History of Restoration: Destruction, Renewal, and Hope for the Future of Driftless Area Trout Streams

David M. Vetrano[a,1]

[a]Wisconsin Department of Natural Resources (Retired), Wisconsin, USA

This manuscript was compiled on February 5, 2019

1. There has been an enormous amount of change in the Driftless Area landscape since Europeans settled the area. By the 1930's some 12 to 15 feet of sediment had eroded off the hillsides onto the valley floors from early farming practices.
2. To their credit, farmers realized early on that soil erosion was the limiting factor to economic stability in the region and implemented a variety of conservation practices (e.g., contour farming, grassed waterways).
3. Conservation practices reduced erosion and benefited stream flows and temperatures, and stream habitat restoration programs improved trout habitat over time.
4. The native Brook Trout *Salvelinus fontinalis* suffered early on, and were replaced by stocked Brown Trout *Salmo trutta*, but today both species can be found in streams in the Driftless Area.
5. Today, the Driftless Area is a destination fishery with a substantial economic impact on the regional economy.

Fisheries Management | Habitat Management | Restoration | Recovery | Trout | History

The Driftless Area of Southwest Wisconsin, Southeast Minnesota, Northeast Iowa, and Northwest Illinois is a unique landform of the United States (Fig. 1). There is no evidence that the last glaciation altered the area unlike most of North America (Splinter, page 5). This lack of glacial drift gave the Driftless Area its name. Unfortunately, there has been an enormous amount of change in the landscape since Europeans settled the area.

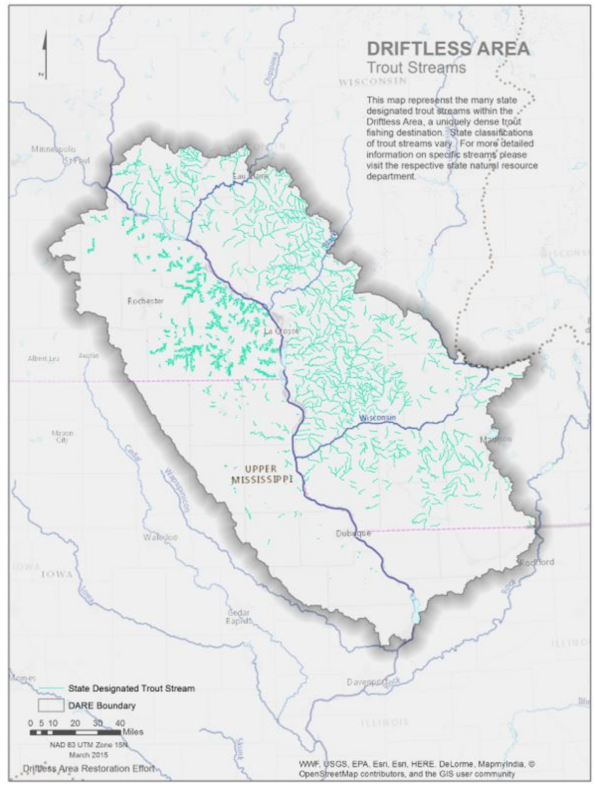

Fig. 1. The Driftless Area of southwestern Wisconsin, southeastern Minnesota, northeastern Iowa, and northwestern Illinois. Credit: Driftless Area Restoration Effort (DARE).

The 1800's

Although there had been travellers through the Driftless Area since the late 1500's, it wasn't until the 1820's that the major migration of mostly northern Europeans occurred. They found a landscape that looks significantly different than it does now. Most of the land on either side of the Mississippi River was tall grass prairie or oak savannah. The predominant landforms are coulees, from the french verb "couler" which means, "to flow". Limestone and sandstone bluffs that tower some 400 feet above the valley floor characterize it. The first settlers found a plethora of narrow, deep, crystal clear, spring fed streams that were full of Brook Trout *Salvelinus fontinalis*. Records of 18 to 20 inch fish were not uncommon.

