



Bachelor Creek is designated for expected aquatic life support and secondary contact recreation main stem segment. The impaired use is expected aquatic life support. Bachelor Creek fails to meet the 5 mg/L DO water quality standard. Reduction of BOD to 2.0 mg/L in the stream is targeted to attain DO standards.

#### **Link Between Numeric Target(s) and Pollutant(s) of concern**

*An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.*

All excursions from standards were seen at flows of less than 1.5 cfs. Regression analysis indicates a significant predictive relationship between BOD and DO when flows are below this critical level of 1.5 cfs. A target of 2.0 mg/L of BOD was established targeting an in-stream DO of 5.5 mg/L at the pH values seen during critical flow periods. At flows above the critical level DO levels have remained in compliance, therefore this TMDL targets the BOD concentration for these flows as the historic average BOD concentration of 4.0 mg/L. Monitoring samples are no longer analyzed for BOD so phase two of this TMDL will revise targets to TOC which replaced BOD analyses. As more TOC data is accumulated a relationship between BOD and TOC in this stream will be used to derive the new target.

TMDL load duration curve methodology presents a comparatively simple empirical approach to achieving WQS. The flow duration curve is a cumulative frequency curve that shows the percent of time during which specified discharges were equaled or exceeded in a given period. KDHE used daily flow records for evaluating water quality in the listed waters. By representing a long-term flow of the listed waters, along with the applicable monitoring data, the curves can be used to predict the distribution of future flows for meeting State WQS for DO. Descriptions of allocations are detailed and indicate the source assessment was thorough. Evaluation shows sum of all allocations and implicit margin of safety will not exceed the loading capacity.

#### **Source Analysis**

*Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.*

There are no NPDES municipal permitted wastewater dischargers in the watershed and one non-discharging facility. The non-discharging facility may only contribute BOD load during extreme precipitation events after notification of KDHE of an anticipated bypass. From census data 23% of the population in the county in which Bachelor Creek is located are on septic systems, failing septic systems can contribute significant oxygen demanding substances. In this watershed 73% of the watershed produces runoff with rainfall of less than 0.57 inches per hour. Background conditions also exist that load oxygen demanding material to the stream. This includes streamside vegetation and wildlife. It appears all significant sources of oxygen demanding load have been considered.

**Allocation**

*Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.*

This TMDL assigns load allocations for nonpoint sources. There are no discharging point sources located within the watershed

**WLA Comment**

The waste load allocation is zero because there are no discharging point sources in the watershed.

**LA Comment**

The load allocation for this TMDL is 2.0 mg/L of BOD during periods of critical flow (< 1.5 cfs) and 4.0 mg/L BOD for flows higher than 1.5 cfs.

**Margin of Safety**

*Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.*

The margin of safety is explicit based on the target DO of 5.5 mg/L instead of the standard of 5.0 mg/L when setting the target BOD concentration under the critical flow condition. For flows above the critical level the target is the historic average BOD concentration is used, this is implicit as there have not been violations recorded when flow is above the critical level.

**Seasonal Variation and Critical Conditions**

*Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).*

Seasonality is addressed in this TMDL through the use of critical flow conditions. These low flow generally occur in summer and fall.

**Public Participation**

*Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).*

The following public participation occurred with this TMDL:

Public meetings: January 30, 2004 in Burlington, July 30, 2004 in Marion

Public Hearing: September 30, 2004 in Burlington

The Neosho Basin Advisory Committee meeting January 30, 2004, July 30, 2004 in Marion and September 30, 2004 in Burlington.

A web site was implemented to make the TMDL available to the public.

**Monitoring Plan for TMDL(s) Under Phased Approach**

*The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).*

The KDHE will collect bimonthly samples in 2005 and 2009 to assess the success of this TMDL. If the stream remains impaired the desired endpoints will be refined and more intensive sampling may be conducted if needed.

**Reasonable assurance**

*Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.*

Reasonable assurances are not required as nonpoint reductions are not being used to ensure waste load allocations will result in meeting water quality standards.

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