

# MARAIS DES CYGNES BASIN 4c JUSTIFICATION

**Waterbody: Pottawatomie Creek**  
**Water Quality Impairment: Biology**

## 1. INTRODUCTION AND PROBLEM IDENTIFICATION

**Subbasin:** Upper Marais des Cygnes      **County:** Miami, Franklin, Anderson, Linn and Coffey

**HUC 8:** 10290101

**HUC 11 (HUC 14s):**      **050** (010, 020, 030, 040, 050, 060, 070, 080 and 090)  
                                 **060** (010, 020, 030 and 040)

**Drainage Area:**                      538.3 square miles

**Main Stem Segments:** 51, 53, 55, 56, 58, 59, 61, 63, 65; starting at confluence with Marais des Cygnes River and traveling upstream to eastern Coffey County (**Figure 1**).

**Tributary Segment:**      Unnamed Tributary (52)  
                                 Unnamed Tributary (54)  
                                 Dry Creek (57)  
                                 Sac Creek (60)  
                                 Iantha Creek (62)  
                                 Kenoma Creek (64)  
                                 Cedar Creek (66)  
                                 S. Fork Pottawatomie Creek (67)  
                                 Thomas Creek (72)  
                                 Cherry Creek (74)  
                                 Bradshaw Cr (75)

**Designated Uses:**                      Special Aquatic Life Support, Primary Contact Recreation (C); Domestic Water Supply; Food Procurement; Ground Water Recharge; Industrial Water Supply Use; Irrigation Use; Livestock Watering Use for Main Stem Segments.

**2004 303(d) Impaired Use:** Special Aquatic Life Support

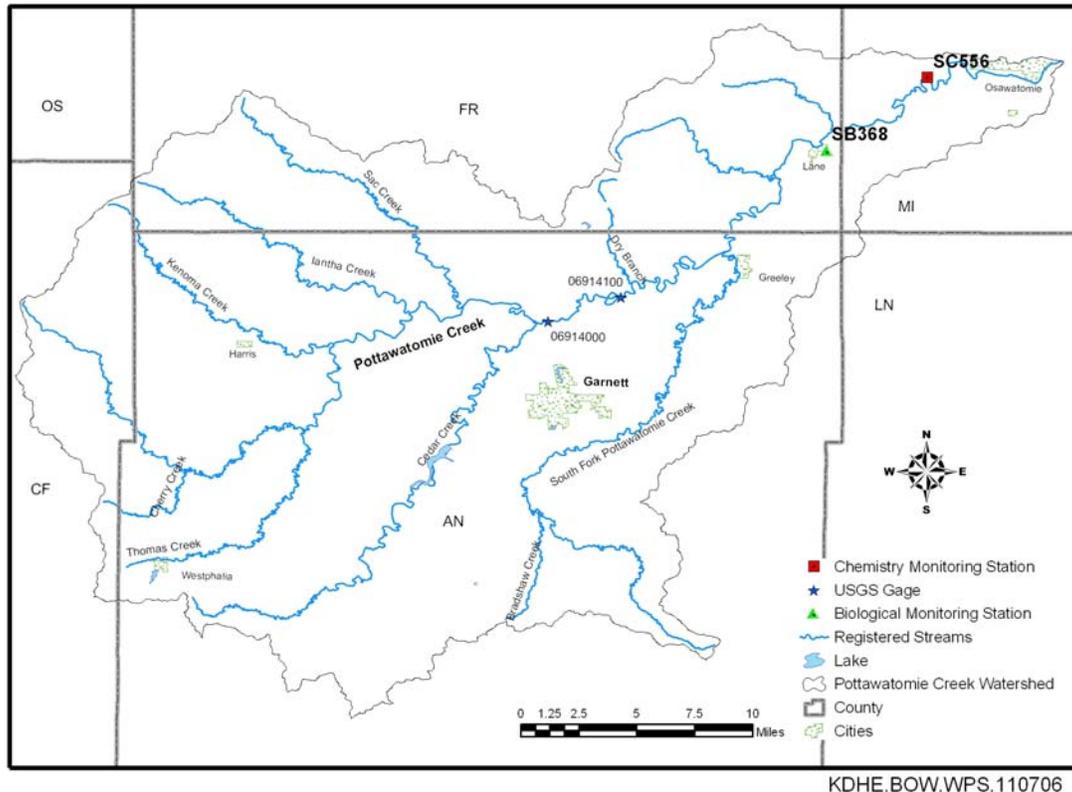
**Water Quality Standard:** Levels of water quality in surface waters of the state shall be maintained to protect the existing uses of those surface waters (K.A.R. 28-16-28c(a)(1)(A)).  
KDHE regards as guidance, the range of metric scores identified by the Stream Biological Monitoring Program (Appendix A) as probable support levels for aquatic life.

