Title
Grass versus trees: A proxy debate for deeper anxieties about competing stream worlds

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Abstract
Stream restoration has become an increasingly important focus in southwestern Wisconsin's Driftless Area, an unglaciated, hilly pocket of the Upper Mississippi River Basin rich in groundwater-driven coldwater streams, recreationally important trout species, and agricultural communities. Climate change is driving a major increase in precipitation and flooding across this rural and often under-resourced region, effects complicated by the ongoing legacies of white settlement and the changes it wrought to area streams, including the burial of floodplains in sediment displaced off area hillslopes. As managers work to consider how to "restore" Driftless streams, riparian vegetation—grass versus trees—has become a central and surprisingly controversial node. Current stream restoration practice typically includes the removal of riparian trees, though that practice has come under increasing criticism. Grounded in more than 5 years of qualitative and biophysical fieldwork in the region, we build from interviews gathered with 18 Driftless Area stream restoration managers from 2018 to 2020 to point to the ways that managers leverage arguments about erosion, flooding, habitat, and angler access, among other things, in service of grass and trees. Indexing the surface flows and underflows of this restoration debate, we introduce the rhetorical concept of the proxy debate to argue that debates about grass versus trees are tethered to competing perspectives on scale, temporality, and dynamism, surficial distractions from much deeper anxieties about what a stream is and should be. We turn to the ways that these distractions serve to further distance the stream restoration enterprise from acknowledging the ongoing human and hydrologic legacies of settler colonialism, and we close by suggesting that careful attention to rhetorical power—both to what arguments say and do, and to what they elide—offers a tentative first step toward restoring lands and relations by questioning what is taken for granted and what lies beneath.

Keywords
Driftless, rhetoric, settler colonialism, stream restoration, Wisconsin

Introduction
The adjacent Kickapoo River and Coon Creek watersheds in southwestern Wisconsin host one of the most popular salmonid fisheries in the United States, with over 600 km of designated trout waters serving as a major economic driver in an otherwise rural, under-resourced region (Fig. 1). Because of an abundance of groundwater-driven coldwater streams, this portion of the hilly, unglaciated Driftless Area is widely viewed as one of the last best hopes for protecting native brook trout (*Salvelinus fontinalis*) at the western edge of their range from increasing water

temperatures associated with climate change. Climate change is also driving a major increase in precipitation and flooding in the region, complicating efforts to protect brook trout and restore area streams, while pushing local municipalities and organizations to their limits as they work towards flood response and adaptation with dwindling resources. More complicated still are the ongoing impacts of white settlement on Driftless Area streams. The attempted removal of the Ho-Chunk, Sauk, Meskwaki, Santee Dakota, and Kickapoo throughout the 19th century was orchestrated to make way for white settlers who imported agricultural practices from the Eastern United States and Western Europe. Poorly suited to the Driftless Area's erosive summer thunderstorms, these practices rapidly buried valleys in up to several meters of post-settlement alluvium as topsoil eroded off the region's steep hills. The same streams that are so rich in trout species wind their ways through walls of sediment, disconnected from their floodplains meters above. These anthropogenically heightened stream banks funnel floodwaters downstream, each major rain event overtopping these banks with intensified force and violently flooding the region's narrow valleys, including the barns, homes, outbuildings, and roads that fill them.

[Insert Fig. 1]

Restoring regional streams to protect native brook trout and economically beneficial brown trout (*Salmo trutta*), and to address increasingly devastating flooding, requires reducing the slope of these steep banks and replanting riparian vegetation to stabilize them. Surprisingly, the latter has become the object of heated debate at field sites and regional stream management conferences. Current stream restoration practice in the region—supported by national, state, county, and NGO funding—typically includes the removal of riparian trees and replanting with grass, though this practice has come under criticism, as we explore here. While grassy riparian areas may, in fact, encourage narrower, deeper streams with less surface area for radiative warming, pro-grass arguments from area managers typically include concerns about tree-induced erosion and interests in improving angler access and trout habitat. On the other side of the debate are those who argue that local managers should stop removing streamside trees and instead embrace wooded streams that provide habitat complexity, offer roughness in the face of flooding, and shade water in hopes of producing the cooler temperatures brook trout require.

It seems like this management debate about riparian grass vs. riparian trees could be resolved by looking more carefully to the scientific literature, but an extensive review of the issue two decades ago (Lyons et al., 2000) did not ultimately resolve the question, and our updated review of the riparian vegetation literature came to the same conclusion: ultimately, it depends on local circumstances whether riparian grass or riparian trees are the "best" approach for shading warming streams. It would be easy to think that this biophysical uncertainty is what's driving the passion and persistence of the grass vs. trees debate in the Driftless Area. It isn't. Both sides seem convinced the science is settled in their favor.

After more than five years of fieldwork in the region, including extensive interviews with regional stream managers and residents, supplemented with repeat temperature, habitat, and geomorphic assessment of restoration sites, we insist that a focus on stream restoration discourse, influenced by our training in rhetorical studies but keenly attentive to the changing physical landscape, is key to understanding this long-standing fight, offering insight into what is actually at stake in these intense debates over Driftless grass and trees. We argue here that this debate is not so much about whether grassy or treed riparian areas are better for trout or for streams or for people, but about competing ontologies, or modes of being, of Driftless Area streams and stream management, with lessons for making sense of stream restoration debates across the country and beyond. Adapting language from Wölfle Hazard (2022: 8), the fight over grass vs. trees is a surface flow, whose explanation can be found in much deeper and more subtle underflows: "the parts of a river that can't be seen," in both their "watery materiality and in the discourses and politics that shape river governance."

In the work that follows, we look first to the surface flows of restoration discourse in the Driftless Area as managers argue over the role of riparian vegetation in trout- and flood-focused restoration efforts, then we attend to the underflows that lie beneath the surface: competing visions of scale, temporality, dynamism, and the very essence of a Driftless stream. In doing so, we argue that what seems like a scientific debate about riparian grass vs. riparian trees actually serves as a *proxy debate*, Malkowski's (2014: 119) term for "a public argument strategy whereby the language of one issue or topic stands in for and distracts from other, recurrent system-level problems." As we argue, this proxy debate about grass vs. trees is a surficial distraction from much deeper anxieties about what a stream is and should be, about past, present, and future (temporality), about myopia and connection (scale), and about the dynamic possibilities for stream systems (dynamism).

