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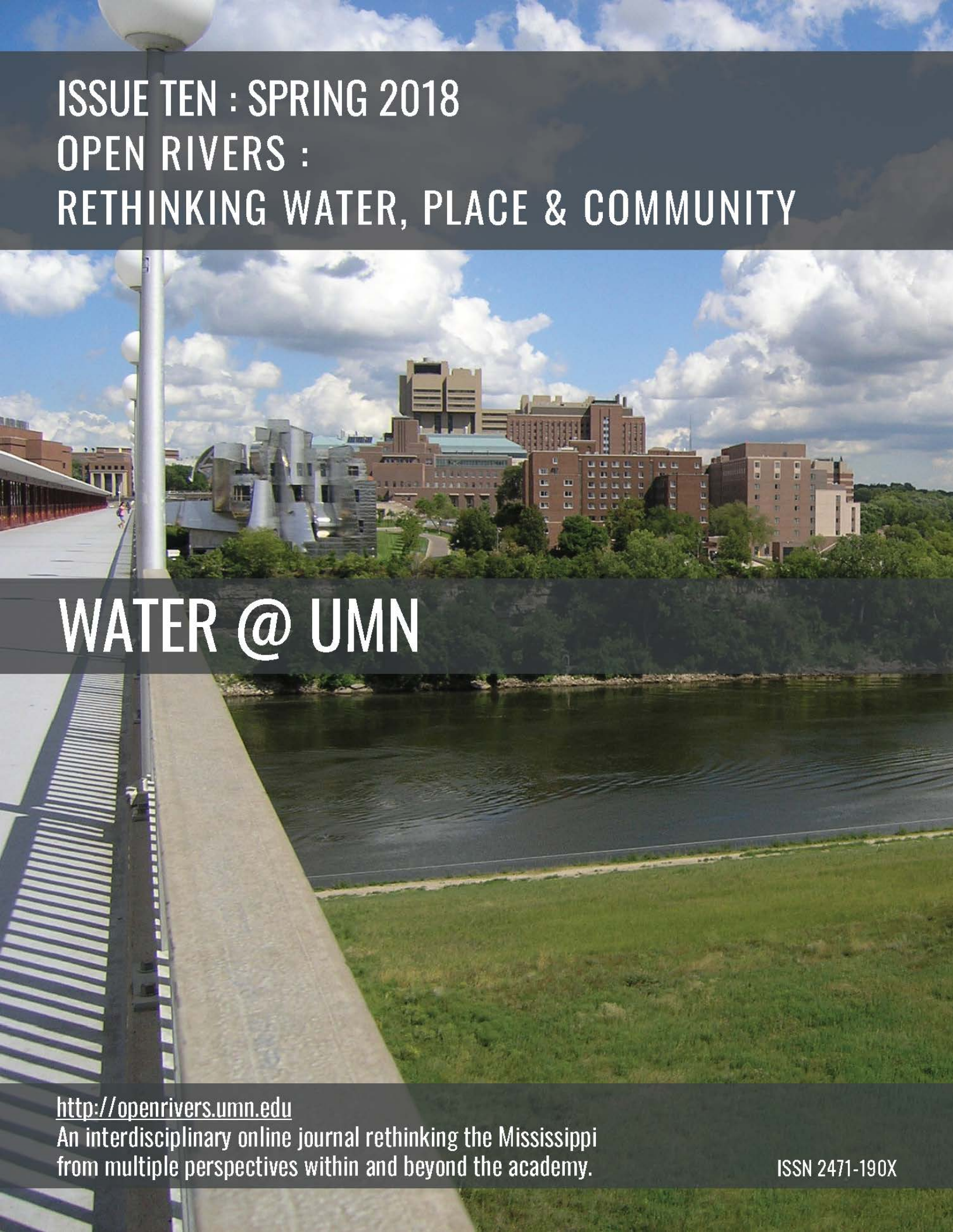

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The cover image is of The East Bank of the Minneapolis campus of the University of Minnesota and the Mississippi River from the Washington Avenue Bridge. Image courtesy of Patrick Nunnally.

