



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Total Maximum Daily Load Information Sheet

Eaton Branch

Water Body ID: 2166

Water Body Segment at a Glance:

County: St. Francois
Nearby Towns: Leadwood
Length: 33
Pollutant: Cadmium in sediment and water
Lead in sediment
Zinc in sediment and water
Source: Leadwood tailings pond



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

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. Eaton Branch is impaired due to exceedances of water quality criteria for the protection of aquatic life.

Designated uses of Eaton Branch*

- Warm Water Habitat (WWH)
- 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 uses that are impaired

- Warm Water Habitat (WWH)
- General criteria

Criteria that apply

- Acute and chronic dissolved metals criteria are provided in Table A of Missouri’s Water Quality Standards at 10 CSR 20-7.031(5)(B)1. These criteria are hardness dependent and are calculated using the formulas in Table A.
- Missouri has no water quality criteria for metals in sediment. Likewise, the U.S. Environmental Protection Agency has not yet established federal guidelines for toxic chemicals in stream or lake sediments. In lieu of such criteria, Probable Effect Concentrations, or PECs, suggested by McDonald, et al., are used.¹ PECs are the concentrations at which some toxic effect on aquatic life is likely.

Background information and water quality data

Eaton Branch is a small creek that drains the Leadwood Mine Tailings Site in St. Francois County. When the mine was active, the Eaton Branch valley was dammed and used for storing the mining and milling waste material. The Leadwood Mine tailings site impounds most of Eaton Branch, with only 0.9 mile of the creek remaining.

The department judges a water to be impaired by dissolved metals if either the chronic or acute criteria are exceeded on more than one occasion during the last three years for which data, collected under stable flow conditions, is available. For Eaton Branch, exceedances of dissolved cadmium and dissolved zinc were observed.

Dissolved Metals Data for Eaton Branch (units = µg/L)

| <i>Sampling Location</i> | <i>Year</i> | <i>Month</i> | <i>Day</i> | <i>Dissolved Cadmium</i> | <i>Dissolved Zinc</i> |
|---|-------------|--------------|------------|--------------------------|-----------------------|
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1988 | 2 | 24 | 2 | 820 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1988 | 5 | 16 | 13 | 3100 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1988 | 9 | 26 | 3 | 1200 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1988 | 12 | 10 | 0.499 | 550 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1989 | 3 | 2 | 2 | 720 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1989 | 5 | 3 | 8 | 2200 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 1989 | 9 | 13 | 4 | 1800 |
| Eaton Br. 0.4 mile below Leadwood tailings pile | 2003 | 4 | 2 | 5 | 1800 |
| Eaton Branch near stream mouth | 2003 | 10 | 1 | 4.78 | 1720 |
| Eaton Branch near stream mouth | 2004 | 3 | 23 | 5.07 | 1240 |
| Eaton Br. at county road nr mouth | 2006 | 2 | 16 | 2.38 | 1090 |
| Eaton Branch near stream mouth | 2006 | 4 | 13 | 3.33 | 1140 |
| Eaton Br. at county road nr mouth | 2006 | 10 | 30 | 1.92 | 656 |
| Eaton Br. at county road nr mouth | 2007 | 4 | 18 | 1.69 | 633 |
| Eaton Branch near stream mouth | 2007 | 9 | 6 | 0.44 | 384 |
| Eaton Br. at county road nr mouth | 2008 | 10 | 16 | 2.18 | 1170 |
| Eaton Branch near stream mouth | 2008 | 6 | 11 | 5.65 | 1880 |
| Eaton Br. at county road nr mouth | 2012 | 7 | 25 | 0.0499 | 389 |
| Eaton Br. at county road nr mouth | 2012 | 8 | 15 | 0.0499 | 346 |
| Eaton Br. at county road nr mouth | 2012 | 9 | 5 | 0.88 | 725 |
| Eaton Br. at county road nr mouth | 2012 | 10 | 12 | 2.67 | 1580 |
| Criterion = | | | | 0.61 | 359 |

¹ *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000

For metals in sediments, the department judges a stream to be impaired when the geometric mean of observed values exceed the PEC values by more than 150 percent. Additionally, the synergistic effects of multiple sediment contaminations are considered and a stream may be judged to be impaired if the sediment quotient is 150 percent great than the PEC quotient value of 0.75. For Eaton Branch, the sediment quotient value was calculated as 5.477, which is 729 percent greater than the PEC quotient value.

Eaton Branch Sediment Data (unit = mg/kg)

| Location | CD | PB | ZN |
|------------------------------|---------------|---------------|--------------|
| Eaton Branch near mouth | 67.1 | 2,243 | 2,013 |
| Eaton Branch near mouth | 76 | 2,490 | 3,910 |
| Geomean | 71 | 2,363 | 2,805 |
| PEC | 4.98 | 128 | 459 |
| Percent exceeding PEC | 1,434% | 1,846% | 611% |

TMDL for Eaton Branch

The Eaton Branch 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 Eaton Branch 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.

For more information call or write:

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Map of the Eaton Branch Watershed