Ultimately, the proxy debate of grass vs. trees distracts from the system-level problems of settler land use and stream management, anthropogenic climate change, and the accumulation of post-settlement alluvium: a material example of what Whyte (2018: 137-138) referred to as *vicious sedimentation*, "the pattern of how environmental changes compound over time to reinforce and strengthen settler ignorance against Indigenous peoples." We argue that attention to this proxy debate and others like it is critical for engaging with underflows as active method, one that, as Wölfle Hazard (2022: 9) describes, "is of and for movements that protect and strengthen well-being in the face of settler state violence, which attempts to erase ways of living otherwise." And so, we close the essay with careful attention to the settler structures that currently narrow the imagination and practice of Driftless Area stream restoration, with hopes that our work might begin to support practitioners to engage in "restoration otherwise," what Barra (2023: 3) has described, through the Critical Restoration Geographies Collective (CritRest, 2021), as "an attempt to tell new stories about restoration that stretch and refashion its meaning as a cultural,

political, and environmental practice," broadening the possibilities of stream restoration science and management to begin to transform landscapes and relations.

Stream Restoration in the Driftless Area Context

The combination of the Driftless Area's distinct geomorphology—with broad loess-covered uplands, steep hillslopes, and deeply incised valleys (Knox, 1982)—and its tangled history of Euro-American settlement—with the profound changes to the landscape that resulted from the conversion from prairie, forest, and oak-savannah to cropland and pasture—produced devastating erosion, flooding, and downstream sedimentation that dramatically altered the form and function of its stream-floodplain ecosystems (Happ, 1944; Knox, 2006). These widespread changes were the tangible residue of white settlement and had immediate negative economic consequences on even settlers themselves, both in terms of agricultural productivity and flood damages. These negative impacts ultimately inspired a movement towards repair: not of the fundamental processes of disenfranchisement that removed Native peoples off these lands, but of the region's hillslopes and streams, spawning a new era of land and water conservation highlighted by the creation in 1933 of the U.S. Soil Conservation Service's first pilot project in the Coon Creek watershed (Anderson, 2002; Leopold, 1935). While improvements in agricultural land and water management over the 20th century led to decreased erosion (Trimble and Lund, 1982), decreased flooding (Potter, 1991), and increased baseflows (Gebert and Krug, 1996), local streams continued to provide poor habitat for native fish as a consequence of erosive floods, burial of riparian wetlands by as much as several meters of post-settlement alluvium, and subsequent erosion of high vertical banks. By the 1950s, local rod and gun clubs, followed by state and county conservation agencies, implemented habitat enhancement techniques to add in-stream structure and minimally re-slope steep banks, which they hoped would slow erosion and support flood attenuation, as well as improve trout habitat (Vetrano, 2019). None of this work addressed the root cause of the damage—the introduction of white settlers and their agricultural practices to the region, which rapidly transformed stream-floodplain systems—but it did work to make Driftless streams more habitable for native brook trout and especially for introduced brown trout. Ultimately, these efforts have made the Driftless Area a major destination for trout anglers in recent decades, contributing over $957 million in direct spending to the Driftless economy in 2015 (Anderson, 2016).

This emphasis on recreational trout angling, coupled with the accelerated impacts of flooding, have made stream restoration a widespread activity across the region. Major U.S. non-profit Trout Unlimited's Driftless Area Restoration Effort and their partners coordinated 50 stream restoration projects in 2017 alone, projects that included the removal of riparian trees and their replacement with grass, 3:1 sloping of banks, installation of in-stream structures, and, in Wisconsin's portions of the Driftless Area, the addition of rock riprap along streambanks (Johnson, 2019) (Fig. 2). These efforts continue to be complicated, however, by the increasing frequency of storm events in the region (WICCI, 2021; Neri et al., 2020) and their impacts on

reach-based restoration projects. The stability of restoration efforts—their ability to persist intact through major flood events—has become a primary indicator in some regional management conversations for the success of stream restoration efforts, but that stability often comes at the expense of the installation of larger and larger boulders into streambanks, which work to lock anthropogenically aggraded stream corridors into place. Increasingly frequent flooding during the summer construction season troubles the common practice in Wisconsin portions of the Driftless Area to dirt and re-seed these boulder-stabilized banks; summer floods increasingly wash out freshly seeded restoration sites, compromising hopes for lush, grassy riparian areas post-restoration, and posing problems for road crossings and related infrastructure.

[Insert Fig. 2]

This is the important biophysical, economic, and social landscape that shapes—and is shaped by—debates about Driftless stream restoration practice. State fisheries researchers and practitioners are pressured to understand the changing dynamics of regional streams and plan for an uncertain future for an array of recreationally and culturally important fish species. County managers are hard-pressed to respond to these changing stream conditions, under urgent demands from imperiled landowners, often with increasingly limited resources. Those landowners, many of whom are in the agricultural sector, are pressed to increase their livestock and crop production, while following the specific conservation dictates of Natural Resources Conservation Service funding programs, many of which provide crucial funding for restoration efforts. Trout Unlimited managers, meanwhile, tend to find themselves with more consistent funding for stream restoration projects, but funding that is tied, as least implicitly, to the desires of their constituents, many of whom hail from metropolitan centers like the Chicago Area and the Twin Cities, and travel to the Driftless Area on weekends and vacations for prized brown trout. All the while, these various groups try to work together to restore the most possible stream miles, while navigating just exactly what "restoration" means in this complex and ever-changing context.

Attending to Discourse

Our research in Wisconsin's Driftless Area attends to the discourses that circulate about restoration, flooding, and management in the region, while just as carefully attending to the biophysical and social landscapes in which these discourses circulate and which they, in turn, shape. Across our team's qualitative research interviews, which we focus on here, our oral narratives gathered from community residents, and our temperature, habitat, and geomorphic stream surveys, we are interested in the ways that the biophysical landscape impacts the discursive, the discursive impacts the biophysical, and how this whole interwoven ecology is deeply impacted by ongoing legacies of injustice. We work in the spirit of critical physical geography, what Lave et al. (2018: 4), working from Lave (2014), described as, "an emerging body of work that brings together social and natural science in the service of eco-social

transformation, combining attention to power relations and their material impacts with deep knowledge of particular biophysical systems."

