

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Total Maximum Daily Load Information Sheet

Jacobs Branch

Water Body ID: 3223

Water Body Segment at a Glance:

County: Newton
Nearby City: Joplin
Segment Length: 1.6 miles
Pollutants: cadmium (sediment & water)
zinc (sediment & water)
lead (sediment)
Source: Mill tailings and
Tri-state mining district



Statewide Map Showing Location of Watershed

Schedule 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. Jacobs Branch is impaired due to exceedances of state water quality criteria that protect aquatic life designated uses.

Designated uses of Jacobs Branch*

- Warm Water Habitat (WWH)
- Whole Body Contact Recreation Category B (WBC-B)
- 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

- Table A of the Water Quality Standards contains dissolved metals criteria for the protection of aquatic life designated use (WWH). These criteria are hardness dependent and limits are calculated from the formulas shown below:

Dissolved Cadmium

$$\text{Acute}^1 = e^{(1.0166 * \ln(\text{hardness}) - 3.062490)} * (1.136672 - (\ln(\text{hardness}) * 0.041838)) = \mu\text{g/L}$$

$$\text{Chronic} = e^{(0.7409 * \ln(\text{hardness}) - 4.719948)} * (1.101672 - (\ln(\text{hardness}) * 0.041838)) = \mu\text{g/L}$$

Dissolved Zinc

$$\text{Acute and Chronic} = e^{(0.8473 * \ln(\text{hardness}) + 0.884)} * 0.98 = \mu\text{g/L}$$

- Missouri has no numeric criteria for metals in sediment. Likewise, federal guidelines have not yet been established 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 to assess toxicity in stream sediments.² PECs are the concentrations at which some toxic effect on aquatic life is likely.
- Missouri streams are also protected by the general criteria found at 10 CSR 20-7.031(4). The particular general criteria that apply to Jacobs Branch include:
 - (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.

Water quality data and assessment

A water body is judged to be impaired by dissolved metals when more than one exceedance of the metals criteria occurs in the any of the last three years for which there are available data, during stable flow conditions. For Jacobs Branch, there were seven exceedances of both the chronic dissolved cadmium criterion and the acute and chronic dissolved zinc criterion (Figure 1).

A water body is judged to be impaired by metals in sediment when the geometric means of available metals data exceeds the PEC values by more than 150 percent. For Jacobs Branch, the PEC levels were exceeded by this amount for cadmium, zinc, and lead (Table 1).

¹ Acute criteria apply to short exposures to toxic conditions that aquatic creatures can survive without harm. Chronic criteria apply to conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic criteria values are typically lower than acute criteria values.

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

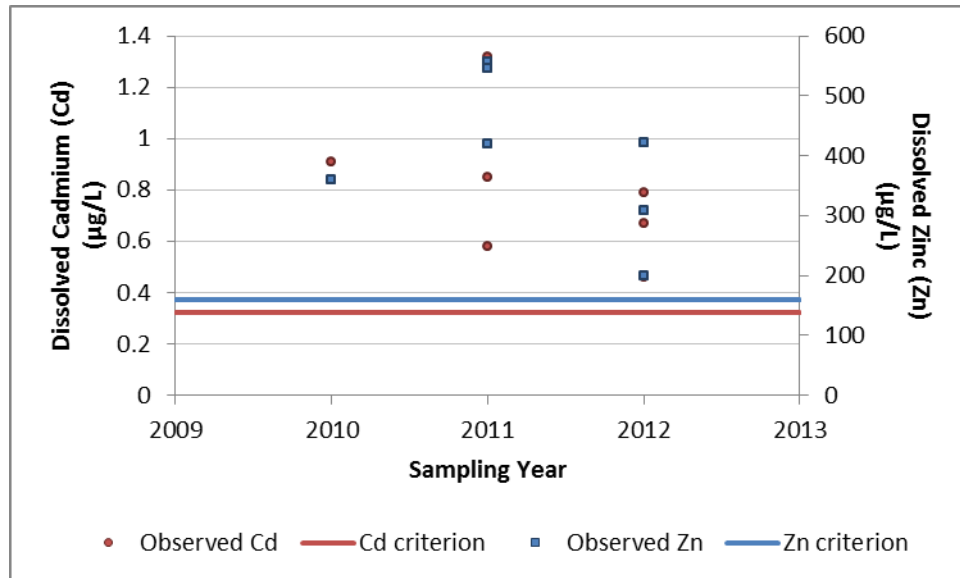


Figure 1. Dissolved cadmium and zinc data for Jacobs Branch (hardness = 144 mg/L)

Table 1. Metals in Sediment Data for Center Creek (data from 1991 – 2007)

<i>Pollutant</i>	<i>PEC (mg/L)</i>	<i>Jacobs Branch Geometric Mean (mg/L)</i>
Cadmium	4.98	81.3
Lead	128	1,499
Zinc	459	11,686

TMDL for Jacobs Branch

The Jacobs 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 Jacobs 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:

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

Map Showing the Jacobs Branch Watershed

