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Update: Our Missouri Waters Lower Grand River Watershed Summer 2015 newsletter

Missouri Department of Natural Resources sent this bulletin at 06/26/2015 01:56 PM CDT

<p style="text-align: center;">Lower Grand River Watershed Summer 2015 Newsletter</p> <hr/> <p style="text-align: center;">Inside this Issue</p> <hr/> <p>"No MOre" trash blitz held in Linn and Boynton</p> <p>Forage Systems Research Center begins 319 demonstration project</p> <p>Barton Farm Campus in Trenton showcases soil and water conservation practices</p>	<p>"No MOre" Trash Blitz held in Linn and Sullivan Counties</p> <p>When litter is on the ground, it eventually winds up in our waters. In the Lower Grand River Watershed in northeast Missouri, streams flow into the Grand River, which empties into the Missouri River at Brunswick, Missouri. In 2012 and 2014, Missouri River Relief (Stream Team 1875) held river trash clean-up events in Brunswick, Missouri, where volunteers from near the mouth of the watershed helped to pick up trash on the Grand and Missouri Rivers. On April 11, 2015, agency and local community partners came together for the first Locust Creek "No MOre" Trash Blitz in the upstream portions of the Lower Grand watershed in Linn and Sullivan Counties. The event was coordinated with the timing of the annual "No MOre"</p>
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USGS study for management of large woody debris in channelized streams

USGS study of nutrient trends in the Lower Grand River Basin

Cover Crop Corner - Missouri is a now a member of the Midwest Cover Crops Council

Cover Crop Corner - Radish Cover Crop Overseeded into Soybean

Water Festivals in Mercer and Grundy counties

Citizens seize opportunity to learn how to monitor water quality in Kirksville

Land and Water Education Resources booklet available

Upcoming Events

Soil Health Advocate Jay Fuhrer will be in Concordia July 13 and Mexico July 14, 2015, 9:30 to 3 pm no registration required

Now Taking Requests for Project WET workshop locations for 2015 or 2016

Contact Mary Culler at 660-385-8000 for more information

Questions and Answers

Please send your questions about the watershed or the Our Missouri Waters effort to the Northeast Regional Watershed Coordinator

Mary Culler at

Mary.Culler@dnr.mo.gov

Funding Opportunities

Trash campaign that is sponsored by the Missouri Departments of Transportation and Conservation each April.

Over 70 volunteers, including local youth organizations and several Adopt-A-Highway groups gathered to pick up trash from local roadways. Volunteers in Linn County picked up trash near Linneus, Browning, and at the Rocky Ford Access on Locust Creek. Volunteers in Sullivan County met in Boynton and picked up trash in the drainage area of the proposed East Locust water supply reservoir. Youth volunteer groups that participated in the event included the Brookfield High School Leo Club, Milan C-2 FBLA, and Cub Scout Pack and Boy Scout Troop #93. Adopt- A- Highway teams that participated included Brinkley Angus, Milan First Baptist Church, Milan United Methodist Men, Jerry and Phyllis Staples, Olive Tree Outreach, and Smithfield/Farmland volunteers.

Planning for the event was a partnership of the Missouri Departments of Transportation, Conservation, Natural Resources, the Missouri Stream Team Program, the local Highway 5 Corridor Coalition, and the North Central Missouri Regional Water Commission in Milan. Local partners, including the Linneus United Methodist Church, Smithfield Foods, North Central Missouri Electric Coop, Pepsi, and local Wal-mart stores, helped to provide lunch for volunteers. By bringing together state agencies, local businesses and local volunteers, over 5 tons of trash were removed from roadways and kept from entering Our Missouri Waters.



A dumpster is filled with trash picked up at the Locust Creek "No-More" trash blitz

Nonpoint Source 319 Grant to Address Nonpoint Water Pollution.

Nonprofit Group Scrap Tire Cost Reimbursement

Wastewater Engineering Grants for Small Communities

5 Star Grants Program

Soil and Water Conservation Program

Contact the Northeast Regional Watershed Coordinator Mary Culler at 660-385-8000 to find out more about these funding sources.

Learn More



Contact the Local Watershed Coordinator

To learn more about the **Our Missouri Waters** effort, visit the department's website at www.dnr.mo.gov/omw

Lower Grand River Watershed

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Volunteers from Smithfield Foods pick up litter along Hwy 6 at Milan

University of Missouri's Forage Systems Research Center near Linneus begins 319 project to demonstrate stream corridor Best Management Practices

The University of Missouri has been awarded a 319 mini-grant for the time period of February 2015 to January 2017 to install stream corridor demonstration areas at the university's Forage Systems Research Center in Linn County.