Logging was the first industry with dozens of sawmill sites using the abundant water resources to float millions of board feet of logs from the great forests to the north. Agriculture did not become a major industry until the 1850's with advent of the moldboard plow that was able to cut through the thick sod layers of the prairies. The first crop was wheat as this was the grain early farmers were most familiar with. Wheat was "king" until the 1880's when dairy became the main industry and remains the main industry today (1).

Statement of Interest

Coon Valley in the Driftless Area was the first large-scale demonstration project by the Soil Conservation Service (now known as the Natural Resource Conservation Service) in the 1930's due to soil erosion from agricultural practices. Today, the Driftless Area contains a vibrant stream restoration community and destination trout fishery.

This chapter was reviewed by J. Hastings.

This paper is reprinted from the Proceedings of the Wild Trout XII Symposium (2017), West Yellowstone, Montana: www.wildtroutsymposium.com. The paper was presented as a plenary presentation at the Wild Trout XII Symposium and the 2018 Driftless Area Symposium.

[1]To whom correspondence should be addressed. E-mail: vetrano.david@gmail.com

Fig. 2. Sediments from historical erosion deposited on top of pre-settlement floodplain with dark organic soils (line mid-photo).

Fig. 3. Grass waterway in field adjacent to Driftless Area stream.

Unfortunately the "up and down" farming practices that worked well in northern Europe where precipitation may only be 10 inches per year were unsuited to a climate with 32 inches of annual precipitation (1). In addition, the "loess" soils of the region have a consistency of melted ice cream when they are saturated. Hillside dairy grazing quickly denuded the vegetation and the animals' hooves compacted the soil preventing percolation of rainwater and snowmelt. Aldo Leopold later referred to this phenomenon as "water off a tin roof". Soon "rills" began to form. These became head cuts, then gullies, then small canyons. Flash flooding which was rare before European settlement became common by the early 1900's as millions of tons of sediment started their downslope movement. By the 1930's some 12 to 15 feet of sediment had eroded off the hillsides onto all of the valley floors on both sides of the Mississippi River. Accretion rates were 2 to 3 inches each year (Fig. 2). The Kickapoo watershed in southwest Wisconsin alone had 36,000 acre-feet of sediment that had eroded into the valley. If this soil were placed on a NFL playing field the result would be a "dirt monument" reaching 12.4 miles into the sky. As sediment inundated the valleys roads, bridges and fences had to be rebuilt as the earlier ones were buried by tons of soil (1).

Trout, Sediment, and Instream Habitat

Not surprisingly, the Brook Trout fishery also suffered. Lower stream sections became deeply entrenched and middle and upper reaches lost their defined channel and became braided. Instream habitat was lost. Spring flow and base flow were reduced as surface water runoff exceeded groundwater recharge. As streams became wide, shallow and unstable, water temperatures rose and the Brook Trout fishery was replaced by species more associated with warmer water (2).

To their credit, these farmers realized early that the massive amount of soil erosion occurring was the limiting factor to economic stability in the Driftless Area. They petitioned the federal government for help. This resulted in the nation's first watershed project just outside of Coon Valley, Wisconsin. At an experimental farm, the Soil Erosion Service was formed. This later became the Soil Conservation Service and is now the Natural Resource Conservation Service. At this site farming practices that are now standard in the Driftless Area (contour strips, terraces, grass waterways, etc.) were developed and perfected (Fig. 3).

By this time Brown Trout *Salmo trutta* were stocked in area streams, as they are more tolerant of the warmer, more turbid stream conditions (2). Postwar rod and gun clubs initiated some habitat restoration efforts in the 1950's to provide overhead cover for the put-and-take fishery (3). By the 1970's, some stream conditions were improving as better farming practices allowed more groundwater infiltration to occur (4). Although some carryover of stocked Brown Trout occurred, little or no natural reproduction could be found in most waters, as stream temperatures remained high.

