

Missouri Department of Natural Resources
Total Maximum Daily Load Information Sheet

Willow Branch

Water Body Segment at a Glance:

County: Putnam
Nearby City: Unionville
Length of impaired segment: 0.6 mile
Pollutant: Unknown
Source: None given
Water Body ID: 0654U-01



State Map Showing Location of Watershed

Scheduled for TMDL development: TMDL established by EPA 2010

Description of the Problem

Willow Branch is unclassified and, therefore, no designated beneficial uses are assigned to it.

Use that is impaired

General Criteria

Standards that apply

Because Willow Branch is unclassified, and has been listed as impaired for unknown pollutants, no identifiable numeric criteria apply. However, all Missouri streams are protected by the general criteria contained in Missouri's Water Quality Standards at 10 CSR 20-7.31(3). The particular criteria that apply to Willow Branch state:

- (A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
- (C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.
- (D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.
- (G) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community.

Background information and water quality data

Willow Branch flows south to join North Blackbird Creek in Putnam County, Mo. (see map last page). The creek was first documented as impaired during the department's Visual/Benthic Low Flow Survey on July 17, 2000. Evidence of impairment was primarily narrative rather than numeric, indicated by the presence of significant algal growth and a predominance of pollution tolerant species of stream invertebrates (insect larvae, crayfish, leeches, etc). However, no numeric data was collected to support the listing.

A study was conducted in 2006 and 2007 by Versar, Inc. to determine what the stressors, or possible causes of impairment, were on Willow Branch. This study did not find that the aquatic community was impaired (Table 1), but identified the following as stressors: nutrients, excessive algal growth, silt deposition, sedimentation in the stream, bank erosion and lack of adequate riparian vegetation.

Table 1. Stream Condition Index Scores for Willow Branch, Putnam County

Scores below 16 indicate impairment

Site	Fall 2006	Spring 2007	Fall 2007
Slightly DS of Hwy Y	16	18	16

The department does not yet have nutrient criteria for rivers and streams. However, the nutrient data from the Versar study can be compared to both the U.S. Environmental Protection Agency, or EPA, Ecoregion criteria and the Regional Technical Assistance Group¹, or RTAG, criteria. As can be seen in Table 2, phosphorus exceeded these criteria every time and nitrogen exceeded them in two of six samples.

Table 2. Nutrient Data for Willow Branch.

	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrate-Nitrite Nitrogen (mg/L)
EPA Ecoregion IX Criteria	0.0925	0.625	0.23
RTAG Benchmark	0.075	---	---
Fall 2006	0.25**	<0.5	<0.02
Spring 2007	0.08*	<0.5	0.25*
Fall 2006	0.11**	2.1*	0.16

Notes: The recommended criteria values are from EPA Ecoregion IX, Level III, Ecoregion 40 and the RTAG benchmarks developed for Region 7.

One asterisk (*) indicates exceedance of one benchmark value.

Two asterisks (**) indicates exceedance of both benchmark values.