The project involves eradication of fescue and establishment of warm season grasses in areas near four ephemeral drainages on the farm that drain toward Muddy Creek. On each side of each ephemeral stream, 45 feet of shrubs and trees are going to be established. The corridor of shrubs, trees, and warm season grasses will provide erosion control, improve the water quality of runoff, provide shade for cattle, and establish wildlife cover and nesting and brood areas for wildlife species. A fence will be constructed to exclude cattle from the shrubs and trees, and cattle will be allowed to flash graze the warm season grass areas.

The project is off to a great start. The warm season grass establishment areas were grazed by cattle this past winter in preparation for spraying, and the areas were sprayed this past spring two times to kill the fescue sod. All of the fence needed to exclude cattle from the demonstration areas has been constructed. Fence types include a combination of hot wire and barbed wire fencing. Fences were designed and constructed in such a manner as to allow cattle into the warm season grass areas for flash grazing. Trees and shrubs were ordered from the state nursery and they were transplanted into the stream corridor areas. Warm season grasses and forbes

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Next Issue

Would you like to submit an article for the next newsletter?
Please let me know.

Mary.Culler@dnr.mo.gov

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were ordered and arrived at the research farm. The warm season grass and forbes mixtures will be sown in June. This project will be featured in the next three newsletters for the Lower Grand River Watershed. If you are in the Linn County area, stop by the research farm to see the progress on this project. The annual field day at the research farm is September 29, 2015.

319 grants are federal dollars that are administered as part of the Clean Water Act for projects that reduce non-point source pollution. 319 grants require a minimum of a 40/60 match of non-federal dollars. Non-federal match for this project is being provided by the University of Missouri Forage Systems Research Center and the Missouri Department of Conservation.



Photo of the project area before native corridor establishment and livestock exclusion

Barton Farm Campus in Trenton showcases Best Management Practices for Water, Energy, Nutrients, and Soil management



A 5000-gallon rainwater retention tank barrel harvests water discharged from the roof which is utilized in the greenhouse and for maintaining landscape plants.

David Nowland, Agriculture Instructor, North Central Missouri College

The North Central Missouri College Agriculture and Natural Resources department offers Associate of Applied Science and Associate of Arts transfer degrees for students pursuing careers related to agribusiness or the management of agricultural and natural resources. Instruction is provided at the main NCMC campus in downtown Trenton, the Elizabeth and Arthur Barton Farm Campus south of town, and various internship experience sites.

Agriculture producers in the Midwest are working to meet growing domestic and international demands for agriculture products, but at the same time they are implementing conservation practices that reduce soil erosion, control nutrient runoff and provide wildlife habitat. Many of these conservation practices are demonstrated at the Barton Farm Campus. The Grundy County Soil and Water Conservation District, Natural Resources Conservation Service and Missouri Department of Conservation assisted in the design and construction of these

projects, and following are some of the conservation practices we are utilizing at the Barton Farm Campus.

Terraces are earthen structures installed on moderate to steep slopes to reduce soil erosion and retain water runoff. NCMC has installed three types of terraces. Broad-based terraces are tilled and have row crops planted over them. Narrow-based and steep-backed terraces are covered with warm season grasses, which serve as habitat for upland birds. Grassed waterways and sediment retention control structures are also utilized to reduce soil erosion.

A two-acre water containment structure is utilized for educational and recreational purposes, and it is managed in coordination with the Missouri Department of Conservation Community Assistance Program. The lake area features a handicap-accessible floating dock and restroom facilities with a shelter house in the planning stages. The lake is used for fishing and other educational activities by approved groups consistent with the Wildlife Code of Missouri.

Livestock at the Barton Farm Campus are housed in the Kuttler Animal Science Complex. Manure from the animals is composted in a roofed stacking structure and is then applied to crop demonstration plots. It serves as fertilizer and improves soil health. Cover crops such as turnips, crimson clover and tillage radishes are also utilized in the crop plots to reduce erosion, reduce nutrient runoff and improve soil health.

Several types of conservation buffers have been installed. Native shrubs on one side of the lake serve as a riparian buffer, providing wildlife habitat and protecting water quality by filtering nutrients from water discharged from nearby crop fields. A habitat buffer was planted last fall at the edge of our crop demonstration plots with a mixture of warm season grasses and native forbs to provide habitat for bobwhite quail and other upland birds. Also, bioswales have been installed on the perimeter of the parking lot. They are seeded to native grasses and retain the runoff from the parking lot to filter pollutants from the discharge. They drain into a constructed wetland prior to discharge into a small pond.

