The Missouri Department of Natural Resources seeks to improve the availability of water resource information to communities where impact to these water resources is felt most. The information presented in this summary is intended to increase awareness of how activities on land and in water have an influence on water resource quality and quantity. The department greatly values local input and engagement regarding the mission of ensuring safe and ample water resources, and will continue to seek local guidance to further focus department efforts and funding strategies for the betterment of Our Missouri Waters.
Key Points

Along the Niangua River and a small tributary, high *Escherichia coli* (*E. coli*) levels are a concern. *E. coli* are a type of bacteria found in the fecal matter from warm blooded mammals. It is used as a risk indicator of waterborne disease and illness from harmful bacteria or viruses. High levels of *E. coli* in streams used by the public for fishing, swimming, and boating can cause serious public health and recreational safety issues. Nonpoint sources of pollution, such as animal waste and contaminants carried by stormwater runoff, can have a serious cumulative impact on surface waters in a largely rural watershed. Agricultural and stormwater best management practices can significantly reduce nonpoint source impacts.

In the Little Niangua River, low dissolved oxygen levels are a challenge. Certain levels of dissolved oxygen need to be maintained in a stream in order for fish and other aquatic life to survive. Low dissolved oxygen levels in streams can be the result of pollution or natural stream characteristics. If pollution sources that contain excess organic materials enter a waterway, the organics can consume oxygen, lowering dissolved oxygen levels and stress aquatic life. Some point sources of organic materials are wastewater treatment systems that are less effective in removing organics. Other sources of excess organics may include animal waste, nutrient loads from fertilizer, and sedimentation from stream bank and sheet erosion. The use of best management practices for both point and nonpoint sources of organics may help prevent low dissolved oxygen levels in water bodies.

Overall, the adoption of conservation practices and pollution prevention measures is very important. The abundance of karst features like losing streams, springs and sinkholes provides a greater potential for contaminants to enter the groundwater supply. Land use and activities occurring on the land have a much greater potential to impact local and regional drinking water supplies as streams and surface runoff often bypass the natural filtration process. There are many resources for water quality best practices, from homeowners to landowners to cities. Adopting these practices will help protect water quality both locally and regionally.

Opportunities

**Community Involvement**
- Through education, advocacy and hands-on projects, communities, groups and individuals can be involved in and promote watershed improvement activities. Some examples include, watershed education for schools, litter control, tree planting, water quality monitoring and storm drain stenciling.

**Education and Outreach**
- Technical assistance providers are available for training and assistance regarding several topics such as source water protection, municipal drinking water loss, water main leak detection, asset management, water conservation planning and implementation, and I/I (inflow and infiltration) reduction.
- Training is also available to livestock operations and landowners regarding the benefits of alternate watering sources for livestock, improvements to land application practices, best management practices and associated cost-share programs.

**Financial Assistance**
- **Clean Water and Drinking Water State Revolving Funds** are available to build or improve municipal wastewater and drinking water infrastructure and support agricultural and urban projects such as improvements to urban runoff, wet weather flow, stormwater and sewer overflow issues, water reuse and conservation and alternative treatment projects.
- **319 Nonpoint Source Funds** are available to assist organizations with implementation of on-the-ground practices that control, reduce or manage nonpoint source pollution such as riparian buffer strips, detention ponds, limitation of animal waste to stream and sinkholes.
- **Source Water Protection Grants** and **Well Plugging Grants** are available to public water systems to support safe well abandonment procedures and source water protection implementation and planning efforts.
- A full list of department funding sources is available at [http://dnr.mo.gov/financial.htm](http://dnr.mo.gov/financial.htm)
Niangua River Watershed
The State of Our Missouri Waters – Background

Geology/Hydrology
The basin is dominated by exposures of dolomite and sandstones of Ordovician age. The soluble, carbonate bedrock has contributed to karst topography with numerous springs, sinkholes, caves and losing streams. Due to the geology of the area and the presence of faults, there is considerable subsurface movement of water, particularly in the eastern part of the basin. All the springs emerge from the Gasconade Formation and are primarily recharged with water from losing streams. There is a considerable amount of groundwater in the Gasconade formation, and streams that incise the middle or lower part of this layer have well-sustained baseflows, even during dry periods.

Land Use
The watershed is largely comprised of forest and pasture lands (greater than 90 percent). Less than 6 percent is urban, developed areas. The developed areas are mostly around small, rural towns in the watershed: Buffalo, Camdenton, Conway, Marshfield and Urbana. Very few croplands exist in the watershed (less than 1 percent).

