

Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Spring Creek (formerly Branch)

Water Body Segment at a Glance:

County:	Dent
Nearby Cities:	Salem
Length of impairment:	7.4 miles
Length of classified water body segment:	18 miles
Pollutants:	Low Dissolved Oxygen Organic Sediment
Source:	Salem Wastewater Treatment Facility
Water Body ID:	1870



State map showing location of watershed

Scheduled for TMDL Development: TMDL approved by EPA Oct. 20, 2010

Description of the Problem

Designated beneficial uses of Spring Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)
- Whole Body Contact Recreation

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

- The Missouri Water Quality Standard, or WQS, found in 10 CSR 20-7.031 Table A, for dissolved oxygen in streams is 5.0 mg/L (milligrams per liter or parts per million).
- The standards for organic sediment may be found in the general criteria section of the WQS at 10 CSR 20-7.031(3)(A) and (C). Here it states:
 - 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
 - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses

Background information and water quality data

Any water body that was listed for BOD, or biochemical oxygen demand, in 2002, such as Spring Creek (also called Spring Branch), is now being listed for low dissolved oxygen. Also, water bodies listed for Volatile Suspended Solids, or VSS, are now being listed for organic sediment. These changes were made in order to help make the list more understandable to the general public. The causes of the impairments and the data used to identify them have not changed.

Spring Creek in Dent County is spring fed and maintains flow all year around. A water quality study in 1985 indicated the stream had problems with deposition of solids and low levels of dissolved oxygen downstream from the Salem Wastewater Treatment Facility, or WWTF. Wastewater high in BOD reduces the amount of dissolved oxygen in the stream’s water. This is a problem because most aquatic organisms require high levels of oxygen to survive. Organic sediment refers to non-mineral particles that are suspended in water and then settle out. Wastewater treatment facilities may contribute to organic sediment in a stream by either directly discharging solids in their effluent, or by discharging nutrients which can contribute to excessive growth of algae. When these solids, in the form of solids or dead algae, settle to the bottom of a stream, they smother the streambed and fill in important habitat for aquatic invertebrate and fish.

Two more-detailed water quality surveys were conducted in July and August 2003. These showed the Salem WWTF was having less impact on Spring Creek. However, low dissolved oxygen was recorded upstream of the WWTF, indicating that the WWTF is not the only source causing the impairment of Spring Creek. To address this, three public meetings were held in Salem in 2007 to encourage citizen involvement in determining what these sources are and to devise and implement plans to fix the problems. A list of possible sources was compiled. More water quality data were gathered in 2008 to use in setting a target for upper Spring Creek for nonpoint source runoff.

Like all wastewater discharges in Missouri, the Salem WWTF has to meet the requirements of a discharge permit issued by the department that is designed to protect the water quality of the receiving stream. Salem’s permit includes instream monitoring of Spring Creek, both upstream and downstream of the WWTF, to further judge the exact impact of the discharge on the creek. Also, the local stream team monitored five sites on Spring Creek in 2007 and 2008.

Graphs of available dissolved oxygen data and total suspended solids data for Spring Creek are presented on the following page. Organic sediment (also called VSS or volatile suspended solids) is a portion of total suspended solids, or TSS, therefore a reduction in TSS will result in a reduction in organic sediment. A map showing the locations of the sample sites on Spring Creek (listed in the table below) can be found on page 4.

Sample Sites

Site	Description
1	Spring Cr. 2.5 miles above WWTF
2	Spring Cr. 0.1 miles above WWTF
3	Salem WWTF effluent
4	Spring Cr. 1.0 miles below WWTF
5	Spring Cr. 2.2 miles below WWTF
6	Spring Cr. 3.8 miles below WWTF
7	Spring Cr. 4.2 miles below WWTF
8	Spring Cr. 5.0 miles below WWTF