Additional conservation projects were included in the Lager Energy and Plant Science Laboratory. A 5000-gallon rainwater retention tank barrel harvests water discharged from the roof which is utilized in the greenhouse and for maintaining landscape plants. In addition, solar panels and a wind turbine produce supplemental electricity.

The Elizabeth and Arthur Barton Farm Campus was established in 2011 to serve as an applied learning environment for agriculture production practices and the

conservation of agricultural and natural resources. NCMC recognizes the importance of protecting Missouri's natural habitat for future generations and incorporates these concerns across its curriculum.



A narrow base terrace is burned to manage warm season grasses

Management of Large Woody Debris in Channelized Streams in Northern Missouri

David Heimann, U.S. Geological Survey Lee's Summit, Missouri; Tom Woodward, Missouri Department of Natural Resources, Pershing State Park; Greg Pitchford, Missouri Department of Conservation, Chillicothe, Missouri

The Missouri Department of Natural Resources (MDNR) and Missouri Department of Conservation (MDC) are tasked with protecting and managing the natural resources of Missouri and wish to effectively manage large woody debris (LWD) in channelized streams in a manner that will maintain the ecological integrity of the streamside forests and aquatic systems without affecting the flood risks on private lands. A study is being conducted by the U.S. Geological Survey in cooperation with MDNR and MDC to characterize LWD and assess the effectiveness of LWD management in lower Locust Creek.

Locust Creek, located in the Lower Grand River Watershed, has been channelized for over half its length and lacks a suitable riparian corridor in many sections. The combination of channel alterations and inadequate forested corridors result in deeply incised and rapidly eroding stream banks. These channel alterations also have resulted in the transport of large amounts of LWD and suspended sediment resulting in reduced water quality, and changes in the channel geometry and hydrology of the system. Problems arise in the Locust Creek

system, and other channelized basins in northern Missouri, as a result of an increased rate of input of LWD and sediment relative to historical (pre-channelization) rates during channel adjustment and, at the same time, there is a substantial decrease in the conveyance of the downstream, un-channelized stream channel as a result of substantial channel aggradation. Numerous and extensive LWD jams have formed in the remnant channel and sediment deposits in excess of 10 feet have accumulated in the downstream sections of the channelized reach and upstream sections of the un-channelized reach within Pershing State Park. The lower section of Locust Creek (approximately 19 miles) within, or adjacent to, Pershing State Park and Fountain Grove Conservation Area is one of the last and most extensive remaining active meandering rivers in Northern Missouri. For the past 15 years, management of LWD accumulations in Lower Locust Creek has involved redistributing the LWD to the inside point bar to mimic the natural stream process of channel cutting around the blockage. There is concern from the U.S. Army Corps of Engineers (USACE) as to the effectiveness of the redistribution technique. Additional information is requested by the USACE in order to test the effectiveness of the methodology and to continue the current practice of LWD redistribution.

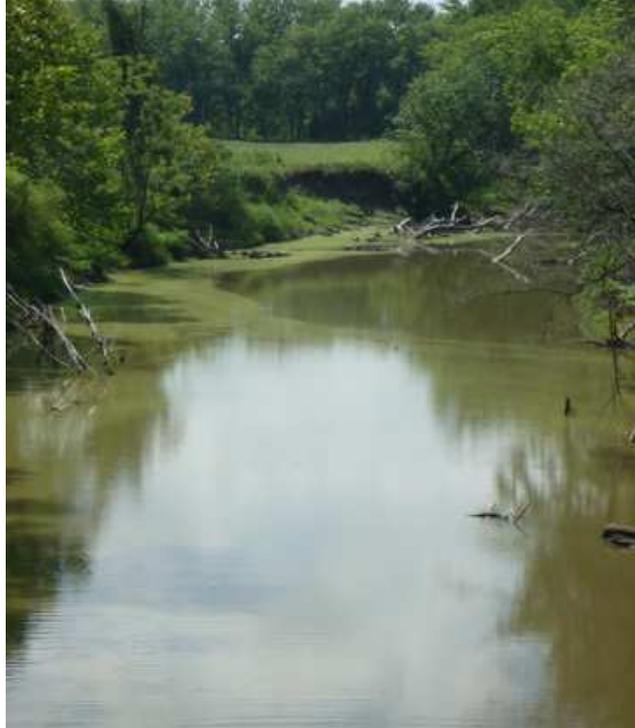


A large woody debris accumulation on Locust Creek at Pershing State Park

USGS Studies Examine Effectiveness of Integrated Conservation Programs on Nutrient Trends in Lower Grand River Basin