Water Resources
Surface Water
There are 1,795 miles of major streams and 42,454 acres of lake. Some of the larger streams include the Niangua and Little Niangua rivers, Dousinberry and Fourmile creeks, among others. Little Niangua and Niangua rivers make up the Niangua Arm of the Lake of the Ozarks.

Groundwater
There are two major aquifers that underlie this region: the St. Francois and Ozark aquifers. The aquifer ranges in thickness from less than 200 feet to, locally, more than 700 feet thick. Most wells are deep enough to produce from the St. Francois aquifer but the shallower Ozark aquifer is also used.

Springs
There are 88 springs located throughout the watershed. Ha Ha Tonka, Blue and Sand Spring are among the largest. Ha Ha Tonka Spring is the 12th largest in Missouri. Bennett Spring contributes 50 to 60 percent of the flow for Niangua River.

Recreational Resources
Fishing, boating, swimming, and hiking are popular recreational activities in this area. Public use areas include: Bennett Spring and HaHa Tonka state parks, Lead Mine Conservation Area, Mule Shoe conservation Area, and Fiery Fork Conservation Area. These parks and areas provide wildlife habitat and many opportunities for locals and visitors to enjoy the outdoors.

Sac River Basin Characteristics
- Drainage area of 1,030 mi²
- Includes portions of five counties
- Part of the Osage River system
- Headwaters of the Niangua Arm of the Lake of the Ozarks
- Population in the watershed has increased approximately 13 percent from 2000 to 2010
- Largest population center is the Marshfield area, in the headwaters

What is a Watershed?
A watershed is an area of land defined by ridges, from which waters flow into a particular lake, river or wetland.

Niangua River Watershed

Our Missouri WATERS

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Precipitation
Annual precipitation totals reveals several wet periods have dominated since the early 1980s. This wet pattern has also been accompanied by an increasing trend of heavy precipitation events. Severe drought occurred during 2012, but this drought was brief compared to major multi-year droughts that occurred in the 1930s and 1950s. Tree ring analyses conducted in Missouri and historic observation data show periods of multi-year severe droughts in Missouri’s history, indicating that extended dry periods are likely to occur in the future.

Groundwater and Stream Monitoring
There are two groundwater monitoring wells located in Marshfield (see right) and Ha Ha Tonka State Park. Annual average groundwater levels appear to be fairly stable at these wells, but groundwater levels fluctuate several feet throughout the year, with groundwater lows typically occurring in winter and highest groundwater levels occurring in late spring. There are currently five stream gauges that measure average stream flow that varies from 26 (tributary) to 275 (mainstem Niangua) million gallons per day.

Major Water Use Characteristics
A major water user is defined as the capacity to withdraw more than 70 GPM (gallons per minute) or 100,000 GPD (gallons per day). The estimated annual water use as of 2013 is 499 billion gallons, of which 99 percent is diverted surface water and 0.1 percent is groundwater. Thirty major water users are registered in the basin. The majority of water diverted is used for wildlife (88.1 percent) at the Department of Conservation’s Bennett Spring Fish Hatchery.

There are 92 public drinking water systems serving approximately 30,537 people. Waters systems required to report show that approximately 2.25 million gallons of water are consumed per day. There is 10.7 million gallons of available drinking water capacity per day for public water use.
Niangua River Watershed
The State of Our Missouri Waters – Current Conditions and Trends

**Watershed Protection**

**Water Quality Impairments**
Section 303(d) of the federal Clean Water Act requires each state to identify waters that do not meet water quality standards and for which adequate water pollution controls are not in place. These identified waters are considered impaired. Water quality standards protect beneficial uses of water such as whole body contact (e.g. swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife.

The following streams within the watershed are listed on the state’s 2014 List of impaired waterways and are presented on the adjacent map: Dousinberry Creek (Bacteria), Little Niangua River (Low Dissolved Oxygen), and Niangua River (Bacteria). Impairments can be caused by known sources like point or nonpoint source pollution, or may be unknown; however, identifying activities near impaired water bodies can provide key information in determining the sources of contamination as well as developing solutions for impaired waters.

Examples of point sources of pollution include municipal wastewater treatment plants, land disturbance sites, large confined animal operations, and treated industrial wastewater discharges. Common challenges for wastewater treatment include the limited contaminant removal capacity of certain types of treatment. When facilities experience difficulty in providing the proper level of treatment and contaminant removal, the department often works with them to improve the treatment process and quality of the discharge. In cases where point source emitters are unwilling to improve the quality of their discharge, the department has regulatory authority to ensure that inappropriate discharges are discontinued in a timely manner.

Nonpoint pollution sources refer to contaminants that do not come from specific conveyances and may come from multiple sources, such as failing septic systems and contaminants carried in stormwater runoff from rural, urban, and agriculture lands. Other causes of water body impairments include natural causes like precipitation, climate, and drought which can alter stream flow and channel characteristics leading to changes in water quality.

