



## **SMALL WATERSHED ROTATING BASIN MONITORING PROGRAM**

**BASIN GROUP 3:  
LOWER NORTH CANADIAN, LOWER CANADIAN,  
AND LOWER ARKANSAS BASINS  
SECOND CYCLE**

### **FINAL REPORT**

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## 1.0 INTRODUCTION

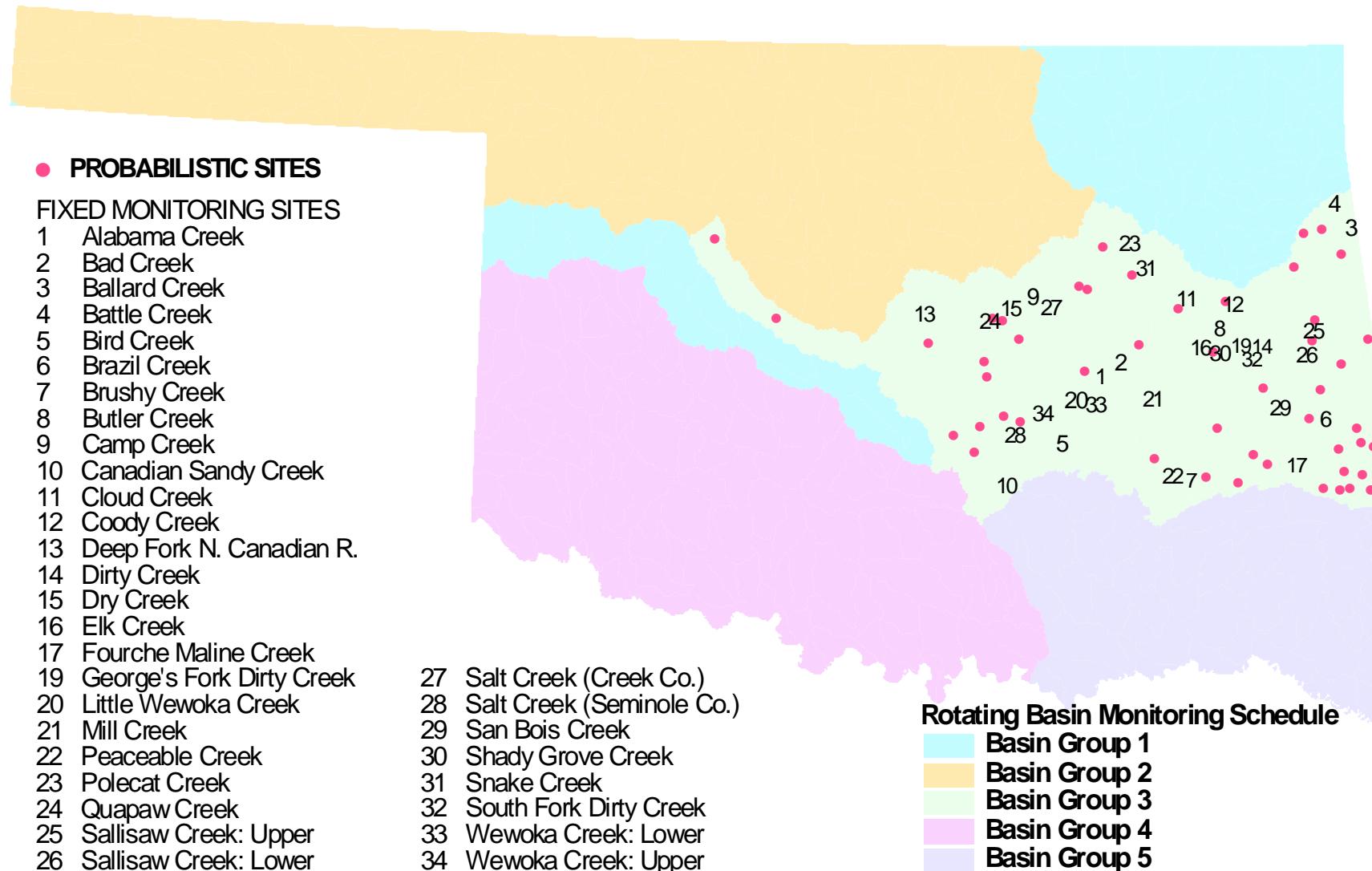
### PROJECT BACKGROUND AND DESCRIPTION

The Clean Water Act has charged each state's nonpoint source (NPS) pollution agency with two primary tasks: 1) identify all waters being impacted by NPS pollution, and 2) develop a management program describing programs to be implemented to correct any identified problems. In addition, each state's NPS agency is charged with identification of all programs which are actively planning or enforcing NPS controls in order to reduce NPS pollution in cooperation with local, regional, and interstate entities. The state NPS agency can then report on total program status with regard to efforts to address NPS impacts and improve water quality. The Oklahoma Conservation Commission (OCC) is charged by Oklahoma state statute as the NPS Program technical lead and therefore must monitor to determine the occurrence, nature, and extent of NPS impacts to state waters. Robust and meaningful assessment of the state's water quality is the foundation for meeting the long-term goals of the Oklahoma NPS program and water quality management in general.

In 2000, the Oklahoma Conservation Commission (OCC) initiated a progressive ambient monitoring program to assess NPS issues on a larger spatial and temporal scale than previously done. Known as the *Small Watershed Rotating Basin Monitoring Program* ("Rotating Basin Program"), this effort entails fixed station sampling at or near the outlets of complete eleven digit Hydrologic Unit Code watersheds (HUC-11). Oklahoma contains all or part of 414 U.S. Geological Survey (USGS) 11-digit HUC basins which have been collated into eleven larger planning basins for state water quality management purposes. The sampling units for the Rotating Basin Monitoring Program are based at the outlets of HUC 11 watersheds located entirely in the state, with secondary sites located upstream in selected watersheds where isolation of a particular tributary influence is necessary. Fixed stations are segregated into strategic basin groups and are sampled every five weeks for a period of two years. Each year, sampling is initiated in a new basin group, resulting in a statewide coverage of all sites in five years (Figure 1).