By Donald H. Wilkison and Heather M. Krempa, U.S. Geological Survey, Lee's Summit, MO

The effectiveness of conservation programs to adequately reduce agricultural nutrient contributions to Gulf of Mexico hypoxia remains a concern. Quantifying conservation program success can be difficult given that short-term changes in nutrient concentration in streams may be masked by long-term shifts. The U.S. Geological Survey (USGS), in cooperation with the Missouri Department of Natural Resources evaluated nutrient export from the Lower Grand River in the 44 months that followed a period of increased, integrated conservation implementation. These short-term responses were then compared to export that occurred in the main stem and adjacent rivers in northern Missouri over a 22-year period. Results recently published in [River Research and Applications](#) indicate that short-term (October 2010 through May 2014) total nitrogen (TN) concentrations in the Grand River were 20 percent less than the long-term average and total phosphorus (TP) concentrations were 23 percent less. Nutrient reductions in the short term were primarily the result of the less-than-average precipitation and, consequently, streamflow that was 36 percent below normal. Therefore, nutrient concentrations measured in tributary streams were likely less than normal during the initial conservation implementation period. Northern Missouri stream TN concentrations (adjusted for flow) remained relatively flat or declined over the period 1991 through 2013 because available sources of nitrogen, determined as the sum of commercial fertilizers, available animal manures, and atmospheric inputs, were typically less than crop requirements for much of that time frame. Conversely, TP concentrations increased over the past 22 years in northern Missouri streams, likely in response to many years of phosphorus inputs in excess of crop requirements. Stream nutrient changes were most pronounced during periods that coincided with the major tillage, planting, and growth phases of row crops and increased streamflow. Nutrient reduction strategies targeted at the period February through June would likely have the greatest impact on reducing nutrient export from the basin.



Locust Creek near Reger, MO in Sullivan County. The photo was taken in August of 2011.

Cover Crop Corner:

Missouri is now a member of the Midwest Cover Crops Council

Missouri is now a member of the Midwest Cover Crops Council. Their website, <http://www.mccc.msu.edu> has a wealth of information, including information about cover crop species, a cover crop decision tool, innovator profiles of farmers that have used cover crops on their farms, extension materials and publications, links to videos, and a calendar of events.

The Cover Crop Decision Tools on the website are an initiative of the Midwest Cover Crop Council to consolidate cover crop information by state to help farmers make cover crop selections at the county level. Information for each state/province is developed by a team of cover crop experts including university researchers, Extension educators, NRCS personnel, agriculture department personnel, crop advisors, seed suppliers and farmers, to help you select cover crops for your situation. For your location, information is given for considerations for using that cover crop, including planting, termination, performance and roles, cultural traits, potential advantages and disadvantages, and information resources

about the cover crop. Check out their website, you will find a wealth of cover crop information.

Radish Cover Crop Overseeded into Soybean

Kelly Nelson, Research Agronomist and Professor, University of Missouri Greenley Research Center at Novelty, and Dana Harder, Superintendent, University of Missouri Greenley Research Center at Novelty

There are a lot of benefits of cover crops, but successful establishment is important to realize their full potential. Intercropping systems usually involve overlapping the growth period of two crops. Intercropping radish with soybean could allow earlier radish cover crop establishment while having minimal effects on soybean yield. Radish cover crops have been promoted throughout the Midwest, but have been unsuccessful following soybean in northern Missouri. This is due to a short growing period following harvest, and freezing conditions usually occur around the first week of December in northern Missouri and terminate the radish cover crop. From 2012 to 2014 we evaluated the effect of radish overseeding planting date in the presence and absence of N fertilizer on soybean yield, radish biomass, and corn yield the following year. Overseeding radish in the presence or absence of 30 lbs N/acre had no effect on soybean yield. Precipitation following overseeding of radishes in early September along with an open soybean canopy in 2012 provided good conditions for successful radish establishment (Figure 1).



Figure 1. Radish seedlings on September 5, 2012 six days after overseeding (top) and the same plots on December 4, 2012 (bottom left) compared to a later seeding date (bottom right).

Dry conditions following overseeding of radish in 2013 and 2014 along with a dense soybean canopy in 2014 resulted in poor establishment of an overseeded radish cover crop (Figure 2).



Figure 2. Radish seedlings in soybean residue following harvest on October 22, 2014.

Based on this and other research at the Greenley Research Center, radish should be seeded before September 1 in northern Missouri. We have observed that an early establishment of radish suppressed winter annual weeds 40 to 90% the following spring (Figure 3).