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**Protection of Our Natural Resources**
The department exercises authority under Missouri’s Clean Water Law to regulate point sources of pollution. When point sources are known or discovered, the department issues permits for these sources to limit the amount of certain water contaminants that may be discharged into the water body.

The department also has resources to help people proactively plan to protect water resources, such as:
- Source Water Protection Plans for drinking water sources
- Section 319 funding for watershed planning and projects
- Funding to plan for source water protection
- Soil and Water Conservation funding
- State Revolving Fund grants and loans for community drinking water and wastewater improvements

A full list of department funding sources is available at dnr.mo.gov/financial.htm

It is important to note that resources are limited and local involvement, in determining most critical and effective focus areas, is invaluable.
A TMDL is the mathematical calculation of the amount of a specific pollutant that a water body can absorb and still meet water quality standards. A TMDL study identifies the potential or suspected pollutant sources in the water and allocates the allowable pollutant load among these sources. It also includes an implementation plan to identify how the load will be reduced to a level that will protect water quality.

In this watershed, a TMDL was written for the West Fork Niangua River in Webster County to address low dissolved oxygen levels in that stream. To address this condition, the TMDL establishes pollutant allocations and reduction targets for nutrients, sediment, ammonia, and biochemical oxygen demand. Reductions are needed from both point and nonpoint sources to restore the stream’s designated aquatic life use.

For more information regarding this TMDL can be found online at: http://www.dnr.mo.gov/env/wpp/tmdl/1175-w-fk-niangua-r-record.htm
Local Awareness
Is it safe to fish or swim in the nearby stream? Does the stream provide habitat suitable for fish? What does it cost to make this water potable? Will I have enough water during a drought?

Impacts to water quality and quantity are most critical to local communities; however, impacts are often not realized until a dire situation arises as a result of poor water quality or quantity. Local awareness and involvement can lead to pollution prevention and reduction, water supply sustainability and can give communities the upper hand in protecting, preserving and enhancing local water supplies for generations to come.

2014 Conservation Practices

<table>
<thead>
<tr>
<th>Practice</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Waste Management</td>
<td>34%</td>
</tr>
<tr>
<td>Grazing Management</td>
<td>25%</td>
</tr>
<tr>
<td>Irrigation Management</td>
<td>16%</td>
</tr>
<tr>
<td>Nutrient and Pest Management</td>
<td>20%</td>
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<tr>
<td>Sensitive Areas</td>
<td>0%</td>
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<tr>
<td>Sheet, Rill and Gully Erosion</td>
<td>4%</td>
</tr>
<tr>
<td>Woodland Erosion</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Source Water Protection Projects and Grants
This voluntary program is designed to assist public water systems and the communities they serve with developing local voluntary source water protection plans to protect their source of drinking water from existing or additional contamination sources. Contamination of drinking water sources (or those areas that recharge drinking water sources) often require a water system to increase the level of treatment that must be applied to raw drinking water to remove harmful pathogens, chemicals or other agents, and these increased costs typically must be absorbed by the greater community and consumers. Learn more at http://dnr.mo.gov/refresh/rdwbt/swpp.htm.

Well Plugging Grants
As part of Source Water Protection, the department offers grants to plug abandoned wells. Inactive wells can act as a direct conduit for pollutants to enter our water sources. Safely closing these wells is another layer of protection for pollution prevention.

Soil and Water Conservation Cost Share Programs
Soil and Water Conservation Districts set goals for conservation issue concerns. These practices are funded and implemented to help districts meet their resource conservation goals, which conserves soil and improves water quality by reducing sedimentation in our rivers and streams. The chart on the left illustrates the number of practices implemented for each concern in the watershed from 2009 to 2014, relative to the total number of practices for this watershed. No irrigation management practices were implemented during this time. District funding requests for FY15 show that grazing management and sheet, rill and gully practices are most prevalent.
Niangua River Watershed

The State of Our Missouri Waters

Resources

Education and Outreach Resources include:
Missouri Department of Natural Resources’ Our Missouri Waters [dnr.mo.gov/omw]
Natural Resources Conservation Service (NRCS) [http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/]
EPA Region 7 Environmental Finance Center (EFC) [http://webs.wichita.edu/?u=HUGOWALL&p=/Centers_Research/Environmental_Finance_Center/]

Funding Resources include:
Natural Resources Conservation Service (NRCS) [http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/]
United States Department of Agriculture Rural Development (USDA-RD) [http://www.rurdev.usda.gov/ProgramsAndOpportunities.html]

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