To complement the fixed site monitoring, the OCC added a probabilistic component to the Rotating Basin Monitoring Program in 2008. This addition to the Rotating Basin Program provides a statistically qualified assessment of water quality conditions throughout each of the project basin units. To accomplish this, sites are randomly selected from all of the waters of interest in a target area (i.e., basin unit), and the monitoring results are used to estimate water quality conditions in the larger area with known confidence (USGAO 2004). Through the probabilistic component, data will be collected from 250 stream locations over a five-year period, with 50 targeted sites sampled each year. The probabilistic sites will be coordinated with the basins being sampled by the rotating basin project in any given year; thus, for 2008, both rotating basin and probabilistic sites were sampled in the Lower North Canadian, Lower Canadian, and Lower Arkansas basins (Figure 1).

Figure 1. Fixed and probabilistic monitoring sites in “Basin Group 3” for the second cycle of the Small Watershed Rotating Basin Monitoring Project.



Effectively coordinated with other state monitoring programs, the OCC's Rotating Basin program is designed to accomplish the state's NPS monitoring needs in four stages. The first stage includes a comprehensive, coordinated investigation and analysis of the causes and sources of NPS pollution throughout the state—*Ambient Monitoring*. The second stage involves more intensive, specialized monitoring designed to identify specific causes and sources of NPS pollution—*Diagnostic Monitoring*. The data from diagnostic monitoring can be used to formulate an implementation plan to specifically address the sources and types of identified NPS pollution. The third stage of monitoring is designed to initiate remedial and/or mitigation efforts to address the NPS problems—*Implementation Monitoring*. Finally, the fourth stage evaluates the effectiveness of the implementation through assessment and post-implementation monitoring—*Success Monitoring*. This assessment program provides a thorough and statistically sound evaluation of Oklahoma's waters every five years, which helps focus NPS program planning, education, and implementation efforts in areas where they can be most effective.

The Small Watershed Rotating Basin Monitoring Program considers the following specific questions in the context of Oklahoma Water Quality Standards and Use Support Assessment Protocols (USAPs) in addressing NPS pollution:

1. Which HUC 11 waterbodies are not-supporting assigned beneficial uses due to NPS or NPS plus point source (PS) pollution?
2. Which waterbodies show elevated or increasing levels of NPS or NPS plus PS pollutants, which may threaten water quality?
3. What are the sources and magnitude of pollution loading within threatened or impaired waterbodies?
4. Which land uses or changes in land use are sources or potential sources for pollutants causing beneficial use impairment?

