Victories." *Earth Island Journal* (October 2021).
- Lincoln, George A. "Twentieth Biennial Report of the State Fish and Game Warden to the Governor of Iowa." 1912. Iowa Archives Online.
- Matson, Laura, G.H. Crystal Ng, Michael Dockry, Madeline Nyblade, Hannah Jo King, Mark Bellcourt, Jeremy Bloomquist, et al. "Transforming Research and

- Relationships through Collaborative Tribal-University Partnerships on Manoomin (Wild Rice).” *Environmental Science & Policy* 115 (January 2021): 108–15.
- Mertens, Richard. “Fight to Save Wild Rice from Destruction.” *Maquah Native American Press/Ojibwe News* (April 26, 2002).
- Minnesota Chippewa Tribe Tribal Wild Rice Task Force. “Tribal Wild Rice Task Force Report.” December 15, 2018. Minnesota Chippewa Tribe website. <https://mnchippewatribe.org/pdf/TWRTF.Report.2018.pdf>.
- Minnesota Center for Environmental Advocacy. *A conversation with Nancy Schuldt, the Fond du Lac Band's Water Projects Coordinator*. YouTube Video, (October 2020).
- Minnesota Department of Natural Resources. “Natural Wild Rice in Minnesota: A Wild Rice Study document submitted to the Minnesota Legislature by the Minnesota Department of Natural Resources February 15, 2008.” Report accessed from the DNR website.
- Murray, Patty. “A Potential Wild Rice Comeback in Green Bay.” *Wisconsin Public Radio* (November 2016).
- “Native Groups Criticize U of M’s Wild Rice Genome Research.” *Institute for Agriculture and Trade Policy* (May 2002).
- National Oceanic and Atmospheric Administration. “Efforts to Restore Native Wild Rice in the St. Louis River Estuary.” *NOAA Fisheries News* (June 2022).
- Neiland, Bonita Miller and John T. Curtis, “Differential Responses to Clipping of Six Prairie Grasses in Wisconsin.” *Ecology* 37, no. 2 (April 1956): 355–365
- Ode, Arthur H. “Some Aspects of Establishing Prairie Species by Direct Seeding.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 52-62. Galesburg: Knox College Biological Field Station, 1970.
- Oelke, Ervin A., Janis Grava, David Noetzel, Donald Barron, James Percich, Cletus Schertz, John Strait, and Robert Stucker. “Wild Rice Production in Minnesota.” *University of Minnesota Extension Bulletin* 464 (May 1982).
- Paige, Zachary. “White Earth Nation Food Sovereignty Initiative Five-Year Strategic Plan.” 2020. Report accessed from the White Earth Nation website. <https://whiteearth.com/assets/files/natural%20resources/2020WEFSI-StrategicPlan.pdf>.
- Psiñ Collective. “Preserving the Integrity of Manoomin in Minnesota.” 2011. White paper accessed from the Psiñ collective website.
- Schramm, Peter. “Preface.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 2. Galesburg: Knox College Biological Field Station, 1970.
- . “My Career in Prairie Research and Restoration.” In *Proceedings of the 24th North American Prairie Conference*, edited by Roger Anderson and Chris Brenda. 63-68. Normal: Illinois State University, 2016.
- . “A Practical Restoration Method for Tall-Grass Prairie.” In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 63-65. Galesburg: Knox College Biological Field Station, 1970.
- Shepard, Paul. *Man in the Landscape: A Historic View of the Esthetics of Nature*. Athens: University of Georgia Press, 1967.

- Stiles, Kaelyn. "Honoring the Third Fire: Investigating Claims to Ownership of Seeds as Reproducible Property." December 2007. Final report for graduate student project accessed from the Sustainable Agriculture Research and Education Projects website.
- Streiffer, Robert. "An Ethical Analysis of Ojibway Objections to Genomics and Genetics Research On Wild Rice." *Philosophy in the Contemporary World* 12, no. 2 (January 2005): 37-45.
- Red Lake Band of the Chippewa. "Red Lake Department of Natural Resources." n.d. Brochure accessed from the Red Lake DNR website.
<https://www.redlakednr.org/wp-content/uploads/15815-Brochure-PROOF-Red-Lake-DNR.pdf>.
- Robocker, W. C. and Bonita J. Miller, "Effects of Clipping, Burning and Competition on Establishment and Survival of Some Native Grasses in Wisconsin." *Journal of Range Management* 8, no. 3 (April 1955): 117-120.
- Robocker, W. C., John T. Curtis, and H. L. Ahlgren, "Some Factors Affecting Emergence and Establishment of Native Grass Seedlings in Wisconsin." *Ecology* 34, no. 1 (January 1953): 194-199.
- Vocelka, Sandra. "A Comparison of Two Transplanting Techniques in Prairie Restoration." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 49-50. Galesburg: Knox College Biological Field Station, 1970.
- Water Legacy. "Rulemaking: Wild Rice Sulfate Standard." Water Legacy website (n.d.).
- Wilson, Jim. "How to Get a Good Stand of Native Prairie Grass in Nebraska." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 61-63. Galesburg: Knox College Biological Field Station, 1970.
- Wilson, R.E. "The Role of Allelopathy in Old-Field Succession on Grassland Areas of Central Oklahoma." In *Proceedings of a Symposium on Prairie and Prairie Restoration*, edited by Peter Schramm. 24-26. Galesburg: Knox College Biological Field Station, 1970.