Our discourse-focused methodology is also heavily informed by perspectives from rhetorical studies, "the academic discipline devoted to the persuasive power of language, including argument, public discourse, and civic engagement," which focuses on, "the capacity of language to persuade audiences, connect individuals, and affect the biophysical world" (Gottschalk Druschke and McGreavy, 2016: 46). And we find much in this approach that corresponds with recent work from Wölfle Hazard (2022), who, as we described above, focuses on underflows in U.S. river management. Early in the text, Wölfle Hazard (2022: 8) first introduces underflows as, "the parts of a river that can't be seen," and describes a central focus on underflows, "both in their watery materiality and in the discourses and politics that shape river governance." These underflows, "percolate and influence conceptual surface flows of settler-colonial river management and the mainstream ecology, hydrology, social science and economics that shape it" (Wölfle Hazard, 2022: 8). We borrow that framing to explore the discourses and anxieties that sit beneath the surface of the grass vs. trees debate, focusing on this first version of underflows, on the "discourses and politics that shape river governance," to consider Wölfle Hazard's (2022: 9) second and more central framing of underflows as "a practice, an orientation, and an invitation to attend to hidden flows and their movements, excesses, and relations," a method "of and for movements that protect and strengthen well-being in the face of settler state violence, which attempts to erase ways of living otherwise." Like Wölfle Hazard, we are interested not only in the surface debates of stream restoration, but in the underflows bubbling just below the streambed, and of the possibilities those might open for reimagining well-being in restoration science and management in the Driftless Area and beyond.

To attend to these underflows and their possibilities, we have been monitoring restoration- and flood-induced changes in geomorphology, habitat, vegetation, and stream temperature on area stream reaches, gathered 165 flood-focused oral narratives with community members, and conducted 34 semi-structured research interviews with Driftless area stream managers, including the 18 riparian vegetation focused interviews that we focus on here, recorded from August 2018 to November 2020 with two federal employees, eight current or retired state employees, six non-profit employees, and two private consultants. Interviews were conversational in nature but followed a script based on local knowledge and related research (Lyons et al., 2000a; Lave, 2012; Gottschalk Druschke & Hychka, 2015; Hychka & Gottschalk Druschke, 2017; Lundberg et al., 2022) and included questions about the interviewee's background in stream restoration, how their views have changed over time, their trusted sources of information, their perspectives related to riparian grass and trees in the region, and their views on stream health, restoration goals, and restoring for form vs. process. This study was reviewed by the Institutional Review Board at the University of Wisconsin-Madison and was determined to be exempt.

All audio recordings were professionally transcribed, with each transcript then quality controlled for accuracy, de-identified, and imported into Atlas.ti Cloud. Team members co-created a shared coding document, participated in a norming session, and then individually coded all transcripts, identifying arguments used to support riparian grass vs. trees, as well as related perspectives. Team members focused on both content analysis (Krippendorf, 1989; Hsieh & Shannon, 2005) and rhetorical analysis (Bazerman & Prior, 2003; Gottschalk Druschke et al., 2019), attending to both the validation of common discursive themes, what we refer to here as surface flows, as well as the broader framings of discursive arguments and how those shape the experiences and understandings of restored streams, something akin to Wölfle Hazard's underflows.

We note that, unlike Wölfle Hazard, the underflows we point to here are not inherently liberatory; instead, we see underflows as embodying the anxieties and imaginaries that seem to infuse stream restoration practice in the Driftless Area. But we suggest that attention to these material, discursive, and political underflows—and to the surface flows with which they interact and through which they are sometimes obscured—is necessary to understand current debates over restoration science and management, to consider power relations and their material impacts, and to imagine eco-social transformation by undermining settler colonial logics of stream restoration practice, a point to which we will return.

Surficial Conflicts over Riparian Vegetation

A tense disagreement about riparian grass and trees circulates through stream management conversations in southwestern Wisconsin, so our first round of analysis was closely focused on the grass and tree discourses sitting near the surface of this debate. These analyses helped us see that stream restoration managers often pointed to a relatively bounded set of common arguments supporting riparian grass or riparian trees, and these analyses were important for us to understand the ways this debate plays out discursively and materially, but also to begin to see the connections between these surface flows and the underflows that lie beneath.

Surface Flows: Arguments for Riparian Grass

Pro-grass perspectives tended to be concentrated across regional trout-focused nonprofits and state-level fisheries departments, managers focused primarily on recreational fisheries. Sometimes, these managers pointed to grassed riparian corridors as an inherent good, connected to a healthy stream system in the Upper Midwest's savannah-dotted landscape. As one representative state manager argued, "I mean, what would be best for the stream and the stream corridor, would be to remove all trees" (State 5, 10/15/2020). A nonprofit manager emphasized a similar point, suggesting grassy riparian areas as the natural state of area streams. Describing a past project in the region, they recalled, "All they did was take a chainsaw and went down the stream and cut down the rows [of riparian trees] and just let the grass grow and burn it every year. And it healed. The stream healed on its own" (Nonprofit 2, 2/1/2019).

In addition to this argument about the natural-ness of riparian grass was an argument for its usefulness for trout and trout anglers. Many managers pointed to the capacity for grass-lined streams to create the kinds of overhead cover that mature brown trout love, as well as supporting more aquatic and terrestrial food production. Managers pointed to trout's dependence on grazing macroinvertebrates who depend on sunlit streams, and thus struggle in tree-lined, shaded stream reaches: "They're grazers so if you open up that [tree] canopy, more sunlight hits that stream bottom, more plant growth is available, and it just increases the carrying capacity of those streams" (Nonprofit 6, 10/16/2020). Sometimes explicitly and often implicitly, many of these managers focused on the needs and interests of not just trout, but trout anglers, noting that tree removal creates easier access for stream-based recreation, particularly for economically important fly fishing in the region, and the open canopy necessary for most anglers to cast a fly rod. As one federal manager explained, state managers are quite literally beholden to managing for what license holding anglers want, and what they want, they suggested, is a picturesque grassy stream corridor that's easy to access. As they argued, "Regardless of what discoveries are made in terms of the original ecological site description, you must compete against people's aesthetic values of what a stream should look like, and people who wanna fish it and kind of enjoy that element of it. It's not compatible with trees and brush. So yeah, they just want the babbling brook that you can see, you know. And I mean everyone can understand that, right?" (Federal 2, 11/2/2020).