In its entirety, OCC's Rotating Basin Monitoring Program provides an assessment of water quality, watershed condition, and support status for selected streams statewide necessary for planning, implementation, and eventual evaluation of mitigation efforts. The statewide ambient monitoring program has allowed a comprehensive approach for the identification of nonpoint source (NPS) affected waters, as well as the identification of high quality streams. Results from this effort are used to assist the state in producing the 305(b) and 303(d) lists which are required by the EPA to assess beneficial use support for waterbodies biannually.

This report discusses the results of the *ambient* (routine physical, chemical, and biological sampling) and *diagnostic* (special parameter sampling) stages of the second cycle of the Rotating Basin program in the Neosho-Grand and Upper Canadian basins (see Figure 1). Data from both fixed and probabilistic sites will be discussed. *Implementation* and *success* monitoring are typically accomplished through priority watershed projects and reported on in project-specific final reports.

This program will continue to provide a robust baseline dataset to assess the impact of NPS pollution throughout the state, identify the causes and sources of the pollution, and determine the success of measures to improve water conditions. The use of probabilistic monitoring in conjunction with the rotating basin monitoring program will allow a statistically valid and

qualified assessment/representation of the percentage of stream miles across the state that are in good or bad condition and the percentage of stream miles that are fulfilling or not fulfilling their designated uses.

## **MATERIALS AND METHODS**

### **GENERAL**

Sampling stations were selected to effectively represent streams of the Lower North Canadian, Lower Canadian, and Lower Arkansas Basins. Candidate streams were selected from subwatersheds within these basins located entirely within the state of Oklahoma having perennial water. Watersheds that did not have perennial water or were actually a segment of a larger river being sampled by another agency were not chosen. Where a particular watershed was monitored by another entity, the stream was dropped from consideration for a Rotating Basin site if the monitoring being conducted met the project data quality objectives. For most subwatersheds, the monitoring site was located near the outflow of the primary stream far enough upstream to limit backwater (surface and alluvial) effects of the waterbody to which it drained. For larger subwatersheds, an additional site was sometimes located upstream to isolate a particularly strong tributary influence. In some cases, sites were specifically chosen to monitor a stream draining an area of landuse different from the majority of the other streams being monitored in that region or subwatershed.

Reconnaissance of all of the potential sites within the Lower North Canadian, Lower Canadian, and Lower Arkansas basins was accomplished prior to the first round of monitoring in 2003, and sites which did not meet the sampling criteria were removed from the project. Thirty-four sites were monitored during the first rotating basin cycle, from 2003-2005. The second cycle of monitoring in these basins occurred from June 2008-May 2010. One site (Gentry Creek) was dropped, and three site locations were moved slightly for the second cycle due to landowner permission issues.

With the initiation of the probabilistic component of the Rotating Basin Program, the OCC sampled a total of 50 randomly selected sites in the Lower North Canadian, Lower Canadian, and Lower Arkansas basins during the summer of 2008. These sites were part of a master site list generated by Tony Olsen with the EPA Corvallis Lab which included 150 sites total. Sampling occurred in the order the list was generated until 50 sites were assessed. The additional 100 sites were “back-ups” to be used if one of the first 50 sites was inaccessible or if access permission was denied.

The sites monitored in the Lower Arkansas basin occur over four level-three ecoregions: Arkansas Valley (AV), Central Irregular Plains (CIP), Ozark Highlands (OH), and Boston Mountains (BM) (Woods et al. 2005). In the Lower Canadian basin, sites are located in the Cross Timbers (CT) and Arkansas Valley ecoregions. The Lower North Canadian basin includes sites in the Cross Timbers ecoregion as well as in the Central Irregular Plains ecoregion. Three fixed sites had a heavy influence from a bordering ecoregion (i.e., the sites are very close to the ecoregion border and have water originating in the other ecoregion), so they were grouped with the influencing ecoregion when compared to reference conditions: Polecat Creek and Snake

Creek (located in CIP but influenced by CT) and Sallisaw Creek Lower (located in AV but influenced by BM). This is indicated by the “modified ecoregion” column in Table 1.