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FEATURE

FIELDS: THE TRANSFORMATION AND HEALING OF THE WHITEWATER VALLEY

By Maria DeLaundreau

They say hindsight is 20/20. Farmers of the past didn't have information about environmentally friendly agricultural techniques. The farming techniques used today to reduce erosion and other negative environmental effects were developed as we learned from agriculturally derived disasters. Situated in the Whitewater River Valley less than 10 miles from the confluence with the Mississippi River, Beaver, Minnesota was one such town that suffered. Farming the steep valley slopes and floodplains contributed to a degraded landscape and exacerbated the effects of

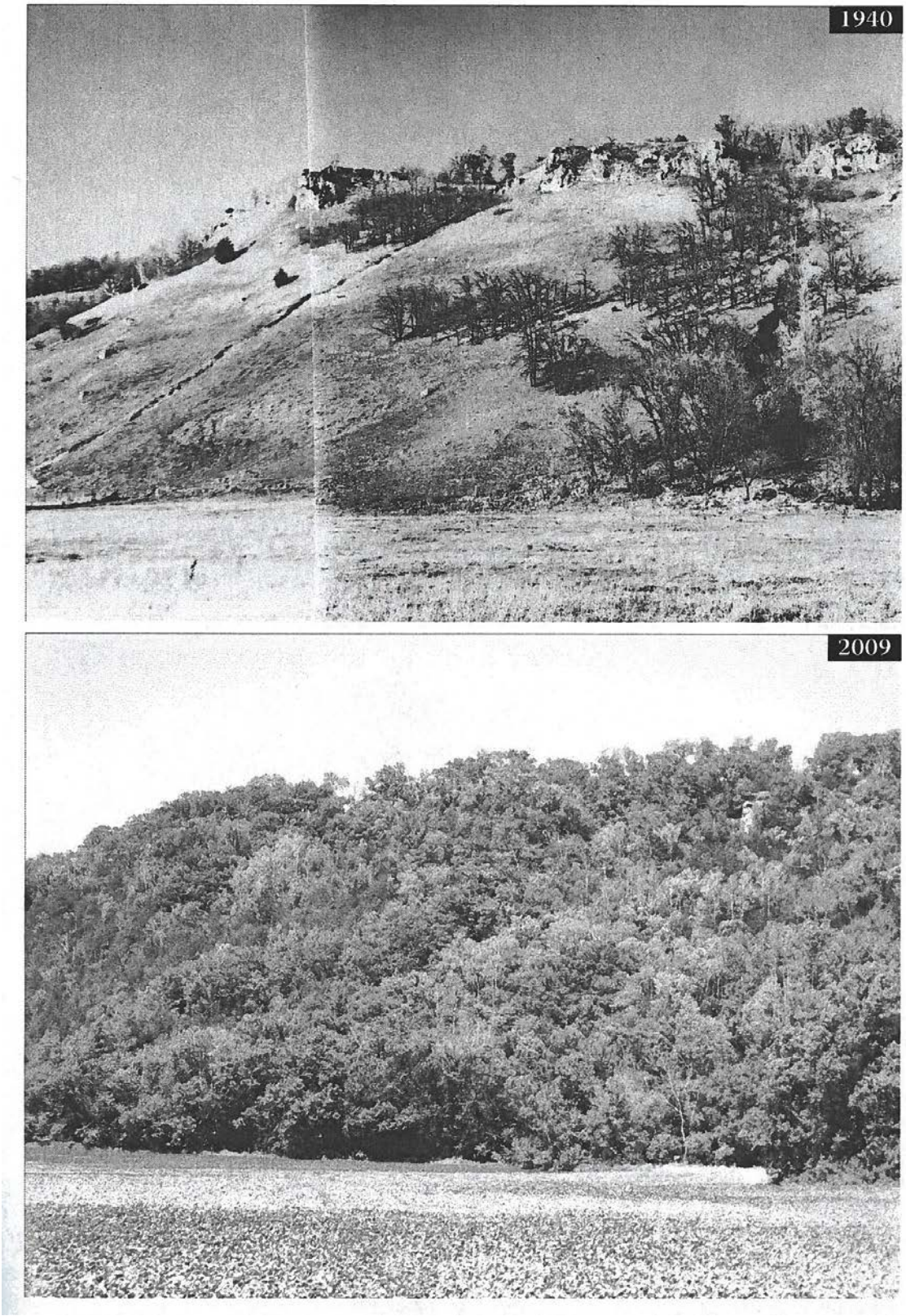
Landscape view at Whitewater Park. Notice the fields on the hillside. Image courtesy of the Minnesota Historical Society.