Figure 3. Henbit suppression on March 12, 2012 with radish drill seeded on September 1, 2011 (top left) and September 26, 2011 (top right). No-till corn was planted in the same areas on May 1, 2012.

Farmers should take note of their residual herbicide program and any effects it may have on the establishment of a cover crop. Radish is sensitive to several residual herbicides used for weed control in soybean. Corn yield following radish overseeded into soybean was not affected in 2013 or 2014. Radish growth was maximized when overseeded prior to September 1 when there was an open soybean canopy and rainfall followed the overseeding event. If you are planning a cover crop blend, radish could be included if it was seeded prior to September 1 in northern Missouri. More details on this and other cover crop research at the Greenley Research Center is available at: <http://greenley.cafnr.org/cover-crops-abstracts/>.

Grundy and Mercer County annual Water Festivals held in Trenton and Princeton

Fifth grade students in Grundy and Mercer County participated in the annual Water Festivals held in their county this past

spring. University of Missouri Extension and teaching partners Department of Natural Resources, Department of Conservation, and the Soil and Water Conservation Districts hold the festival each year to teach soil and water stewardship along with identified grade level expectations (GLEs) set by the state for fifth grade. Mercer County festival was hosted by the Baptist Church in Princeton, and the Grundy County festival was hosted by North Central Missouri College on the Barton campus.

Students are split into groups and then rotate through eight or nine sessions which focus on various concepts of water quality, soil conservation, animal ecosystems, pollution, and using scientific methods. Teachers are enthusiastic about the day. It provides hands on interactive learning to engage student learning. And it comes just before the Missouri Assessment Program exams giving the students a great review before the test. MU Extension also sponsors festivals for Caldwell, Clinton, DeKalb, Gentry, Harrison, and Worth Counties.

Citizens seize opportunity to learn how to monitor water quality in Kirksville

Amy Meier, Stream Team Coordination Biologist, Missouri Department of Conservation

On Saturday, April 18th, fifteen volunteers from around the region attended the Stream Team Volunteer Water Quality Monitoring (VWQM) Introductory workshop in Kirksville, held at Truman State University. Volunteers ranged from Truman State Biology students to teachers and landowners interested in learning about water quality. During the classroom portion, workshop participants learned how to choose a monitoring site based on the habitat types present, how to map a watershed, and how to access streams safely and with landowner permission. During the field portion at Big Creek Conservation area, volunteers collected and identified benthic macroinvertebrates as part of their biological assessment. They also used a tape measure, a plastic whiffle ball, and a stopwatch to measure the stream's cross-sectional area and velocity to calculate discharge in cubic feet per second. Not only was it a beautiful day in between light, warm rain showers, but volunteers were excited to find an extremely large male crayfish and nearby a female carrying eggs.

Anyone interested in learning how to monitor a stream is invited to join the [Missouri Stream Team Program](#). Stream Team volunteers can participate in numerous types of activities

including litter pickups, tree-planting, storm drain stenciling, habitat improvement, and advocacy, to name a few. Volunteer Water Quality Monitoring is the only activity that requires training, and offers tiered levels of training with each level building upon the previous. Introductory classes are held in the spring, and volunteers can advance to Level 1 in the fall. The Level 1 workshop focuses more on water chemistry and physical attributes of the adopted stream site. Volunteers can continue to advance to higher Quality Control/Quality Assurance designations, which assigns a high level of confidence to the data for its users. More information about the Stream Team Program and VWQM can be found at www.mostreamteam.org.



Volunteers learn about stream macroinvertebrate sampling at a Stream Team workshop in Kirksville

Land and Water Education Resources booklet available for Northeast Missouri educators

A new resource booklet is now available for educators in Northeast Missouri. The booklet, entitled Land and Water Education Resources for Northeast Missouri, provides a list of the curriculum, activity guides, field science and discovery programs, items available for loan, soil health resources, and displays available for guest presentations (pending staff scheduling and availability) in Northeast Missouri. The booklet is available on-line at

<http://dnr.mo.gov/education/resources.htm>.

The booklet is a living document, so if you know of additional resources that should be added to the booklet, please contact Mary Culler at Mary.Culler@dnr.mo.gov. Please share this resource with educators in your area.

Promoting, Protecting and Enjoying our Natural Resources.
Learn more at dnr.mo.gov.

Our Missouri Waters -- is a Missouri Department of Natural Resources statewide effort that will streamline watershed planning efforts while increasing public engagement, better targeting and utilizing resources and providing greater benefit in protecting Missouri water resources.



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