**Table 1. Fixed Site List for Rotating Basin Monitoring Program: Basin Group 3, Cycle 2.**

Site Name	WBD	Latitude	Longitude	Legal	County	Ecoregion	Modified Ecoregion
Alabama Creek	OK520500-01-0200D	35.3366	-96.1425	NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ SECTION 16-10N-11E	Okfuskee	CT	
Bad Creek	OK520500-01-0170L	35.3778	-96.0586	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ SECTION 5-10N-12E	Okfuskee	CT	
Ballard Creek	OK121700-03-0370G	36.1063	-94.5646	NW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ SECTION 20-19N-26E	Adair	OH	
Battle Creek	OK121700-06-0040G	36.2104	-94.6844	SW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 18-20N-25E	Delaware	OH	
Bird Creek	OK520800-01-0050G	35.0142	-96.3906	SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 6-6N-9E	Hughes	CT	
Brazil Creek	OK220100-03-0010G	35.1388	-94.7690	SE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 27-8N-24E	LeFlore	AV	
Brushy Creek	OK220600-03-0010J	34.8432	-95.6141	NW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 3-4N-16E	Pittsburg	AV	
Butler Creek	OK120400-02-0160D	35.5806	-95.4179	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 20-13N-18E	Muskogee	CIP	
Camp Creek	OK520700-03-0220G	35.7559	-96.5723	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 21-15N-7E	Creek	CT	
Canadian Sandy Creek	OK520600-03-0010D	34.8119	-96.7036	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ SECTION 18-4N-6E	Pontotoc	CT	
Cloud Creek	OK120410-01-0100T	35.7402	-95.6132	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 33-15N-16E	Muskogee	CIP	
Coody Creek	OK120400-01-0400F	35.7143	-95.3224	SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 5-14N-19E	Muskogee	CIP	
Deep Fork of N. Canadian Riv.	OK520710-01-0010G	35.6590	-97.2447	NW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 30-14N-1E	Oklahoma	CT	
Dirty Creek	OK120400-02-0010F	35.4709	-95.1499	SE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 35-12N-20E	Muskogee	AV	
Dry Creek	OK520700-04-0020F	35.6848	-96.6949	SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 17-14N-6E	Lincoln	CT	
Elk Creek	OK120400-02-0190D	35.5224	-95.5030	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 10-12N-17E	McIntosh	CIP	
Fourche Maline Creek	OK220100-04-0020H	34.9199	-94.9453	NW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$ SECTION 12-5N-22E	LeFlore	AV	
George's Fork of Dirty Creek	OK120400-02-0110D	35.4935	-95.2454	NW $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 25-12N-19E	Muskogee	CIP	
Little Wewoka Creek	OK520500-02-0090D	35.2318	-96.2957	NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 30-9N-10E	Hughes	CT	
Mill Creek	OK220600-01-0100P	35.2310	-95.8394	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 28-9N-14E	McIntosh	AV	
Peaceable Creek	OK220600-03-0050F	34.8519	-95.6542	SW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 5-4N-16E	Pittsburg	AV	
Polecat Creek	OK120420-02-0050D	36.0103	-95.9940	SW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 25-18N-12E	Tulsa	CIP	CT
Quapaw Creek	OK520700-04-0260C	35.6221	-96.8196	SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 12-13N-4E	Lincoln	CT	
Sallisaw Creek: Lower	OK220200-03-0010C	35.4646	-94.8618	SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 34-12N-23E	Sequoyah	AV	BM
Sallisaw Creek: Upper	OK220200-03-0010G	35.5775	-94.8292	NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 26-13N-23E	Sequoyah	BM	
Salt Creek (Creek Co.)	OK520700-03-0100B	35.6962	-96.4765	NW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 16-14N-8E	Creek	CT	
Salt Creek (Seminole Co.)	OK520800-03-0010D	35.0490	-96.6676	SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 28-7N-6E	Seminole	CT	
San Bois Creek	OK220200-04-0010G	35.2011	-95.0444	NW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 1-8N-21E	Haskell	AV	
Shady Grove Creek	OK120400-02-0240H	35.4735	-95.4512	NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 36-12N-17E	McIntosh	CIP	
Snake Creek	OK120410-01-0220G	35.8859	-95.8724	SW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 6-16N-14E	Tulsa	CIP	CT
South Fork of Dirty Creek	OK120400-02-0030F	35.4594	-95.2003	NE $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 4-11N-20E	Muskogee	CIP	
Wewoka Creek	OK520500-02-0010M	35.1677	-96.4933	SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 18-8N-8E	Seminole	CT	
Wewoka Creek: Downstream	OK520500-02-0010C	35.2187	-96.2135	NE $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 35-9N-10E	Hughes	CT	

Table 2 shows the site information for the probabilistic sites which were sampled. Some of the smaller, 2<sup>nd</sup> and 3<sup>rd</sup> Strahler stream order sites were on unnamed reaches.