### Related Guidance on 4c Waters:

#### 3. Which segments should states include in Category 4c?

Segments should be placed in Category 4c when the state demonstrates that the failure to meet an applicable water quality standard is not caused by a pollutant, but instead is caused by other types of pollution. Segments placed in Category 4c do not require the development of a TMDL. Pollution, as defined by the CWA is “the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water” (section 502(19)). In some cases, the pollution is caused by the presence of a pollutant and a TMDL is required. In other cases, pollution does not result from a pollutant and a TMDL is not required. States should schedule these segments for monitoring to confirm that there continues to be no pollutant associated with the failure to meet the water quality standard and to support water quality management actions necessary to address the cause(s) of the impairment. Examples of circumstances where an impaired segment may be placed in Category 4c include segments impaired solely due to lack of adequate flow or to stream channelization. (July 29, 2005 Integrated Report Guidance, page 56, Diane Regas)

## Pottawatomie Creek Biology 4c Map



(Figure 1)

## 2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

**Monitoring Sites:** SC556 near Osawatome, SB368

**Period of Record Used:** 1990-2006 for SC556, 1994-2005 for SB368 (Table 1)

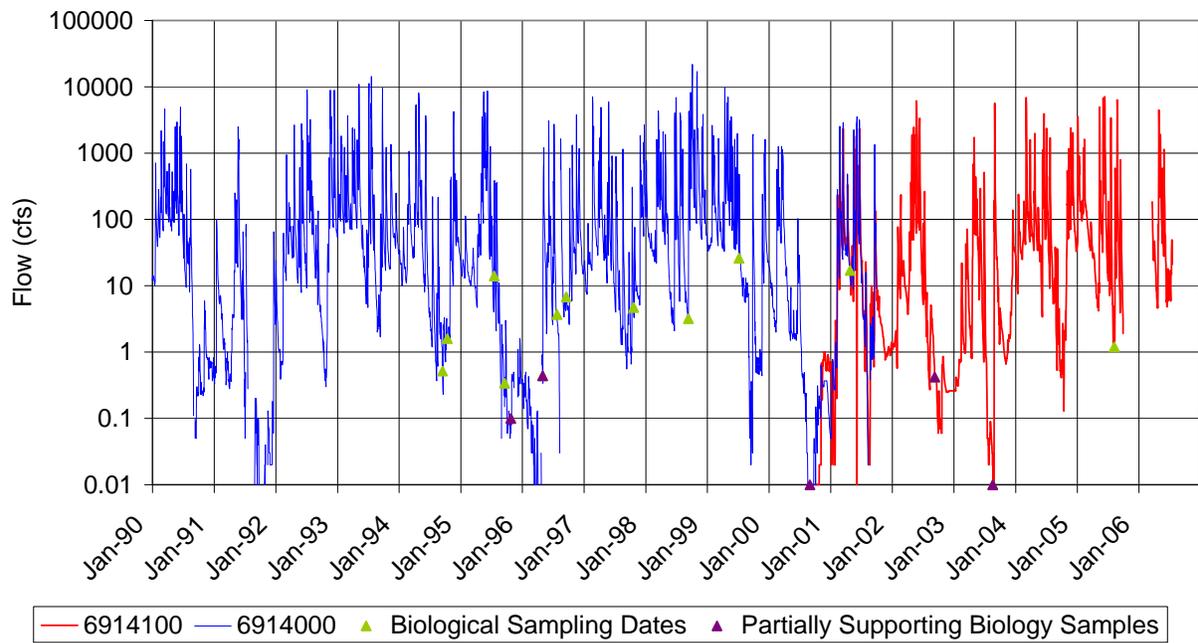
**Flow Record:** USGS Station 06914000: 1971 to 2000; USGS Station 06914100: 2001-2006

