



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

# Total Maximum Daily Load Information Sheet

## Crooked Creek

**Water Body ID: 1928 and 3961<sup>1</sup>**

---

### Water Body Segment at a Glance:

**County:** Iron, Dent and Crawford  
**Nearby City:** Viburnum  
**Length:** water body 1928 – 3.5 miles  
Water body 3961 – 5.2 miles  
**Pollutants:** Cadmium, lead and copper  
**Source:** Buick smelter



State Map Showing Location of Watershed

### Scheduled for TMDL development:

TMDL development schedules are subject to change.

The most current schedule for TMDL development is available on the department's website at [dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-progress.htm](http://dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-progress.htm)

---

### Description of the Problem

A water body is considered impaired when it fails to meet applicable water quality standards. Water quality standards consist of designated uses, water quality criteria, an antidegradation policy and implementation procedures. Crooked Creek is impaired due to exceedances of water quality criteria for the protection of aquatic life.

### Designated uses of Crooked Creek\*

- Warm Water Habitat (WWH)
- Cool Water Habitat (CLF)
- Whole Body Contact Recreation Category A (WBC-A)
- Secondary Contact Recreation (SCR)
- Human Health Protection (HHP)
- Irrigation (IRR)
- Livestock and Wildlife Protection (LWP)

\*In addition to these specific uses, all waters of the state are protected by the general water quality criteria that are specified in the state's Water Quality Standards at 10 CSR 20-7.031(4).

### Designated use that are impaired

- Warm Water Habitat (WWH)
- General criteria

---

<sup>1</sup> Water body ID number 3961 of Crooked Creek currently appears in Missouri's use designation dataset as ID number 3960.

### **Criteria that apply**

- Missouri Water Quality Standards found in 10 CSR 20-7.031 Table A provides formulas for calculating numeric chronic and acute dissolved metals criteria for the protection of aquatic life.
- Missouri does not currently have numeric water quality criteria for the protection of aquatic life from metals toxicity in sediments. However, aquatic life are protected through the general criteria found at 10 CSR 20-7.031(4). The particular general criteria that apply to Crooked Creek are:
  - (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.
- Since Missouri has no criteria for metals in sediment, Probable Effect Concentrations, or PECs, suggested by McDonald, et al<sup>2</sup>, are used for assessing compliance with the narrative general criteria. PECs are the concentrations at which some toxic effect on aquatic life is likely.

### **Assessment and water quality data**

A water body is judged to be impaired by dissolved metals, when the chronic or acute criteria values are exceeded during stable flow conditions on more than one occasion in the last three years for which data is available. For both water body segments of Crooked Creek, the dissolved cadmium criteria was exceeded. For the upstream portion of Crooked Creek, water body 3961, the dissolved copper criteria was also exceeded.

For sediments impairments, the department judges a stream to be impaired when the PEC value is exceeded by more than 150 percent. The PEC values for cadmium and lead were exceeded by more than this amount in the downstream portion of Crooked Creek, water body 1928.

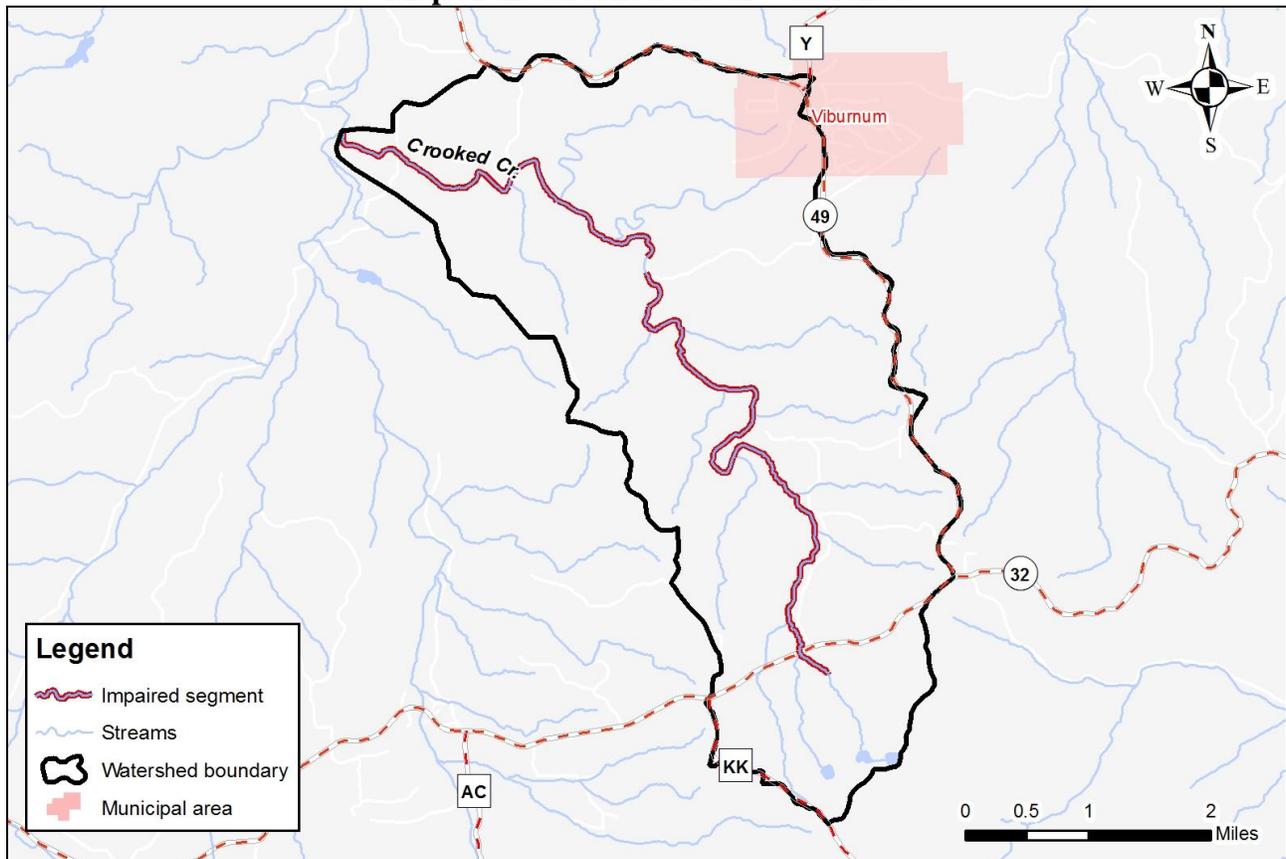
### **TMDL for Crooked Creek**

The Crooked Creek TMDL will calculate the maximum amount of each listed pollutant that the stream can receive and still meet water quality standards. The TMDL will also identify all potential or suspected pollutant sources in the watershed and distribute the allowable pollutant loads among those various sources. When developed, the Crooked Creek TMDL will use the most current and available data. For this reason, the final TMDL may present information that differs from that contained in this information sheet.

---

<sup>2</sup> *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000. USGS

## Map of the Crooked Creek Watershed



### For more information call or write:

Department of Natural Resources  
Water Protection Program – Watershed Protection Section  
P.O. Box 176  
Jefferson City, MO 65102-0176  
Ph: 1-800-361-4827 or 573-751-1300  
Fax: 573-526-6802  
Email: [TMDL@dnr.mo.gov](mailto:TMDL@dnr.mo.gov)  
Program Home Page: [dnr.mo.gov/env/wpp/index.html](http://dnr.mo.gov/env/wpp/index.html)