



St. Francis River

Waterbody Segment at a Glance:

County: St. Francois
Nearby Cities: Farmington
Length of impairment: 3 miles
Pollutants: Biochemical Oxygen Demand (BOD)
Ammonia (NH₃N)

Source: Farmington West Wastewater Treatment Plant (WWTP)



TMDL Priority Ranking: Approved 2006

Description of the Problem

Beneficial uses of the St. Francis River

- Livestock and Wildlife Watering
- Protection of Aquatic Life (Cool Water Fishery)
- Protection of Human Health associated with Fish Consumption
- Irrigation
- Whole Body Contact Recreation (Swimming)
- Boating and Canoeing

Use that is impaired

- Protection of Aquatic Life (Cool Water Fishery)

Standards that apply

- The Missouri Water Quality Standard (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) or the natural dissolved oxygen profile of the stream, whichever is less.
- Ammonia (NH₃N) standards vary depending on the pH and the temperature. The ammonia limits that apply (at a pH of 7.8) are 1.2 mg/L for summer and 2.1 mg/L during the winter. The tables are found at 10 CSR 20-7.031 Table B.

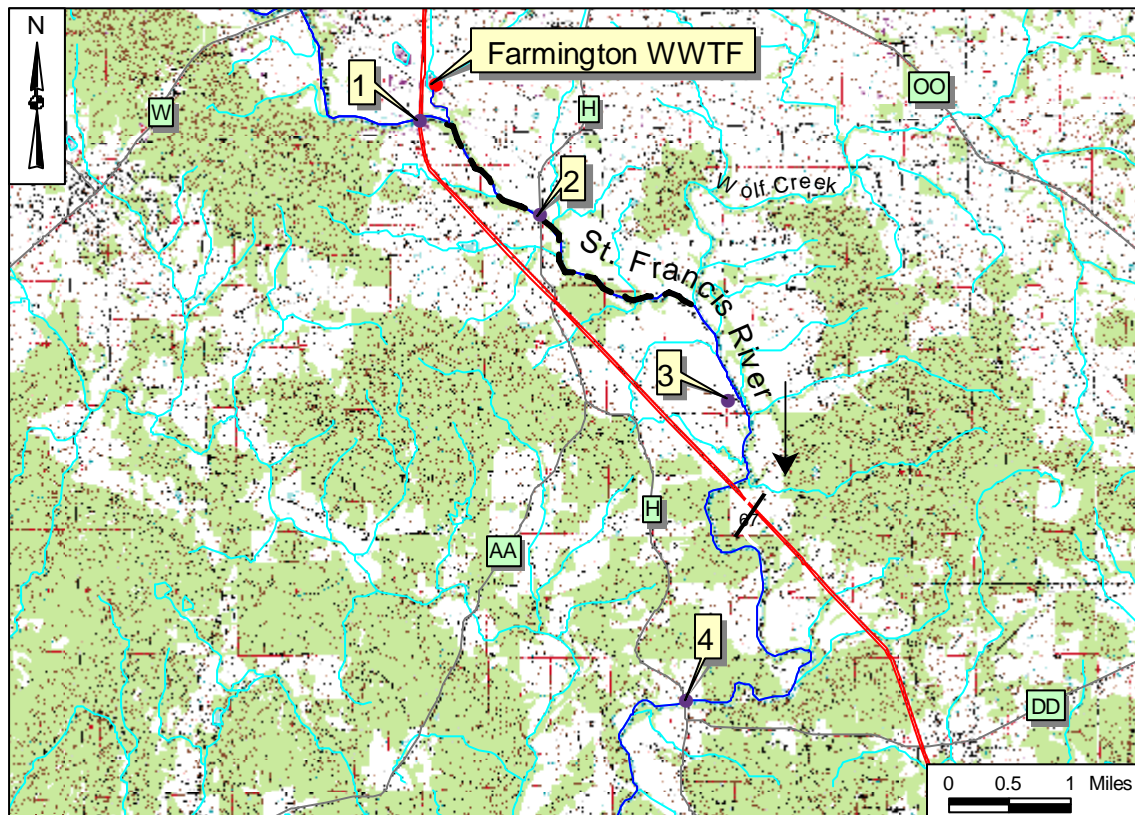
Background Information and Water Quality Data

The Farmington West Wastewater Treatment Plant (WWTP) was upgraded in 1990 to accommodate more sewage. Due to concerns that the increased volume of effluent (discharge) might cause violations of the state water quality standards during low flow conditions, the water quality of the

receiving stream was tested in July 1992. Both dissolved oxygen (the stream measurement that relates to Biochemical Oxygen Demand, BOD) and ammonia levels were found to exceed water quality standards in the St. Francis River below the WWTP. Wastewater that is high in BOD lowers the oxygen in the stream. Most aquatic organisms require high levels of oxygen to survive. The dissolved oxygen was too low below the wastewater discharge. In addition, ammonia (NH₃N) is a common by-product of wastewater treatment and can be toxic to aquatic life.