Instream habitat structures were short lived as little attention was given to reconnecting the stream to its floodplain, allowing the still frequent flash floods to erode around the single wing deflectors commonly used leaving them high and dry. In the early 1980's Wisconsin Department of Natural Resources made a major change in instream habitat efforts in the Driftless Area by developing a different overhead structure (LUNKERS) and by sloping the stream banks to reconnect the stream to it's floodplain (Fig. 4)(5, 6). As a result, floods no longer caused the amount of damage that was common with earlier efforts.

The 1985 Farm Bill proved to be a watershed event (pun intended) resulting in more groundwater percolation. The Conservation Reserve Program (CRP) paid farmers to idle and plant perennial vegetation on thousands of acres. Cross Compliance required producers receiving any agricultural subsidies to have and follow a conservation tillage plan on their farms. By the late 1980's, base flow and spring flow increased as more perennial vegetation improved groundwater infiltration resulting in colder stream temperatures (7). Fisheries surveys in many streams found more carryover of Brown Trout and for the first time natural reproduction as stream conditions improved (8).

Local efforts by fisheries personnel to improve trout survival resulted in an experimental stocking program of "feral" Brown Trout and Brook Trout. Adults from naturally reproducing, non-stocked streams were stripped of eggs and milt and the subsequent young were raised in a partially covered raceway with automatic feeders to keep human contact to a minimum.

Fig. 4. Recently restored Driftless Area stream with stream buffer, sloped banks, and armored streabank toe.

Fig. 5. Angler fishing a restored Driftless Area stream.

To compare survival of the feral fish against the hatchery strains, matched cohorts were stocked in several streams. A year later the feral trout had out survived the domestic strain fish by a factor of 6:1. A statewide wild trout program was initiated in 1995.

A Destination Fishery

By this time the number of non-local anglers (driving more than 50 miles) increased significantly as word of the ever-improving fishery in Driftless Area spread. Entrepreneurs catered to more urban anglers by providing lodging and more upscale dining experiences. By 2008, a Trout Unlimited economic study found that trout fishing in the entire Driftless Area was a $1.1 billion USD industry and growing (9).

Unfortunately, some of the same issues that plagued the streams in the 1930's still exist. When commodity prices reached record levels several years ago much of the long idled or conservation tillage acreage was plowed up and planted into row crops (10). "Up and down" farming increased along with greater amounts of soil erosion. Large concentrated animal feeding operations (CAFO) in excess of 1,000 animal units increased groundwater issues as more liquid manure is spread on shallow soils over karst limestone. Feedlots adjacent to trout streams allowed large amounts of manure and sediments to enter the water, especially during high flow periods (11).

All of these issues could be addressed by converting more acreage into managed grazing systems (12). Producers using this technology reduce sediment and nutrient runoff as well as reduced amounts of herbicide and pesticide issues by replacing row crops with perennial grasses and forbs. Land is divided into "paddocks" restricting cattle access to a small area for a short time with adequate rest periods to allow vegetation to recover. Research has shown that producers using managed grazing systems can show a profit of $524 USD per cow versus a profit of just $132 USD per cow using a conventional confinement system.

Today the Driftless Area rivals angling opportunities that are found in the western and some northeastern U.S. streams. Waters that were non-trout in 1980 had naturally reproducing, self-sustaining populations of both Brook Trout and Brown Trout by 2010 (Fig. 5). Just in the four counties of the La Crosse Area in Southwest Wisconsin, more than 400 miles of newly classified trout water was added to the "Trout Book" bringing the total to more than 1,000 miles. Numbers in excess of 3,000 trout per mile are not uncommon in streams where only 200 fish per mile could be found just two decades before (6). A 2017 follow up study of Trout Unlimited's 2008 economic impact found that trout fishing had added another 500 million dollars bringing the total to $1.6 billion USD (13). This amount is expected to increase as more local communities realize the positive economic impact of healthy watersheds.

ACKNOWLEDGMENTS. I thank R. Carline and K. Meyer for allowing the reprinting of this Wild Trout XII Symposium paper.

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