Secondary Sources

- Alagona, Peter S. *After the Grizzly: Endangered Species and the Politics of Place in California*. Berkeley: University of California Press, 2013.
- Allen, T. F. H., Gregg Mitman, and T.W. Hoekstra, "Synthesis Mid-Century: J. T. Curtis and the Community Concept." In *John T. Curtis: Fifty Years of Wisconsin Plant Ecology*, edited by James S. Fralish, Robert P. McIntosh, and Orie L. Loucks. 123-144. Madison: The Wisconsin Academy of Arts, Letters, and Sciences, 1992.
- Anderson, P.G. "Grasses Tame and Wild: Imperial Entanglements in Settler Colonial Cereal Breeding and Botany." *Environment and Planning E: Nature and Space* 1, no. 4 (December 2018): 539-60.
- Anderson, Roger. "History and Progress of Ecological Restoration in Tallgrass Prairie." In *Canaries in the Catbird Seat: The Past, Present, and Future of Biological Resources in a Changing Environment*, edited by C. Taylor, J. Taft, and C. Warwick. 217-225. Champaign: Illinois Natural History Survey, 2009.
- Anker, Peder. *Imperial Ecology: Environmental Order in the British Empire, 1895-1945*. Cambridge: Harvard University Press, 2001.

- Bocking, Stephen. *Ecologists and Environmental Politics: A History of Contemporary Ecology*. 2nd edition. Morgantown: West Virginia University Press, 2017.
- Buhs, Joshua Blu. *The Fire Ant Wars: Nature, Science, and Public Policy in Twentieth-Century America*. Chicago: University of Chicago Press, 2004.
- Bullard, Robert D. *Dumping in Dixie: Race, Class, and Environmental Quality*. Boulder: Westview Press, 2000.
- Callicott, J. Baird. "The Arboretum and the University: The Speech and the Essay." *Transactions of the Wisconsin Academy of Sciences, Arts, and Letters* 87 (1999): 5-22.
- Child, Brenda and Will Shakes. *My Grandfather's Knocking Sticks: Ojibwe Family Life and Labor on the Reservation, 1900-1940*. St. Paul: Minnesota Historical Society Press, 2014.
- Cittadino, Eugene. "A 'Marvelous Cosmopolitan Preserve': The Dunes, Chicago, and the Dynamic Ecology of Henry Cowles." *Perspectives on Science* 1, no. 3 (September 1993): 520-559.
- . *Nature as the Laboratory: Darwinian Plant Ecology in the German Empire, 1880-1900*. Cambridge: Cambridge University Press, 1990.
- Cronon, William. *Nature's Metropolis: Chicago and the Great West*. New York: W.W. Norton, 1992.
- . "The Trouble with Wilderness; or, Getting Back to the Wrong Nature." In *Uncommon Ground: Toward Reinventing Nature*, edited by William Cronon, 298–320. New York: W. W. Norton and Company, 1995.
- Di Chiro, Giovanna. "Nature as Community: The Convergence of Environment and Social Justice." In *Uncommon Ground: Toward Reinventing Nature*, edited by William Cronon, 298–320. New York: W. W. Norton and Company, 1995.
- Doerfler, Jill. "An Anishinaabe Tribalography: Investigating and Interweaving Conceptions of Identity during the 1910s on the White Earth Reservation." *The American Indian Quarterly* 33, no. 3 (June 22, 2009): 295–325.
- Dunaway, Finis. *Seeing Green: The Use and Abuse of American Environmental Images*. Chicago: University of Chicago Press, 2015.
- Fleischman, Thomas. *Communist Pigs: An Animal History of East Germany's Rise and Fall*. Seattle: University of Washington Press, 2020.
- Giese, Michael W. *A Federal Foundation for Wildlife Conservation: The Evolution of the National Wildlife Refuge System, 1920-1968*. Ph.D. Dissertation. American University, 2008.
- Hall, Marcus. *Earth Repair: A Transatlantic History of Environmental Restoration*. Charlottesville: University of Virginia Press, 2005.
- Harvard Project on American Indian Economic Development. *The State of the Native Nations: Conditions under U.S. Policies of Self-Determination*. Oxford: Oxford University Press, 2008.
- Hays, Samuel P. *Beauty, Health, and Permanence: Environmental Politics in the United States, 1955-1985*. Cambridge: Cambridge University Press, 1987.
- Hersey, Mark D. "'What We Need Is a Crop Ecologist': Ecology and Agricultural Science in Progressive-Era America." *Agricultural History* 85, no. 3 (2011): 297–321.
- Hicks, Emily and Melody R. Stein, "Wild Rice Waters." *Places Journal* (June 2021).