landscape-altering floods. In the 1920s, the town was flooded up to 20 times per year, and in 1938 Beaver was flooded 28 times. Crops and homes alike were not only flooded, but buried as the hills eroded; eventually, the floods deposited 15 feet of sediment, reaching almost to the town's second story floors. By 1940, residents were forced to abandon their community. Today the bluff country is scarred in ways that may seem subtle, but are apparent to natural resources professionals from "reading" the vegetation and soils. We are still learning how to heal this damaged natural system.

Before the catastrophe in the Whitewater Valley, there were no formal programs to prevent erosion. Preventing erosion was a critical first step toward the recovery of this region. Local farmers were eager to adopt new tillage and land management practices to prevent future disasters from erosion and flooding. National attention was likewise turning to soil and erosion issues, and in 1935 the federal government passed a law creating the Soil Conservation Service, the predecessor of the Natural Resources Conservation Service (NRCS), to implement soil-conservation practices throughout the country. Shortly after, in 1941, the Whitewater Soil and Water Conservation District (SWCD) became the ninth SWCD in the state. Together, these agencies and local farmers worked to reduce erosion.

The valley proved unsuitable for towns and agriculture, but the Izaak Walton League of Minnesota saw its potential and petitioned for the establishment of a game preserve in 1931.

Erosion was so severe this stone wall was partially buried. Image courtesy of Stanley W. Trimble.