These arguments in favor of riparian grass were often linked with arguments against riparian trees. Where riparian trees would seem to provide important shading for warming streams, grass-forward managers suggested this thermal benefit didn't matter in the Driftless context because of abundant, cool groundwater. As one manager suggested, "We don't need to shade for the cold water. We've got springs that are streams as you go down. In fact some of our streams get colder as you go down because of the streams coming into it. So we don't need the shade part of trees" (Nonprofit 6, 10/16/2020). Other managers went a step further to argue that riparian trees have a significant negative impact, suggesting that trees cause and worsen erosion, exacerbating flood impacts. As one state level manager insisted, "What we've found after most flooding occurs is that woody vegetation can have a big impact on the riparian and in-stream habitat. Many times you have one single tree along the stream bank. After a major flood you're gonna have a big scour hole on the stream bank, downstream from that one tree. If you have many trees, you have possibility for flood debris catching on the trees and then constricting the floodway and then you have more damage in stream… [and] lose a lot of previous stream restoration work and a lot of nice habitat" (State 5, 10/15/2020).

Crucially, this pro-grass view is codified into restoration policies and planning for Wisconsin portions of the Driftless Area, where, as we detailed above, restoration plans created by Driftless Area county conservation departments, in partnership with Trout Unlimited, Wisconsin Department of Natural Resources, and the Natural Resources Conservation Service, typically

feature the removal of riparian woody vegetation, the 3:1 tapering of streambanks, the addition of rock riprap, and the application of topsoil and grass seed mixes. But while these arguments for streamside grass dominate restoration planning in Wisconsin portions of the Driftless Area, our interviews demonstrated that not all area restoration managers agree with this approach.

Surface Flows: Arguments For Riparian Trees

A number of interviewees responded with varying levels of annoyance, exhaustion, and anger about the central role of riparian grass in Driftless stream restoration, and the arguments on which it relies. Several of our interviewees—often those with at least some background in geomorphology—tried to debunk a number of these pro-grass claims, expressing frustration with what several interviewees felt was a lack of straightforwardness about the importance of angler demands for driving restoration planning decisions and questioning some managers' claims about the relationship between treed riparian corridors, erosion, and stream health.

One consultant expressed a view we heard from several interviewees about a lack of straightforwardness about Trout Unlimited's priorities, suggesting they make decisions in support of adult brown trout but claim to manage for ecosystem health. As they saw it, Trout Unlimited promotes riparian grass in Driftless restoration efforts to make it easier for anglers to access area streams, a point that was confirmed by the federal manager above. As one consultant argued, "I feel like very much the Trout Unlimited folks, whether or not they'd admit it, are worried about angling ease" (Consultant 2, 12/18/2020). Another expressed this frustration and connected it to the entire grass vs. trees debate. Referring to Trout Unlimited, they suggested, "Their management is not based on good science. So this grass vs. trees thing is just, like, nonsense, I think… And I would like to see that kind of shot down. I don't care if they still wanna do prairie projects, that's fine. But don't say things like trees cause erosion and stuff like that kinda nonsense" (Consultant 1, 12/18/2020). A state manager extended this critique, questioning whether angler access should be conflated with what might be best for the fishery, particularly when it comes to supporting native brook trout. They reflected on recent research on restoration efforts focused on pastoral riparian zones and offered, "I question how that is good habitat management for brook trout. I understand it's good habitat management for fly anglers and access for anglers. It's people habitat. It's good people habitat" because "these types of habitat projects are very conducive to fly angling" (State 3, 9/4/2019). But they went on to question, like the consultants above, what restoration managers were actually managing for. As they put it: "So some of this riparian management issue goes to: riparian management for whom? And a lot of our riparian management […] is as much about anglers as it is trout. We call it trout habitat projects, but I think they're trout angling habitat projects too" (State 3, 9/4/2019).

In addition to this focus on angler access, a number of interviewees expressed their frustration that pro-grass claims of trees prompting erosion are over-exaggerated. As a consultant argued, "So it's really easy for people, for lay people, I think, to go out and see a tree falling in and say

that trees are causing the erosion. 'Look at that!' You could just as easily say that trout stream fishermen are causing the erosion, 'cause I see them on streams all the time" (Consultant 1, 12/18/2020). They continued on to insist that this claim was problematic because it fails to make a distinction between local scour and reach-scale net erosion, in other words between the hyper-local erosion of sediments at the base of an object like a tree or bridge, and the important contribution of sediment further downstream. This consultant wasn't alone in this critique. A federal manager suggested that understanding the impacts of erosion should be about, "a systemwide approach to what's going on where" (Federal 1, 10/23/2020). They then extended this critique, wondering whether claims about the negative impacts of a common, fast-growing tree—the box elder—on Driftless streams were overstated by many other stream managers. As they questioned, "When I see box elders falling in and a bank eroding I'm like, 'Well that's creating diversity. So is that not necessarily bad?' You know?" (Federal 1, 10/23/2020). They worried that taking a non-site-specific approach to restoration projects across so many stream reaches and stream miles—the consistent removal of riparian trees, the 3:1 sloping of banks, the addition of rock riprap, and the installation of fixed in-stream habitat structures—eliminates important diversity and potentially exports problems downstream.

This worry about the lack of habitat diversity across stream restoration projects in the region was echoed by some managers who advocated for the importance of riparian trees, at least in some locations, arguing against the current practice of widespread tree removal in restoration efforts across the Wisconsin portion of the Driftless. These managers pointed to the existence of large wood as an important part of a healthy stream system, in terms of both habitat and geomorphology. As one consultant suggested, what would be ideal would be to build a dynamic stream system that includes wood recruitment: "Cause then it kinda just creates its own habitat. That's what you want. […] Every time wood falls in, it creates habitat" (Consultant 1, 12/18/2020). This habitat complexity, many managers argued, is essential to an "ideal" stream, what one state manager described as "one that has natural meanders and woody debris, and maybe old, abandoned channels, spring fed, you know, water coming in. […] So yeah, I mean, in general, kind of a little bit more, more complex than kind of what we've shot for in the past" (State 4, 10/8/2020).