The Department of Natural Resources conducted more water quality studies in 1996, 1997, 1999, 2001 and 2004. The data from the last two studies were used to run a computer model of the river. This model was used to calculate the wasteload allocation, or how much of a pollutant the river can handle and still meet WQS. Permit limits are derived from the wasteload allocation. Another problem in the St. Francis River is that the DO is consistently low in the St. Francis upstream of the WWTP tributary. No viable source for this low DO has been found and it is believed to be a “natural” condition. The river is very slow and wide and hence is not aerated in this area. The TMDL provides background information and a discussion of the model. It will be implemented through modifying the permit; however, the low background DO still needs to be addressed. One possible approach is to collect data to establish a site specific DO criterion for the upper St. Francis River. The U. S. Environmental Protection Agency approved the TMDL February 1, 2006.

**The St. Francis River below Farmington in St. Francois County, Missouri,
Showing the Impaired Segment and Sampling Sites**

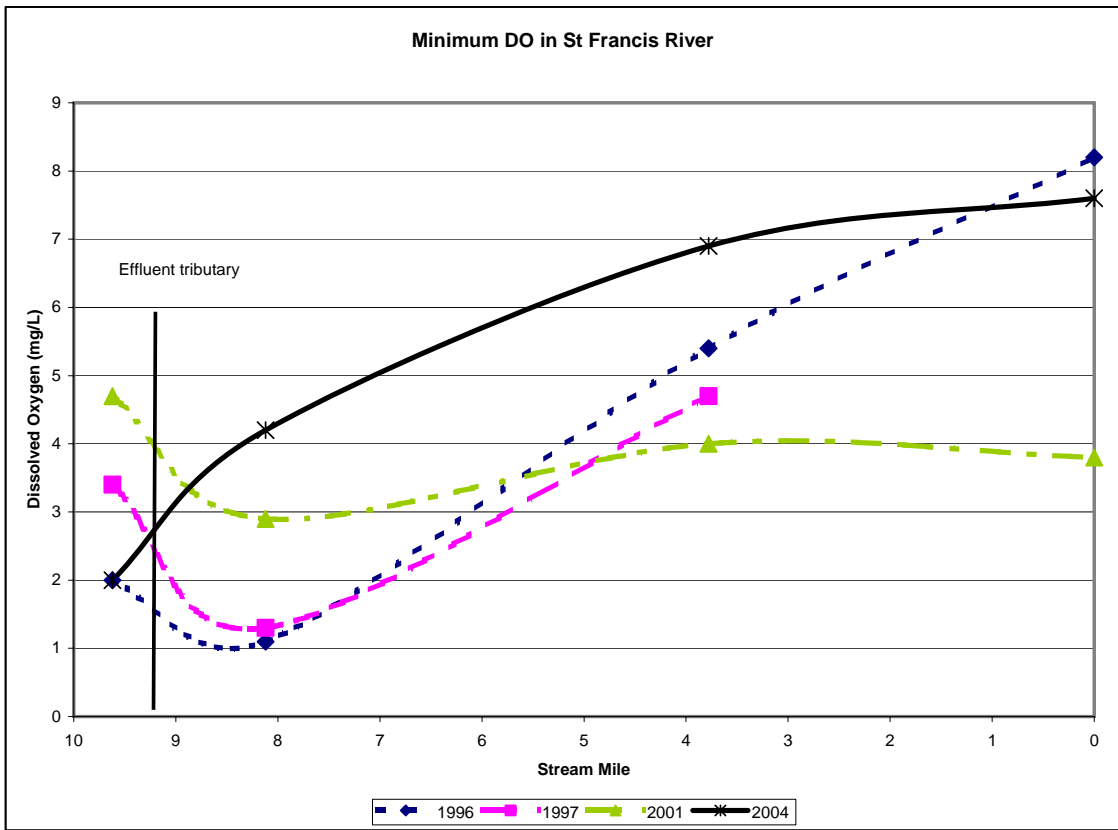


— — — — — Impaired Segment → Direction of Flow
 The key to the sample sites is on the next page.

- Sample Site Index
- 1 – St. Francis River 0.25 mile above effluent tributary
 - 2 – St. Francis River above Gruner Ford Conservation Area
 - 3 – St. Francis River 1.75 miles below Wolf Creek
 - 4 – St. Francis River at County Highway H crossing

The figure below shows the DO for four different years, both before and after the 2001 upgrade. It indicates that, while improvement is evident, compliance with water quality criteria, specifically the minimum of 5 mg/L for dissolved oxygen, has yet to be fully achieved. It also points out the low DO upstream of the effluent tributary and that it stays unacceptably low (below the standard) for more than two miles downstream. In contrast, sampling results in August 2005 showed that the DO directly below the outfall from the WWTP was 6.8 mg/L. This raises the point that the WWTP may not be the cause of the low DO and it may be appropriate to consider if site specific criteria are indicated.

Observed Early Morning DO in the St. Francis River



Source: Missouri Department of Natural Resources

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