- Higgs, Eric, Donald Falk, Anita Guerrini, Marcus Hall, Jim Harris, Richard Hobbs, Stephen Jackson, Jeanine Rhemtulla, and William Throop. "The Changing Role of History in Restoration Ecology." *Frontiers in Ecology and the Environment* 12, no. 9 (November 2014): 499-506.
- Higgs, Eric. *Nature by Design: People, Natural Process, and Ecological Restoration*. Cambridge: The MIT Press, 2003.
- . "The Two-Culture Problem: Ecological Restoration and the Integration of Knowledge," *Restoration Ecology* 13, no. 1 (2005): 159-164.
- Hodson, A.C. "History of the Cedar Creek Natural History Area." *University of Minnesota Field Biology Program Occasional Papers* No. 2 (June 1985).
- Holtgren, Marty, Stephanie Ogren, and Kyle Whyte. "Renewing Relatives: One Tribe's Efforts to Bring Back an Ancient Fish." *Earth Island Journal*. San Francisco: Earth Island Institute, Autumn 2015.
- Jacoby, Karl. *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*. Berkeley: University of California Press, 2003.
- Johnston, Carol A., and Nancy E. McIntyre. "Effects of Cropland Encroachment on Prairie Pothole Wetlands: Numbers, Density, Size, Shape, and Structural Connectivity." *Landscape Ecology* 34, no. 4 (April 2019): 827-41.
- Jordan III, William R. and George M. Lubick. *Making Nature Whole: A History of Ecological Restoration*. Washington DC: Island Press/Center for Resource Economics, 2011.
- Kehoe, Terence. *Cleaning Up the Great Lakes: From Cooperation to Confrontation*. DeKalb: Northern Illinois University Press, 1997.
- Kiel, Doug. "Rebuilding Indigenous Nations: Native American Activism and the Long Red Power Movement" *Expedition* 55, no. 3 (Winter 2013): 8-11.
- Kimmerer, Robin Wall. *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*. Minneapolis: Milkweed Editions, 2013.
- . "Restoration and Reciprocity: The Contributions of Traditional Ecological Knowledge." In *Human Dimensions of Ecological Restoration: Integrating Science, Nature, and Culture*, edited by Dave Egan, Evan E. Hjerpe, and Jesse Abrams, 257-276. Washington, DC: Island Press/Center for Resource Economics, 2011.
- Kohler, Robert E. "Paul Errington, Aldo Leopold, and Wildlife Ecology: Residential Science." *Historical Studies in the Natural Sciences* 41, no. 2 (2011): 216-54.
- Koontz, Tomas M., and Jennifer Bodine. "Implementing Ecosystem Management in Public Agencies: Lessons from the U.S. Bureau of Land Management and the Forest Service." *Conservation Biology* 22, no. 1 (2008): 60-69.
- LaDuke, Winona. *All Our Relations: Native Struggles for Land and Life*. Chicago: Haymarket Books, 2016.
- . "The Long and Honorable Battle of the Ojibwe to Keep Their Wild Rice Wild." *Indian Country Today* (September 2011).
- . "Ricekeepers." *Orion Magazine* (July 2007).
- Langston, Nancy. *Climate Ghosts: Migratory Species in the Anthropocene*. Waltham, Massachusetts: Brandeis University Press, 2021.