In addition to habitat complexity, some managers pointed to the importance of woody vegetation for offering roughness in increasingly floodprone systems like Wisconsin's Driftless Area. Without an abundance of large wood, in the form of dead tree trunks and branches, one federal manager described each channel and ravine "like a conveyor belt," powering rainwater and eroded material downhill. But in the presence of an abundance of woody material, they explained, "Those trees act as another way of holding back sediment, arresting any kind of bottom erosion, bed erosion, and giving some structure back to the stream channel" (Federal 1, 10/23/2020).

It might seem as though stream managers supporting riparian grass were strictly those concerned with fisheries, and those arguing for the importance of (some) riparian trees were those focused on stream geomorphology, but that was not entirely the case. Instead, arguments in favor of riparian grass and against woody vegetation seemed to come from managers invested, explicitly and implicitly, in mature brown trout and the economic impact they provide. Trout habitat work through recent decades in the region has tended to manage for mature browns who thrive on grassy, overhanging banks and make use of heavy, installed habitat structures. Native brook trout, on the other hand, continue to struggle for population growth against the larger, more competitive introduced browns. And so, fisheries managers invested in brook trout, and those invested in whole ecosystem views of Driftless streams including a focus on a range of fish species and life stages, tended, like geomorphically inclined managers, to advocate for the importance of riparian trees. A retired state fisheries manager, for instance, pointed to the potential importance of riparian wood for the conservation of brook trout in the region in stream systems filled with introduced brown trout. They argued that grassy streams likely set up ideal conditions for larger introduced brown trout to outcompete native brook trout: "I think the open, narrow, deep undercut channel is ideal for brown trout. It's probably ideal for brook trout, too, if there were no brown trout there. But because there's brown trout there, it's not ideal for brook trout. The brown trout just drive the brook trout out. And so, when you promote that, you know, a lot of the habitat work that gets done in the state absolutely favors brown trout over brook trout" (Retired State 3, 10/25/2018). As they continued, if the State of Wisconsin is invested in conserving brook trout, especially in the face of competing browns, they need to start thinking more about reforestation, even when that change is socially and biophysically messy. They described the potential importance of less desirable tree species like willows and box elders for headwater streams, acknowledging, "If your goal really is brook trout preservation, maybe, you know, that unfishable, kind of ugly, messy sort of channel isn't necessarily a bad thing" (Retired State 3, 10/25/2018). As he continued, "But that's sort of a radical idea for a lot of people in the WDNR [Wisconsin Department of Natural Resources]" (Retired State 3, 10/25/2018). That change in management approach would demand a change in perspective.

Attending carefully to these interviewees, and to the surface arguments they forwarded, we realized that what seemed at first blush like a debate between grass vs. trees—an attempt to determine the best approach to protect sensitive and lucrative trout species and streamside human communities in a warmer and wetter climate—emerged as a suite of other concerns: about erosion, flooding, aquatic and terrestrial food production, in-stream habitat, angler access, and large wood, which we argue still only scratch the surface of this debate. With that foundation in mind, we turn here to what underlies these arguments for grass and trees in the Driftless stream restoration context, which—we suggest—is about much more than grass and trees.

Underflows of Riparian Vegetation

To make sense of this ambiguity and complexity, we borrow from a rhetorical approach to the discursive, which attends to these arguments' strategic (persuading audiences), relational (connecting individuals), and material (affecting and being affected by the biophysical world) dimensions and to the power they leverage for the larger ideas to which they are attached (Gottschalk Druschke & McGreavy, 2016). And in attending to the arguments at work in Wisconsin's Driftless Area over riparian vegetation, we want to propose that these arguments really aren't so much about grass or trees at all.

Grass vs. Trees as a Proxy Debate

Instead, we want to argue that this intense conflict about riparian grass and riparian trees serves as a proxy debate, what Malkowski (2014: 243) defined as "a rhetorical process wherein overt public attention paid to distinct individuals and/or particular issues within situated contexts creates and conveys meaning about larger, nebulous social concerns." In that same text, she suggested that "proxy debate" is "a public argument strategy whereby the language of one issue or topic stands in for and distracts from other, recurrent system-level problems" (Malkowski, 2014: 119). Further, Malkowski (2014: 243) argued that attention to the idea of a proxy debate can turn our attention to "gridlocks and standstills," to arguments engaged "strategically, suggestively, and sometimes distractingly," and arguments that are used to speak about "other anxieties more generally."

Malkowski leveraged the term "proxy debate" to talk about vaccine hesitancy, but we re-circulate the concept here to consider the ways that this intense debate about grass vs. trees is actually about something deeper. In other words, we argue this grass vs. trees debate is not entirely about fisheries management. And it's not even fully about grass vs. trees. And it's only partly about the competing perspectives that surface in managers' arguments about stream temperature, erosion, access, habitat, and geomorphology. Instead, we want to argue that these points of evidential leverage for championing various positions about stream restoration in the region—and the grass or trees upon which that work might depend—stand in as metonyms, a particular kind of discursive substitute, for the (in)stability of structures, sediments, perspectives, and landscapes: tangible manifestations of much more intangible and deep-seated anxieties about central concerns of scale, temporality, and dynamism. In essence, these underflows are about competing ideas of what a stream is and ought to be.

Metonymy is a common trope or figure of speech that relies on "reference to something or someone by naming one of its attributes" (*Silva Rhetoricae*). Unlike its close relative, synecdoche, in which the whole is represented by one of its parts (e.g., referring to someone's car as their "wheels"), metonymy relies on close association (e.g., referring to journalists as "the press"). Metonymy, like synecdoche, is a subset of metaphor, and, as such, its two components are what Richards (1936) identified as the "tenor"—the concept being represented—and the "vehicle"—the figurative language doing the representing. The tenors, in the previous examples,

are the car and the journalists, while the vehicles are, respectively, wheels and the press. Metonymy, like other forms of metaphor, is powerful because it is capable of crystallizing or simplifying larger, more complex concepts (tenors) down to more evocative, efficient figurative terms (vehicles). Given their usefulness and power, it's no surprise that metonyms pervade our language.