**Long Term Flow Conditions (as recorded at 06914000):** 10% Exceedence Flows = 420 cfs, 50% Exceedence Flows = 23 cfs, 90% Exceedence Flows = 0.2 cfs

Date	MBI	KBI-NO	EPT Taxa	EPT Percentage	30 Day Median Flow	30 Day Avg. Flow	30 Day Peak Flow	30 Day Minimum Flow
9/16/1994	4.45	2.59	15	59.00%	2.30	17.94	216.00	0.52
10/14/1994	4.25	2.56	14	67.00%	1.55	1.59	3.30	0.23
7/19/1995	4.09	2.56	15	73.00%	35.00	107.88	1250.00	4.00
9/19/1995	4.46	2.61	13	50.00%	0.70	0.86	2.60	0.00
10/26/1995	4.57	2.73	12	31.00%	0.09	0.22	2.10	0.05
5/1/1996	4.64	2.85	8	26.00%	0.00	0.09	0.91	0.00
7/25/1996	4.35	2.72	14	53.00%	12.50	196.26	2720.00	2.60
9/18/1996	4.29	2.57	16	66.00%	5.90	17.15	111.00	3.40
10/22/1997	4.48	2.48	15	66.00%	5.60	27.84	305.00	0.66
9/11/1998	4.4	2.51	18	62.00%	6.40	11.87	55.00	3.10
7/8/1999	4.13	2.62	12	54.00%	89.50	303.63	1980.00	26.00
8/31/2000	4.92	2.9	9	31.00%	0.03	0.06	0.24	0.00
4/26/2001	3.76	2.41	11	48.00%	41.50	63.10	335.00	17.00
9/10/2002	4.56	2.65	8	33.00%	1.80	2.13	5.10	0.26
8/20/2003	4.61	3	5	25.00%	0.03	0.04	0.08	0.01
8/9/2005	4.49	2.68	14	59.00%	8.45	181.77	3390.00	1.10
Average	4.40	2.65	12.44	50.19%				
Median	4.46	2.62	13.50	53.50%				
Minimum	3.76	2.41	5.00	25.00%				
Maximum	4.92	3.00	18.00	73.00%				