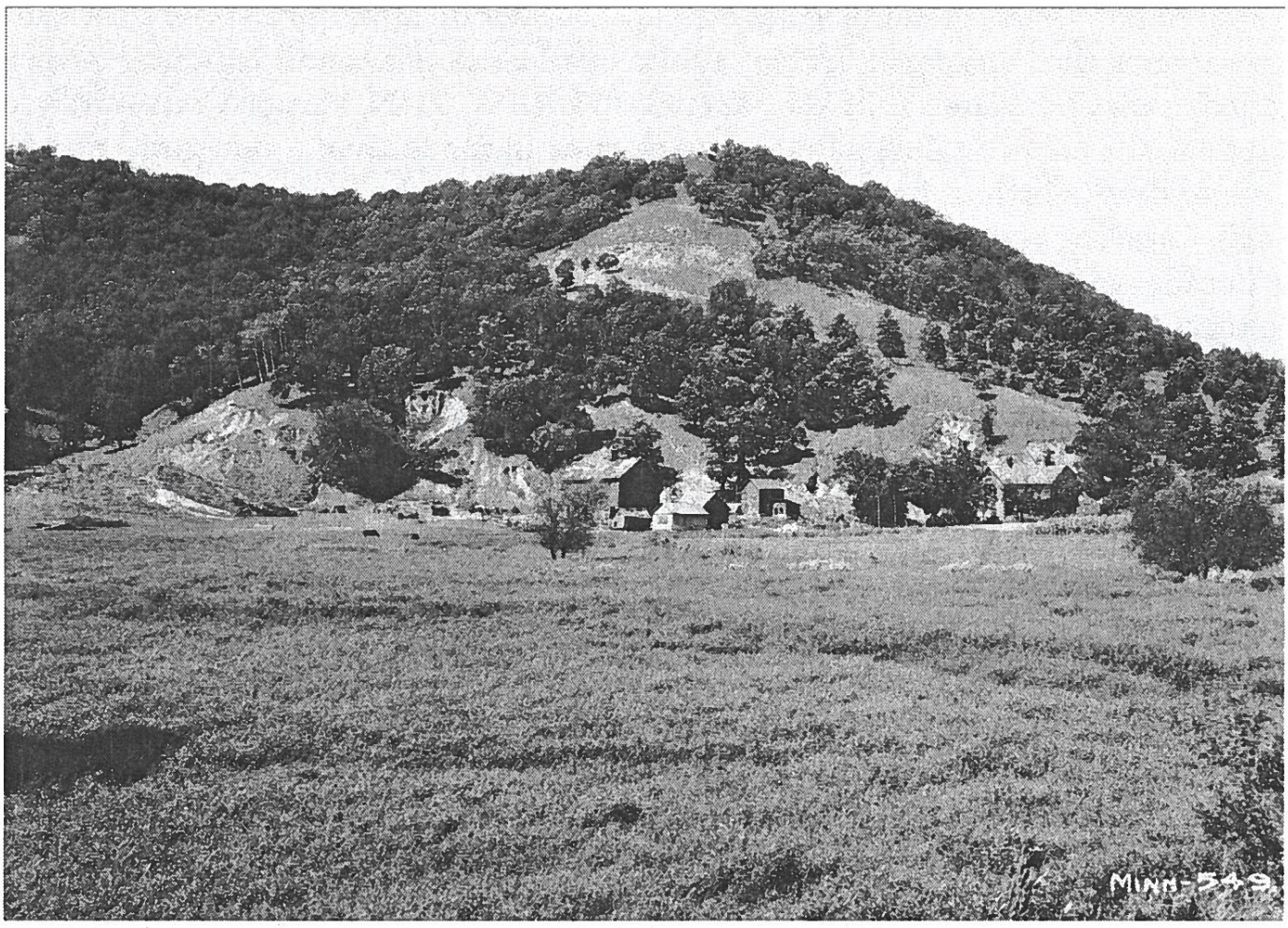


In 1940 (top) much of the native vegetation was cleared, destabilizing the soil and leading to the formation of large gullies. By 2009 (bottom) bluffs were allowed to convert back to native vegetation, stabilizing the gullies and soils. Image courtesy of Stanley W. Trimble.

Residents were relieved to sell properties whose values had plummeted, and today locals have a place to hunt and recreate. Once the geology was stabilized and the land protected, the biology was given a chance to recover.

However, native biotic communities did not reestablish everywhere in the valley on their own. Some plant communities, like sand prairies, proved resilient, and seeded in naturally, but other areas converted to low quality monocultures of an invasive species. Here invasive reed canarygrass is a symptom of historic degradation that is limiting recreation and wildlife habitat. Ten feet of silt accumulated following the floods and created an opportunity for reed canarygrass to colonize the bottomlands. This wetland grass is notorious for spreading and establishing faster than other species in bottomlands, especially when the native soils were broken apart and native seed banks buried.

Don Nelson, former manager of the Whitewater Wildlife Management Area (WMA), knew the reed canarygrass was not helping him meet the WMA's land management goals. The WMA strives to perpetuate and enhance populations of rare species and uncommon plant communities, produce wildlife for the public to hunt and fish, and support other forms of outdoor recreation, like bird watching, canoeing, hiking, photography, and foraging. The reed canarygrass fields have no rare plants or animals, provide habitat for only a handful of animals, and lack the beauty



A farm in the Whitewater Valley with a field of what is likely invasive reed canarygrass in the foreground. Image courtesy of Stanley W. Trimble.

of more diverse systems that attract recreation. The Whitewater WMA needed ecological restoration—the recovery of an ecosystem that has been degraded, damaged, or destroyed—to improve its ecological and recreational value. Unfortunately, there are no well-established practices to convert reed canarygrass in the floodplains to a forest. When my research team applied for a permit to study integrated reed canarygrass control and floodplain tree planting, Nelson saw a win-win situation.

I am a graduate student at the University of Minnesota researching how to transform degraded fields of invasive reed canarygrass to healthy native floodplain forests. The research site at Whitewater WMA stood out to me right away as I first approached it, and captured my interest. Hugging the bluffside on a minimum-maintenance, one-lane dirt road, I drove though beautiful forests before reaching a toe slope (the lower part of a slope where the incline lessens and gradually grades into the valley floor) sand prairie dense with grasses and horsetails. Birds and bugs chirped and buzzed. I cut perpendicular to the slope following the prairie perimeter down a path dividing the lively toe slope prairie from another grassland. Even to the untrained eye, these ecosystems are different. On my left, patches of different greens and tans, heights, and textures differentiated between clumps of different plant species. Butterflies, bees, and other bugs flitted and zipped, swerving around the grasses and horsetails from one colorful flower to the next. On my right, the vegetation was all one color, one height, and one texture for acres and acres. This low-diversity field was dominated by invasive reed canarygrass, and I was going to turn it into a native forest.