Burke (1941) classically argued that science itself is the work of metonymy, in which the scientific method serves as a mechanism for reducing a phenomenal effect—the result observed in the world—to a material cause—the conditions that prompted it, as Abeles et al. (2020) detailed. Viewed through this lens, the hydrologic cycle, gravity, and the laws of motion are vehicles that serve to make a relational coupling between phenomenal effect and material world. It should come as no surprise, then, that in stream restoration debates about grass vs. trees, "grass" and "trees" might serve as the vehicles—the useful, figurative simplifications—for more complex tenors. And they do work this way. But we want to argue here that there is something like a double metonymy at work, where appeals to grass and trees are vehicles for arguments about scientific and experiential evidence supporting these grassy and treed approaches to restoration, and also and more importantly serve as stand-ins for arguments about much deeper, more nuanced underflows: anxieties about the stream worlds in question.

In other words, when some managers leverage arguments for riparian grass that rely on historical referents, on the lack of necessity of shade due to cold groundwater inputs, on the negative impact of riparian trees on erosion, on mature brown trout habitat and trout angler habitat, and others leverage arguments for riparian trees that rely on the importance of large wood for habitat diversity, for shading, for geomorphic roughness, and for adapting management practices to support brook trout over brown trout, we suggest these debates serve as a diversion from the underflows that are more centrally at stake. Graham (2015: 129) highlighted that metonymy creates particular relationships between vehicle—the efficient, figurative stand-in—and tenor—the more complex concept—that are "the result of a reference to the larger whole of the ontology or emergent metaphysics." If, as Graham (2015: 130) argued, "a metonymy reduces an intangible idea to the perspective of a tangible one," then passionate debates about grass vs. trees are seemingly simple, certainly tangible manifestations of much more intangible and deep-seated anxieties about whether stream channels should be static or dynamic, whether the temporal focus of restoration ought to be past, present, or future, and how we can flexibly respond and adapt to collectively coexist with other-than-human species into an increasingly uncertain future. Grass vs. trees stands in for ontological forms of difference that stream managers have not even begun to attempt to reconcile.

This double metonymy—the tendency for grass and trees to stand in for more complex concepts like deformability and lateral migration, but also and especially for complex and fraught underflows embedded in competing worlds—is, we argue, at the heart of this proxy debate.

Firmly held perspectives about grass vs. trees are leveraged to argue over the science and values of Driftless Area stream restoration. And that move serves as a detour around the complexity of the disturbed fluvial landscape as well as a deflection around more central concerns about the proper role of scale, temporality, and dynamism in Driftless Area stream restoration and, by extension, Driftless Area streams.

Underflows: Competing Visions of Scale

Take, for example, the quotes included above about local concerns with erosion in many pro-grass arguments vs. the system-wide focus on net erosion and sedimentation on the part of many managers leveraging pro-tree arguments. Recall the manager who explained the erosion damage caused by riparian trees during the 2018 flood in terms of local scour: "Any tree that was standing along the stream bank, there's a big scour hole downstream from it" (State 5, 10/15/2020) versus the consultant who argued in response, "You need to really make a distinction between local scour and global erosion or reach-scale erosion, right? They're two completely different things" (Consultant 1, 12/18/2020). This debate about erosive scale is taking on increasing weight related to phosphorus trading, as Wisconsin recently created a system for bank stabilization projects to generate nutrient credits (WDNR, 2020). Crediting takes a local focus on preventing phosphorus-rich soil from eroding off particular streambanks, but fails to account for global erosion—including deposition downstream—in estimates of phosphorus loading.

This scalar conflict emerged, too, as some managers focused on the possibilities for reach-based interventions, while others zoomed out to consider the extreme constraints on restoration efforts in a larger system that is already deeply anthropogenically altered. Speaking about the tight focus of many regional restoration efforts to the reach scale, one nonprofit manager reflected on the importance of, instead, "getting people thinking from the watershed scale" and understanding "what it means to take a watershed perspective and how fisheries people need to change their practices" (Nonprofit 1, 9/26/2018). As they continued:

> You're gonna see a lot of things called restoration that are really Band-Aids. Oh, we've got erosion here. We've got to restore our creek, because it's eroding. Instead of looking at the reason that it's eroding. We're putting riprap along the banks, and we're calling that restoration. That's absolutely not restoration. It is a Band-Aid on a really screwed up situation. Trying to hold a river locked into a place. And does it sometimes produce more trout? Hell yes. But is it the right tool in the long run? That's the question we have to ask ourselves. I would argue that it's not. (Nonprofit 1, 9/26/2018)

While we acknowledge the very real challenge for local practitioners to work at watershed scales that extend beyond county boundaries and require the coordination of complex relationships and

funding sources, the critique also seems fair in its focus on perspective: about limits of vision and possibility. And we note that this critique extends across both scale—an eroding bank—and time—"the long run."

Underflows: Competing Visions of Temporality

Just as scale seemed to sit beneath the surface of many arguments leveraged for grass and trees, so, too, did temporality. Many managers who questioned pro-grass arguments pointed to their concerns with frequent references to a historical referent of prairie in pro-grass arguments. In response, one state manager detailed the history of intervention in Driftless trout streams, pointing to its focus on, "removing all the trees—basically to the riparian zone," and "pulling back the banks aggressively, installation of a myriad of in-stream habitat structures, and stream stabilization projects to create an open-meadow condition of cool or warm season grasses primarily in the riparian zone" (State 3, 9/4/2019). But they went on to complicate that typical approach, suggesting, "That open-meadow condition—and there's a set of folks that would argue that's the natural community pre-settlement condition—I would say that's hokum. When I go to pre-settlement and I look at 1837, where the surveyors intersected the valley floors—many of these valley floors were forested" (State 3, 9/4/2019). Just as important as this misrecognition of the past, they argued, is the mismatch between past management practices and future conditions. "And what does it really matter today what pre-settlement is?" they asked. "The question is– what should it be in the future? There's very little pre-settlement conditions that exist anywhere anymore in the Driftless and so we would ask the question–it's good to know what pre-settlement was but that doesn't mean we're gonna manage towards it anymore" (State 3, 9/4/2109).