- . *Sustaining Lake Superior: An Extraordinary Lake in a Changing World*. New Haven: Yale University Press, 2017.
- Loew, Patty and James Thannum. “After the Storm: Ojibwe Treaty Rights Twenty-Five Years after the Voigt Decision.” *American Indian Quarterly* 35, no. 2 (2011): 161-191.
- Loo, Tina. *States of Nature: Conserving Canada’s Wildlife in the Twentieth Century*. Nature, History, Society. Vancouver: UBC Press, 2006.
- Maher, Neil M. *Nature’s New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement*. Oxford: Oxford University Press, 2008.
- Makley, Michael J. *Open Spaces, Open Rebellions: The War over America’s Public Lands*. Amherst: University of Massachusetts Press, 2018.
- Manuel, Jeffrey T. *Taconite Dreams: The Struggle to Sustain Mining on Minnesota’s Iron Range, 1915-2000*. Minneapolis: University of Minnesota Press, 2015.
- Martin, Elwood M. *Draft Report: Summaries of Federal Duck Stamp Sales from 1934-2003 and of Estimated Waterfowl and Coot Hunting Activity and Success from U.S. Fish and Wildlife Service Surveys of Waterfowl/Coot Hunters from 1952-2001*. September 19, 2007. Provided by FWS staff on request from author.
- Martin, Laura J. *Wild by Design: The Rise of Ecological Restoration*. Cambridge: Harvard University Press, 2022.
- McIntosh, Robert P. “The Continuum Continued: John T. Curtis’ Influence on Plant Ecology.” In *John T. Curtis: Fifty Years of Wisconsin Plant Ecology*, edited by James S. Fralish, Robert P. McIntosh, and Orie L. Loucks. 98-122. Madison: The Wisconsin Academy of Arts, Letters, and Sciences, 1992.
- Milgroom, Jessica. “Wild Rice and the Ojibwe.” *MNopedia* (July 2020).
- Mills, Stephanie. *In Service of the Wild: Restoring and Reinhabiting Damaged Land*. Boston: Beacon Press, 1995.
- Morrissey, Robert Michael. *People of the Ecotone: Environment and Indigenous Power at the Center of Early America*. Seattle: University of Washington Press, 2022.
- Nash, Roderick Frazier. *Wilderness and the American Mind*. New Haven: Yale University Press, 1967.
- Nicolson, Malcolm. “Community Concepts in Plant Ecology: From Humboldtian Plant Geography to the Superorganism and Beyond.” *Web Ecology* 13, no. 1 (December 2013): 95-102.
- . “‘Towards Establishing Ecology as a Science Instead of an Art’: The Work of John T. Curtis on the Plant Community Continuum.” *Web Ecology* 2, no. 1 (February 2001): 1-6.
- National Oceanic and Atmospheric Administration. “Lake Superior Manoomin Cultural and Ecosystem Characterization Study.” Final Report. May 2020.
- Peacock, Thomas D. “The Ojibwe: Our Historical Role in Influencing Contemporary Minnesota.” *MNopedia* (November 2013).
- Raby, Megan. *American Tropics: The Caribbean Roots of Biodiversity Science*. Chapel Hill: The University of North Carolina Press, 2017.
- Ravindran, Evelyn, Pamela Nankervis, Kyle Seppanen. “Keweenaw Bay Indian Community Waterfowl Index and Wild Rice Index Report: Results for 2014.” Keweenaw Bay Indian Community Natural Resource Department Report (February 2014).