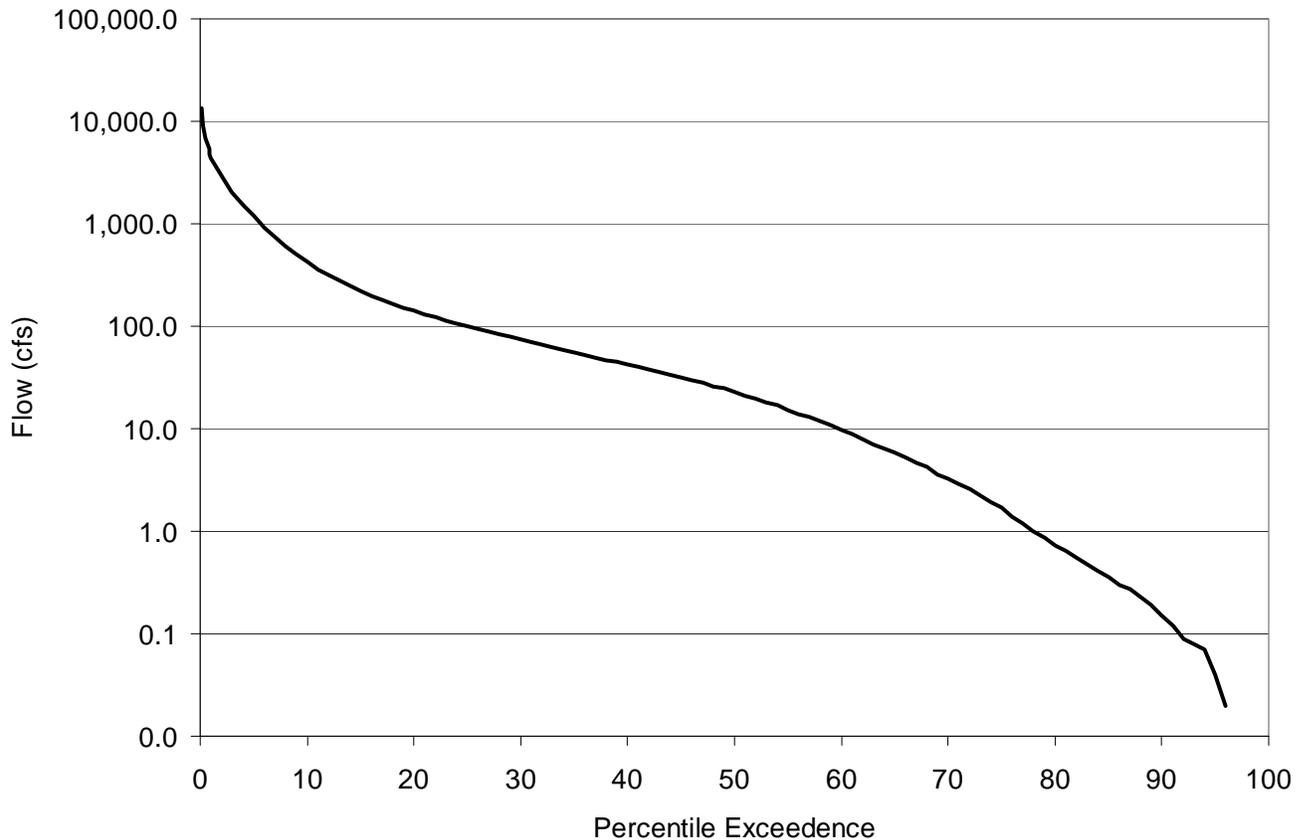
(Table 1- Index Scores measured by the KDHE biological monitoring program and antecedent flow conditions. Pink highlighted cells indicate less than fully supporting index scores, yellow highlighted cells indicate flow conditions for years when all metrics agreed on a partial-support designation.)

# Pottawatomie Creek Flow



(Figure 2- Average daily flow conditions measured by USGS in Pottawatomie Creek since 1990. Gage locations are indicated in Figure 1.)

## 06914000 Flow Duration Curve



**(Figure 3 – Flow duration curve at USGS gage 06914000 since Jan. 1, 1971. Five percent of the time gage data indicate that Pottawatomie Creek is not flowing.)**

**Current Conditions:** Four biological metrics were examined to determine the level of biological impairment at SB368; MBI, KBI-NO, EPT Index and EPT % (see Appendix 1 for a detailed explanation of the metrics), Table 1. Each of the four parameters had some years with less than fully supporting designations, though EPT % had the least, five of sixteen, with the most recent occurring in 2003. Samples were not taken during 2004.

### 3. JUSTIFICATION FOR 4C LISTING

During analysis of the hydrologic data it was noted that flow and biological metric scores were strongly linked. During the 30 days prior to four of the five samples where all four metrics agreed on a partial support designation (10/26/1995, 5/1/1996, 8/31/2000, 8/20/2003) median flow conditions were less than 0.1 cfs. The remaining sample where all four metrics agreed on partial support (9/10/2002) had a median flow of less than 2 cfs, and a minimum flow of 0.26 cfs.

Four samples had KBI-NO scores of partial support at times when MBI scores indicated fully supporting conditions. Of these four, one (9/19/1995) occurred when 30 day antecedent median flow was less than 1 cfs and exceeded the guidance for full support by 1/100 of a point. The remaining three scores of partial support (7/25/1996, 7/8/1999, 8/9/2005) all had flow events in the previous 30 days that with flow percentiles of 97% or greater. The only remaining score of partial support (4/26/2001) was for EPT Taxa, and occurred when the MBI score was the lowest (best) ever recorded at this site. While no explanation is immediately apparent, it appears that this score is not reflective of the total conditions in Pottawatomie Creek at that time.