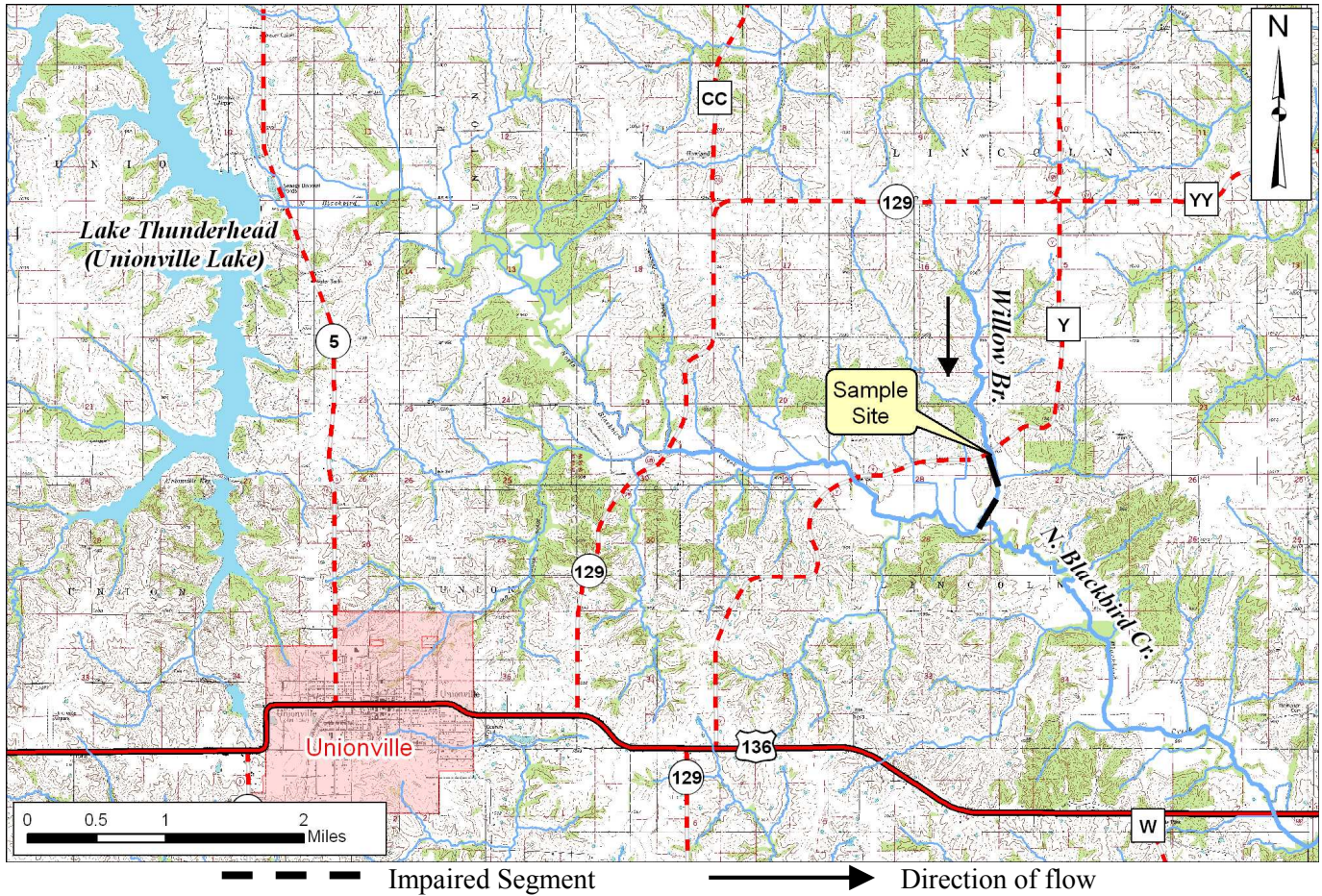
Additional data for total suspended solids were collected by the department six times during 2009 (Table 3). The total suspended solids target for Willow Branch is 5.75 mg/L (see TMDL for more detail). To address the “unknown” impairment, the TMDL targeted total suspended solids (sediment) and the nutrients of phosphorus and nitrogen. EPA established this TMDL Sept. 1, 2010.

Table 3. Total Suspended Solids (TSS) Data for Willow Branch

Org.	Sampling Date	Flow	TSS (mg/L)
Versar	17-Oct-2006	0.03	14
Versar	27-Mar-2007	0.30	6
Versar	16-Sep-2007	0.08	14
MDNR	18-Feb-2009	0.50	5
MDNR	27-Feb-2009	1.00	27
MDNR	11-Mar-2009	2.50	302
MDNR	20-Apr-2009	1.00	12
MDNR	6-May-2009	2.00	79
MDNR	26-May-2009	3.50	35

¹ RTAGs provide information and assistance to EPA in the development of ecoregional nutrient criteria (Section 304(a) of the Clean Water Act),

Map Showing Willow Branch in Putnam County, Mo., with Sampling Site



Sample Site
Willow Br. at State Highway Y

For more information call or write:
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