- Riggs, Christopher K. "American Indians, Economic Development, and Self-Determination in the 1960s." *Pacific Historical Review* 69, no. 3 (2000): 431–63.
- Riney-Kehrberg, Pamela. "A Special and Terrible Irony: Hunger on Iowa's Farms during the Agricultural Crisis of the 1980s." *The Annals of Iowa* 78, no. 4: 361–390.
- . *When a Dream Dies: Agriculture, Iowa, and the Farm Crisis of the 1980s*. Lawrence, KA: University Press of Kansas, 2022.
- Rome, Adam. *The Genius of Earth Day: How a 1970 Teach-in Unexpectedly Made the First Green Generation*. New York: Hill and Wang, 2013.
- Sandlos, John. *Hunters at the Margin: Native People and Wildlife Conservation in the Northwest Territories*. Vancouver: UBC Press, 2007.
- Sams III, Charles F. "Tribal Co-Management of Federal Lands: Acknowledging the History and Considering the Path Forward." Statement by the US Department of the Interior. March 8, 2022.
- Sayre, Nathan. *The Politics of Scale: A History of Rangeland Science*. Chicago: University of Chicago Press, 2017.
- Schuldt, Nancy. "What Happens in the Headwaters: Mining Impacts in the St. Louis River Watershed." Presentation abstract in *Proceedings of the St. Louis River Estuary Summit* (February 2013).
- Sellers, Christopher C. *Crabgrass Crucible: Suburban Nature and the Rise of Environmentalism in Twentieth-Century America*. Chapel Hill: University of North Carolina Press, 2012.
- Skillen, James R. *Federal Ecosystem Management: Its Rise, Fall, and Afterlife*. Lawrence, KA: University Press of Kansas, 2015.
- Smiley Jr., Peter C. and John Shuey. "Discovering the Roots of Ecology and Restoration Ecology in the Midwest." In *Ecological Restoration in the Midwest: Past, Present, and Future*, edited by Christian Lenhart and Peter C. Smiley Jr. Iowa City: University of Iowa Press, 2018.
- Smith, Daryl. "Prairie Restoration: Bridging the Past and the Future." *The Prairie Naturalist* 46 (August 2014): 62–69.
- Spence, Mark David. *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*. Oxford: Oxford University Press, 2000.
- Thielen, Amy. "The True Story of Wild Rice, North America's Most Misunderstood Grain," *Saveur* (August 2019).
- Tilley, Helen. *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950*. Chicago: University of Chicago Press, 2011.
- Thompson, Douglas P. *The Right to Hunt and Fish Therein: Understanding Chippewa Treaty Rights in Minnesota's 1854 Ceded Territory*. Duluth: 1854 Treaty Authority, 2017.
- Tobey, Ronald. *Saving the Prairies: The Life Cycle of the Founding School of American Plant Ecology, 1895–1955*. Berkeley: University of California Press, 1981.
- Tomblin, David C. "Managing Boundaries, Healing the Homeland: Ecological Restoration and the Revitalization of the White Mountain Apache Tribe, 1933 – 2000." PhD dissertation. Virginia Polytechnic Institute, 2009.
- Treuer, Anton. *Ojibwe in Minnesota*. St. Paul: Minnesota Historical Society Press, 2010.
- United States Bureau of the Census. *Statistical Abstract of the United States*, Washington: United States Government Publishing Office, 1980. 238.

- United States Fish and Wildlife Service. *Classification, Inventory, and Analysis of Fish and Wildlife Habitat*. Washington DC: Biological Services Program, 1978.
- van der Valk, Arnold G. "From Formation to Ecosystem: Tansley's Response to Clements' Climax." *Journal of the History of Biology* 47, no. 2 (July 2013): 293-321.
- Vennum Jr., Thomas. *Wild Rice and the Ojibway People*. St. Paul: Minnesota Historical Press, 1988.
- Vetter, Jeremy. *Field Life: Science in the American West During the Railroad Era*. Pittsburgh: University of Pittsburgh Press, 2016.
- Vogt, Darren J. "Wild Rice Monitoring and Abundance in the 1854 Ceded Territory (1998-2022)." 1854 Treaty Authority Technical Report 23-06 (February 2023).
- . "St. Louis River Estuary Wild Rice Restoration Monitoring (2015-2022)," November 2022, technical report from the 1854 Treaty Authority website.
- Way, Albert G. "Burned to be Wild: Herbert Stoddard and the Roots of Ecological Conservation in the Southern Longleaf Pine Forest." *Environmental History* 11 (July 2006): 500-526.
- Walker, Rachel Kurkee and Jill Doerfler. "Wild Rice: The Minnesota Legislature, a Distinctive Crop, GMOs, and Ojibwe Perspectives." *Hamline Law Review* 32 (2009): 499-527.
- Whyte, Kyle. "Settler Colonialism, Ecology, and Environmental Injustice," *Environment and Society* 9, no. 1 (September 2018): 125-44.
- Wilkins, David E. *American Indian Politics and the American Political System*. Second edition. Lanham, Maryland: Rowman & Littlefield, 2007.
- Wilkinson, Charles F. *Blood Struggle: The Rise of Modern Indian Nations*. New York: Norton, 2005.
- Wilson, Robert M. *Seeking Refuge: Birds and Landscapes of the Pacific Flyway*. Seattle: University of Washington Press, 2010.
- Wolfe, Patrick. *Settler Colonialism and the Transformation of Anthropology: The Politics and Poetics of an Ethnographic Event*. London: Cassel, 1999.
- Woodhouse, Keith Makoto. "Regulating Off-Road: The California Desert and Collaborative Environmentalism." *Modern American History* 2, no. 3 (2019): 321-43.
- Wrone, David R. "The Economic Impact of the 1837 and 1842 Chippewa Treaties." *American Indian Quarterly* 17, no. 3 (1993): 329-40.