Reed canarygrass is poor wildlife habitat. Image courtesy of the author.

The sand prairie in the foreground supports a vibrant ecosystem, including big bluestem, Indian grass, horsetails, and beautiful flowers such as hoary puccoon, and spotted horsemint. Many beneficial pollinators and other wildlife rely on this prairie. In the distance, reed canarygrass has taken over. Image courtesy of the author.

Conservation Corps members helped researchers plant over 12,000 trees in an exact scientific layout, guided by the rope to make sure planting lines were straight. Image courtesy of the author.

The boundary between these two fields represents the boundary between a healthy and resilient prairie, and an invasive grass stifling biodiversity. Few birds nest in reed canarygrass. Forests, on the other hand, provide habitat for many birds, especially here along the Mississippi Flyway, a migration route along the Mississippi River that birds from Central America follow like a highway to the heart of North America. Bottomland forests are home to birds large and small, including red-shouldered hawks, bald eagles, cerulean warblers, and golden prothonotary warblers.

In this restoration experiment, my research team and I planted a variety of flood-tolerant trees and are controlling the reed canarygrass with herbicide for two years. This invasive species has proven stubbornly persistent over time, but it is not invincible. Spraying the herbicide on the grass weakens it, and allows trees to compete against it. As the trees grow canopies and shade the sun-hungry grass, they lessen its ability to exclude native species from growing; over time, the reed canarygrass may be replaced by a community of native species.

I am still waiting to see the long-term results of the study. Forests establish on the order of decades to centuries, not the two-year time span of masters research, but already I am delighted with some of the changes I've seen. My young trees are growing roots strong enough to withstand next year's floods. I found a tiny bird's nest in a tree that had been in the ground for only a few months, and a tree frog greeted me from another tree we planted. I'm still waiting for the trees to produce shade for me to enjoy during lunch, but when I take a break from data collection and look out across the valley, I see progress.

The valley's bluffs are covered in a mosaic of forests, prairies, and rare cliff habitats, not precarious farm fields. The native vegetation holds water longer after rain events, and releases it slowly into the river, reducing its erosive potential. The WMA boasts species so rare, they are protected under the Endangered Species Act, including the Karner Blue butterfly, rusty patched bumblebee, and threatened Leedy roseroot, a beautiful cliff-dwelling flower. River levels still naturally rise and fall, but the floods are not as devastating as before.

Seeing the landscape transform after catastrophic floods and erosion to this little Eden reminds me of nature's resiliency. Studying restoration strategies reminds me we have more to learn about areas we have damaged beyond the point of self-recovery. Collectively, we are learning from past mistakes and now take greater care to reduce erosion, safeguard our soils, and protect our waterways. I am optimistic that restoration research and implementation of the results will help our degraded floodplains at the boundary of the aquatic and the terrestrial heal, and lead to the restoration of the biodiversity and beauty. Someday these young trees will break the spell of reed canarygrass, and become a forest crowned by the flaps and chirps of colorful birds and the buzzing of contented insects. Its foundation will be touch-me-nots with exploding seed pods, cheerful cut-leaf coneflowers, and small violets. This field-turned-forest at the intersection of water and land will boast a healthy and diverse native community, with humans as an integral member of its transformation. It all began with fields.

This young cottonwood tree is thriving, and grew several feet just a few months after planting. Image courtesy of the author.

This tree frog moved in quickly after diversity was added to the floodplain in our study plots. The tree tag tells researchers this tree is located at the Whitewater site (WW), in plot 31, and is a cottonwood tree. At the end of the tag the tree gets a unique identification number, so its growth can be tracked over time. Image courtesy of the author.

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Whitewater Wildlife Management Area: Interview: Christine Johnson, Acting Whitewater WMA Manager.

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About the Author

Maria DeLaundreau coordinates and conducts land stewardship ranging from site to landscape scales, and is completing a masters degree at the University of Minnesota in natural resources science and management. She enjoys recreating in nature and delights in good tea.