This perspective was echoed by a number of managers, who also focused on the importance of understanding history, but putting history in the context of an unknown future. One nonprofit manager explained this dynamic beginning with what these systems would have been like 500 years ago: "You know that would have been kind of an oak savannah type situation where you had mixed grass and some mixed trees. And you had open floodplains, and you had low banks" (Nonprofit 5, 9/6/2019). But, they insisted, "We're never going to be able to get back to that. It's just not possible. We've gone way beyond that" (Nonprofit 5, 9/6/2019). Instead, "we have all this post-settlement alluvium down in these valleys. You can remove some to some extent to try to redevelop floodplains but there's just so much there that it's just crazy impossible to expect to try to go back to what it was 500 years ago. So all you can do is try to find some middle ground to make it improved" (Nonprofit 5, 9/6/2019).

As many managers reflected on the need to manage streams into a changing future, they also looked to the varying time horizons of restoration efforts. One nonprofit manager chronicled how restoration practice has changed in recent decades, but suggested that these interventions are still too focused only on what they can change at the present moment. They described the history of

stream restoration in the region, suggesting that there have been some important moves away from the "ugly stuff" of trout habitat work in the 1980s, but critiquing what continues to be a short horizon of intervention. As they argued, "The point is, you can't fix it all at once. And you have to live with your watersheds. You have to manage them. […] Restoration is not a thing we do. Too often we use the term restoration as a noun. It's not a noun. 'Oh, I did a restoration.' And it gives you the mindset that you can go out and do something on the land, dump a bunch of rock or do this or do that, and, 'I did a restoration. Now I can walk away from it'" (Nonprofit 1, 9/18/2018). For this manager, and many others, restoration should be thought of not as a singular event, but as an ongoing process, aimed at, "thinking long term. We have to be thinking how do we live with these landscapes, with these wetlands, with these rivers? And that's what it's all about. So don't have the mindset of we're gonna go in and fix something and walk away from it" (Nonprofit 1, 9/18/2018).

Underflows: Competing Visions of Dynamism

In opposition to the above manager's focus on ongoing action, another nonprofit manager detailed a common hope for stability and permanence, for their restoration projects to stay in place. As they detailed, "Well, you know, you cross your fingers, and you hope it lasts for 50 years. But it's so dependent on the weather and storm events. It's like LUNKER structures, once you put them underwater, as long as they don't get disturbed, they could be there for 100 years or more 'cause they're not gonna deteriorate" (Nonprofit 5, 9/6/2019). They recognized that a stream system is always going to have some amount of dynamism—"It's a stream system, so it's always going to be moving and shifting over time"—but they still hoped for stability of restoration efforts—"If things could stay in place for 25 years, it's going to be money well spent" (Nonprofit 5, 9/6/2019).

This view was represented by other interviewees—the hope to stabilize a stream in place through restoration efforts—particularly in light of increasing flooding in the region, but was directly critiqued by still other interviewees as a "Band-Aid on a really screwed up situation," as we mentioned above (Nonprofit 1, 9/26/2018). This Band-Aid often looks like increasingly larger and larger rock riprap as managers struggle to respond to the escalating frequency and magnitude of regional flooding. Looking back to the flood of record in 2018 and several floods since then, one manager exemplified the view that recent restoration efforts are focused on salvaging and reinforcing previous restoration projects, particularly on stream reaches that are heavily fished. As they described, "The next three years are going to be focused on just working on these sections that get a lot of angler pressure that we feel like are going to take a long time to recover from the flood and that could benefit from our work" (State 4, 10/8/2020). This work increasingly means doubling down on stability. As the same manager described, "The crew is also trying a little bit larger rock in hopes to kind of stabilize banks with a little bit larger rocks that—rock that won't get blown out quite as easily, as kind of some of the smaller stuff" (State 4, 10/8/2020). The hope here is that by implementing additional structure and stability into an

inherently dynamic and increasingly volatile system, restoration efforts will keep stream reaches fishable across the region. But that logic stands in direct opposition to those managers who pointed to the inherent dynamism of Driftless Area streams—and all streams—and suggested the futility of trying to control these increasingly volatile systems.

Manifesting Anxieties

As we detailed at the outset, we hoped to highlight the surface flows of this restoration debate over riparian vegetation and consider its underflows, building from Wölfle Hazard's (2022) first definition of underflows as "the parts of a river that can't be seen," in both their "watery materiality and in the discourses and politics that shape river governance." We complemented that approach with Malkowski's (2014) notion of the proxy debate—"a public argument strategy whereby the language of one issue or topic stands in for and distracts from other, recurrent system-level problems"—to consider how these surface flows often work to distract from and obscure these related underflows, a move we suggest opens space for the work of Wölfle Hazard's (2022: 9) second definition of underflows, as "method," as "a practice, an orientation, and an invitation to attend to hidden flows and their movements, excesses, and relations. The underflows method is of and for movements that protect and strengthen well-being in the face of settler state violence, which attempts to erase ways of living otherwise."

Where managers forwarded various arguments in favor of or against riparian grass and riparian trees, deep anxieties about the appropriate scale, temporality, and dynamism of Driftless Area restoration percolated through the streambed. These underflows seeped through all of our riparian vegetation-focused interviews, as managers advocated for removing or retaining trees in large part based on the tightness of their spatial and temporal focus—How can I fix this erosion problem here on this one field edge in the face of next year's flood? How can I plan for a restoration project that will most quickly improve the fishing for trophy brown trout and most immediately improve access for the anglers who want those trophy browns?—or their expansiveness—What role can large wood play in this system over time for providing habitat diversity for diverse species? How will large wood add roughness and impact erosion and deposition over time to change the floodplain and impact future flood events? And perspectives on dynamism and stability played a role in it all. Some managers noted their interests in giving the river room to move, expressed curiosity about seeing where these river systems might go, and advocated for the future possibilities for native brook trout in a changing climate, while many managers were much more directly concerned—and in close proximity to—the concerns of many of their human constituents, who are recovering from recent flood damage while anticipating the next flood, losing lucrative agricultural land into the creek, and financially dependent on trout-based tourism, though of course there was overlap and nuance between these groups. The point is that among the Driftless Area restoration managers we spoke with, "grass" and "trees" served as proxies for much deeper anxieties about what Driftless streams are, what they should be, and who they should be for.