Further support for the movement of Pottawatomie Creek from Category 5 to Category 4c can be seen in the median conditions over time. The median scores for three of the four metrics, MBI, EPT Taxa, and EPT %, are fully supporting. The median score for KBI-NO is only 2/100 of a point above the level of fully supporting, even including all five hydrologically stressed samples.

#### **4. MONITORING**

KDHE will continue to collect samples at SB368. This sampling will allow KDHE to determine if conditions change in a way that merits the return of Pottawatomie Creek to a Category 5 water. Should biological data indicate impairment at times when hydrological stresses are not a predominant factor this listing will be restored to Category 5.

#### **5. FEEDBACK**

**Public Hearings:** Public Hearings on the 2006 303(d) list for the Marais des Cygnes Basin was held in Ottawa on October 24, 2006..

**Basin Advisory Committee:** The Marais des Cygnes Basin Advisory Committee met to discuss the 303(d) listings in the basin on October 24 and November 29, 2006.

**Milestone Evaluation:** In 2006, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Pottawatomie Creek. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

**Consideration for 303(d) Delisting:** The creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2005-2011. Therefore, the decision for delisting will come about in the preparation of the 2012 303(d) list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may be adjusted accordingly.

**Incorporation into Continuing Planning Process, Water Quality Management Plan and the**

**Kansas Water Planning Process:** Under the current version of the Continuing Planning Process, the next anticipated revision will come in 2006 which will emphasize revision of the Water Quality Management Plan. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2006-2010.

## **Appendix A:**

### **KDHE Biological Monitoring Metrics**

MBI- Macroinvertebrate Biotic Index: Developed to assess the impact of oxygen demanding nutrients and organic enrichment on macroinvertebrate populations. Has a wider range of possible scores than the KBI, but the research basis for the larger number of values is lacking. Has more generalization into higher taxonomic units than the KBI. Includes many insect genera and species and other common macroinvertebrates, such as leaches, worms, snails, bivalves, flatworms, and crayfish; some of the insect species scored in the KBI are not scored in the MBI. Scoring Range: 1 (intolerant)-11 (tolerant)

Fully Supporting-  $\leq 4.5$

Partially Supporting- 4.51-5.39

Non-Supporting-  $\geq 5.4$

KBI- Kansas Biotic Index: Reported here as the Nutrient Oxygen Demand component. Developed specifically for Kansas insects belonging to the 10 orders of insects known to occur in Kansas, this metric has six potential categories of impairment- Nutrient Oxygen Demand, Agricultural Pesticides, Heavy Metals, Salinity, Suspended Sediments and Solids, and Persistent Organic Compounds. However, Steve Cringan is not aware of any previous use, or verification of, the non-nutrient tolerance values. Species were assigned tolerance values and the composite score for the site is the abundance weighted average tolerance score for the population collected. Scoring Range: 0 (intolerant)-5 (tolerant)

Fully Supporting-  $\leq 2.6$

Partially Supporting- 2.61-2.99

Non-Supporting-  $\geq 3.0$

EPT- Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies): The simple sum of the number of species collected belonging to these three orders. EPT are widely recognized as relatively intolerant to pollution, and generally the presence of greater numbers (both diversity and abundance) of these species is considered indicative of higher water quality.

Fully Supporting-  $\geq 13$

Partially Supporting- 8-12

Non-Supporting-  $\leq 8$

EPT % Abundance: The percentage of all individuals collected belonging to these three orders. Large populations of a few species may swing this metric to fully supporting when the EPT index registers a partial or non-supporting condition. This metric does not measure diversity in community structure.

Fully Supporting-  $\geq 48\%$

Partially Supporting- 31-47%

Non-Supporting-  $\leq 30\%$