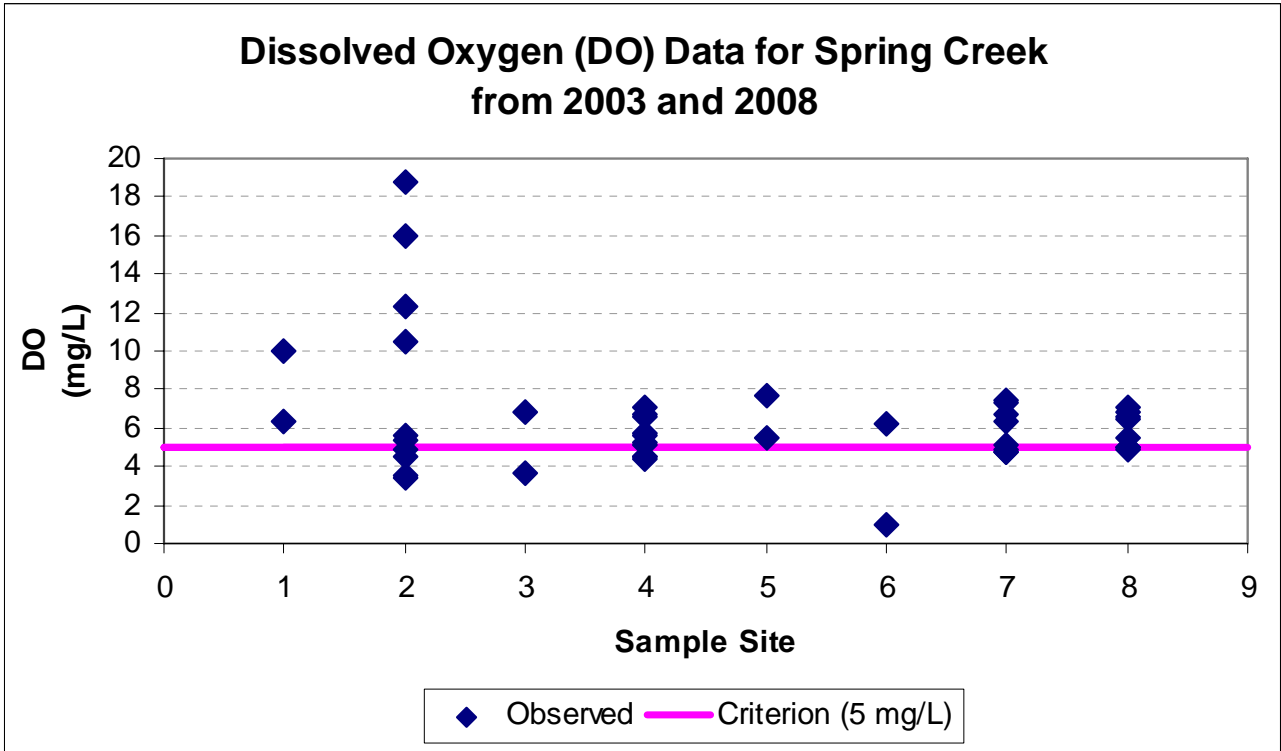


Figure 1

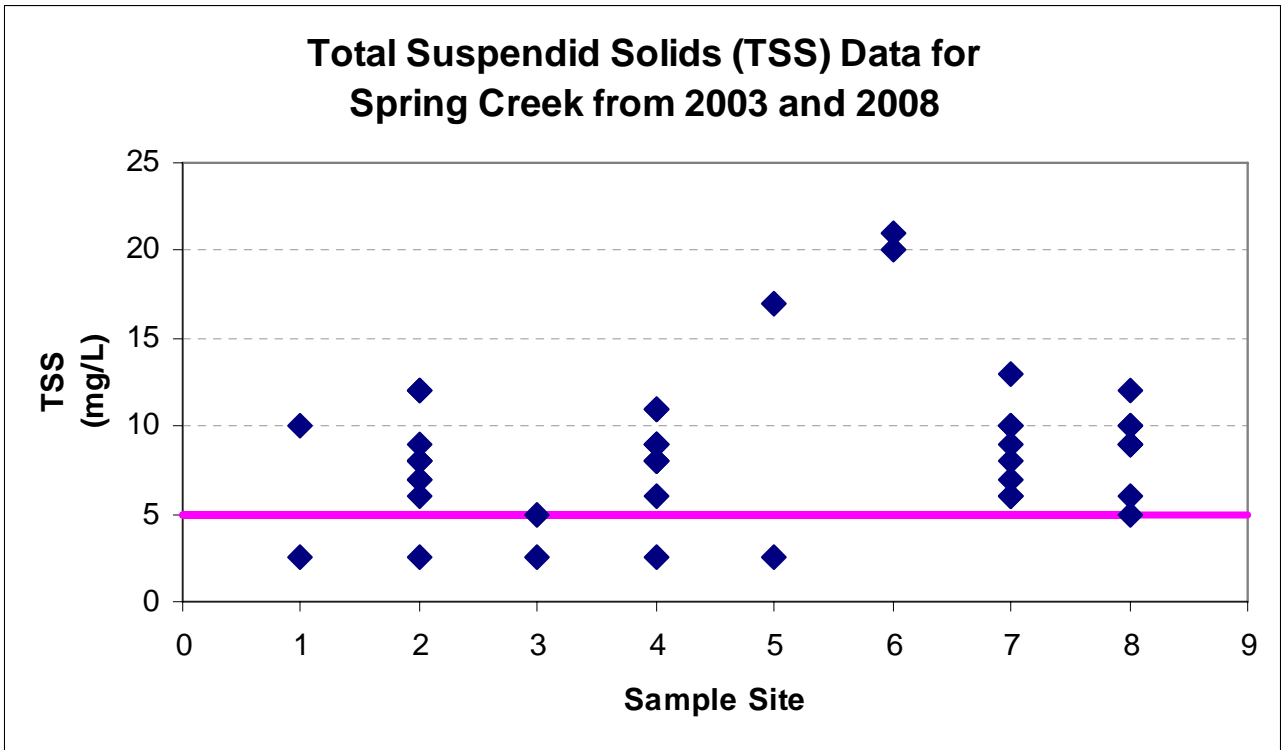
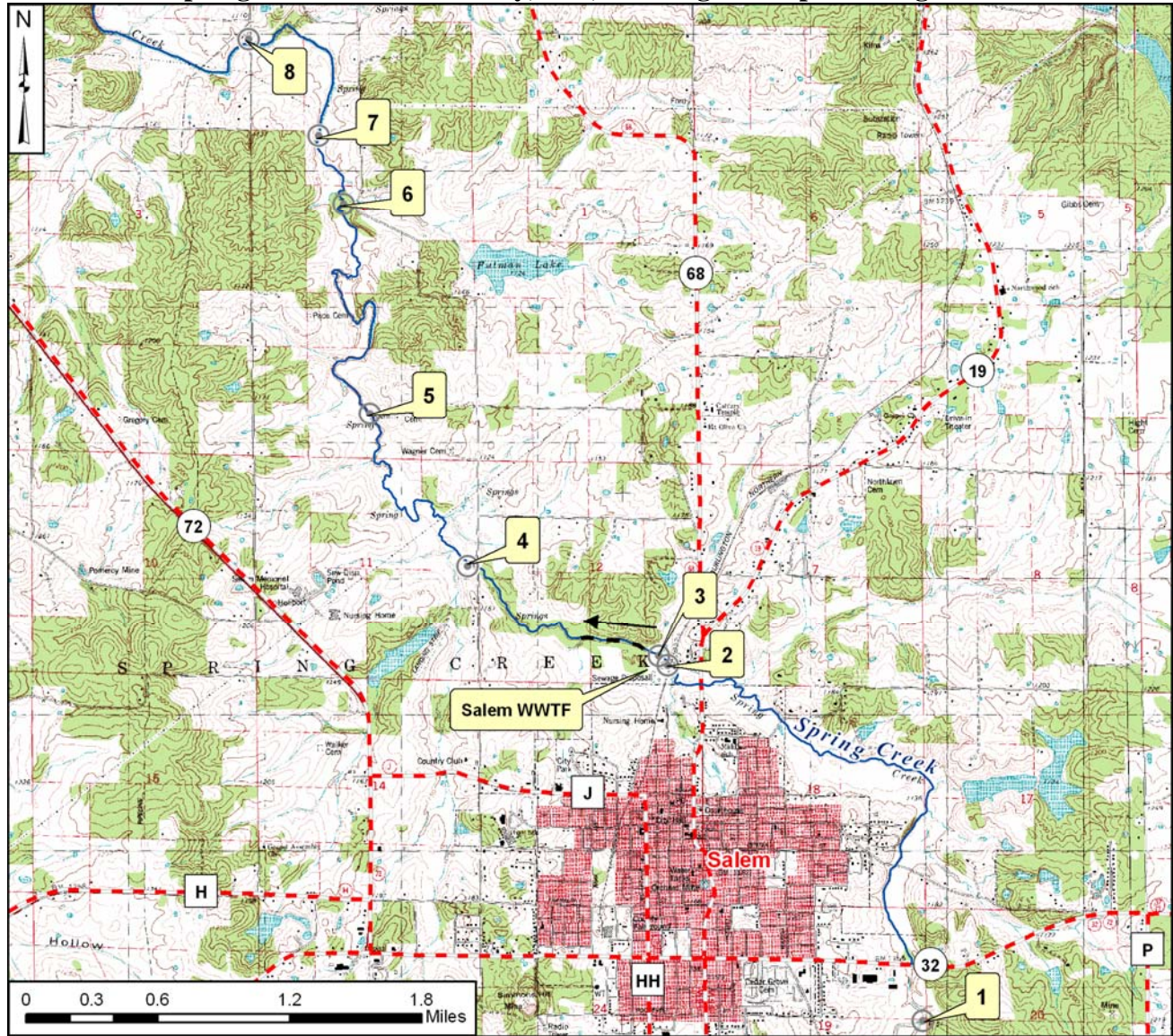


Figure 2

Spring Creek in Dent County, Mo., Showing the Impaired Segment



--- Impaired Segment

← Direction of Flow

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program

P.O. Box 176, Jefferson City, MO 65102-0176

1-800-361-4827 or 573-751-1300 office

573-522-9920 fax

Program Home Page: www.dnr.mo.gov/env/wpp/index.html