Driftless stream managers argue about and advocate vocally for riparian grass and riparian trees, as they worry deeply about all that's flowing below the surface: accountability to landowners, funders, and license holders; catastrophic floods that are escalating in severity and frequency; increasing environmental pressure on native brook trout alongside increasing economic value of introduced brown trout; attachment to a historic fantasy of undisturbed, pre-settlement prairie and the manifest destiny ideal of private property and its preservation; financial and psychic commitment to producing more commodity crops out of each acre; and more. We can't help but wonder how much these surficial arguments—these grass and tree vehicles, and the anxious tenors that flow beneath—serve to obscure the most central, most important deflection at play in these debates about trout conservation, that are actually debates about grass and trees, that are actually debates about all these other things: settler colonialism and its ongoing impacts on the Driftless landscape. A central issue that is only, if ever, glancingly acknowledged in these discussions.

We have come to see the proxy debate of grass versus trees as a powerful way of avoiding discussion of the settler colonial drivers of climate change, as well as deflecting from the settler introduction of German brown trout into the U.S. Midwest to support a more financially viable fishery, introduced brown trout that displaced native brook trout and helped mark them as a cause for concern in the first place. And, even more directly, these are highly effective deflections from the meters of post-settlement alluvium filling Driftless Area valleys, the imagined *terra firma* from which the rest of these restoration discussions, debates, and decisions emerge. Walls of sediment three and even four meters deep that blanket valley floors through the region, created by settler farmers and the U.S. federal government who removed Native residents, then incentivized settlement and the agricultural practices that came along with it. Each new layer of sediment accreting on the last, sedimenting these arguments, anxieties, and ontologies in place.

Here we can't help but be reminded of Whyte's (2018) work on "vicious sedimentation," which he referred to as "the pattern of how environmental changes compound over time to reinforce and strengthen settler ignorance against Indigenous peoples" (137-138). As Whyte described, when settlers gaze over the Midwestern landscape, "From the soils and hydrology to the flora and fauna, all they can see are settler ways of life" (138). For Whyte (2018: 139), opposition to sedimentation, then, would demand from allies that they focus not on single, immediate threats to water and cultural heritage but "engage the longer and larger issues pertaining to mechanisms of colonial power that engendered and maintain land dispossession and the denial of self-determination." Whyte is talking there about the accretion of settler ecologies, materially and conceptually, and we see this as an important way of understanding post-settlement alluvium and the stranglehold it has on both Driftless streams and on the imaginative horizons of Driftless stream management. And we wonder what justice-oriented underflows might lie beneath, what

possibilities exist for what Wölfle Hazard refers to as "a politics of solidarity with water and rivers, by understanding them as willful, unruly, feeling, acting beings," which, for Wölfle Hazard, are "underflows strategies [that] ground that politics in alliances with Native nations' science and management practices" (9).

In the Driftless landscape, the proxy debate we have indexed here serves as a distraction from the system-level problems of settler land use and stream management, anthropogenic climate change, and the accumulation of post-settlement alluvium. This seemingly insurmountable depth of post-settlement alluvium makes Driftless streams exceptionally good at conveying floodwaters downstream; renders stream restoration in the region, as one manager put it, a "Band-Aid" at best; and makes floodplain reconnection, a central goal of restoration projects throughout the Wisconsin Driftless, an impossibility without massive, valley-wide sediment removal. This post-settlement alluvium makes many managers hyper-focused on scale-limited erosion, as we saw above, because a system covered with several meters of post-settlement alluvium is necessarily going to erode through flood events. Instead of facing the challenging reality of slow geomorphic change—leading eventually to reconnected floodplains as long as sediment loads don't rebound with land use degradation upstream—they are—understandably—trying to respond on a more immediate timescale with erosion control practices that range from riprap up to the top of the banks to deep-rooted grasses anchoring the banks. But this will be a never-ending battle without real transformation: a transformation of perspective, of practice, of relation. As Gries et al. (2022: 63) argued, "there could be potential restorative agency in these abiotic fluvial processes." These periodic floods, tracing new pathways across valley floors, carry the potential for change, not only of rivers and floodplains, but of relationships and ontologies.

Climate change-induced flooding is the present and future of these precarious streams, and of the precarious brook trout that they diminishingly host, but it is the past that largely prompted this precarity. A past—as yet—without reconciliation. And it is that past—and the ways it shapes ontologies of scale, temporality, and dynamism—that will need to be reconciled. While a settler reckoning with this past is not the only thing, we see it as an important thing: for Driftless stream managers, enrolled in the settler colonial enterprise of trout-focused stream restoration, to examine their assumptions and interests, the things they take for granted and the things they defend, and to consider what lies beneath. These are conversations through which, as Wölfle Hazard (2022: 218) argued, and as we feel attentive to as settlers ourselves, "we settlers can see rivers in a new way." In other words, this kind of rhetorical attention might prompt stream restoration managers to ask different questions, questions that emerge from attention to colonial land relations, and maybe even start to challenge them. This move might serve to reconfigure settler hydrologies and the land/power relations they manifest in Driftless Area streams. Stream restoration science and management in the Driftless context has been a settler endeavor, focused on improving the economically viable trout fishery and accommodating post-settlement alluvium

and settler agricultural practices to shore up valley streams through increasingly worsening flooding. We hope that closer attention to the proxy debates that inform and permeate these current approaches to restoration might prompt a transformation of vision, and make space for a transformation of relations that might result.

We focused here on the settler structures that currently narrow the practice and imagination of Driftless Area stream restoration, with hopes that our work might begin to support practitioners to engage in "restoration otherwise." In her work on restoration otherwise, Barra (2023: 3), following the CritRest Collective (2021) and Crawley (2016), considered, "how mainstream definitions of environmental restoration rooted in ecological notions of loss and return might be thought otherwise—in ways that subvert, redefine, and shift the dominant (dis)course of environmental restoration towards enactments of cultural continuity, self-reliance, community care, and justice." This is work that makes "an attempt to tell new stories about restoration that stretch and refashion its meaning as a cultural, political, and environmental practice" (Barra, 2023: 3). In doing so, we hope to broaden the possibilities of Driftless Area stream restoration science and management to begin to transform landscapes and relations.

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