**Table 2. Probabilistic Site List for Rotating Basin Monitoring Program: Basin Group 3, Cycle 2.**

Waterbody Name	SITE ID	Latitude	Longitude	County	Ecoregion	Strahler Order
Deep Fork	OKR08715-002	35.6369	-96.8226	LINCOLN	Cross Timbers	5th
	OKR08715-004	34.7778	-94.6812	LE FLORE	Ouachita Mountains	3rd
Deep Fork	OKR08715-007	35.5110	-95.9158	OKMULGEE	Cross Timbers	6th
Fall Branch	OKR08715-010	36.0800	-94.7725	ADAIR	Ozark Highlands	2nd
	OKR08715-011	34.9418	-95.8195	PITTSBURG	Arkansas Valley	2nd
Salt Creek	OKR08715-013	35.0530	-97.0593	POTTAWATOMIE	Cross Timbers	2nd
Sans Bois Creek	OKR08715-014	35.0926	-95.4359	PITTSBURG	Arkansas Valley	4th
	OKR08715-016	35.0823	-94.5701	LE FLORE	Arkansas Valley	3rd
Rock Creek	OKR08715-017	35.9962	-96.1348	CREEK	Cross Timbers	3rd
Cane Creek	OKR08715-019	35.6915	-95.6698	MUSKOGEE	Central Irregular Plains	4th
	OKR08715-020	34.8534	-94.5425	LE FLORE	Arkansas Valley	2nd
Baron Fork	OKR08715-026	35.9509	-94.6528	ADAIR	Ozark Highlands	4th
Big Skin Bayou	OKR08715-028	35.4056	-94.6612	SEQUOYAH	Arkansas Valley	4th
Salt Creek	OKR08715-029	35.0966	-96.8913	POTTAWATOMIE	Cross Timbers	3rd
Little Fourche Maline	OKR08715-030	34.9596	-95.2066	LATIMER	Arkansas Valley	2nd
Turkey Creek	OKR08715-034	35.7861	-96.2378	CREEK	Cross Timbers	3rd
	OKR08715-036	34.8478	-95.5035	LATIMER	Arkansas Valley	3rd
	OKR08715-044	35.6277	-94.8212	SEQUOYAH	Boston Mountains	2nd
North Canadian River	OKR08715-045	35.5066	-97.2224	OKLAHOMA	Cross Timbers	6th
Shady Grove Creek	OKR08715-047	35.4713	-95.4585	MCINTOSH	Central Irregular Plains	3rd
Cache Creek	OKR08715-048	35.2770	-94.7968	LE FLORE	Arkansas Valley	3rd
Little River	OKR08715-053	35.1278	-96.6447	SEMINOLE	Cross Timbers	4th
Tahlequah Creek	OKR08715-054	35.8904	-94.9495	CHEROKEE	Ozark Highlands	3rd
	OKR08715-060	34.9782	-94.6832	LE FLORE	Arkansas Valley	2nd
North Canadian River	OKR08715-061	35.4189	-96.8693	POTTAWATOMIE	Cross Timbers	6th
Poteau River	OKR08715-063	34.8648	-94.6535	LE FLORE	Arkansas Valley	6th
Deep Fork	OKR08715-065	35.6209	-96.7646	LINCOLN	Cross Timbers	5th
Black Fork	OKR08715-066	34.7811	-94.6183	LE FLORE	Ouachita Mountains	4th
North Canadian River	OKR08715-075	35.6209	-98.1616	CANADIAN	Central Great Plains	6th
Cat Creek	OKR08715-079	34.9710	-96.9274	POTTAWATOMIE	Cross Timbers	2nd
North Canadian River	OKR08715-083	36.0071	-98.5578	BLAINE	Central Great Plains	6th
Illinois River	OKR08715-085	36.0561	-94.8861	CHEROKEE	Ozark Highlands	6th
Sallisaw Creek	OKR08715-086	35.5235	-94.8380	SEQUOYAH	Boston Mountains	4th
Sugarloaf Creek	OKR08715-090	34.9914	-94.4743	LE FLORE	Arkansas Valley	4th
Fourche Maline	OKR08715-094	34.9073	-95.1224	LATIMER	Arkansas Valley	4th
North Canadian River	OKR08715-097	35.3452	-96.8573	POTTAWATOMIE	Cross Timbers	6th
Coody Creek	OKR08715-098	35.7248	-95.3746	MUSKOGEE	Central Irregular Plains	2nd
	OKR08715-100	35.1353	-94.8674	LE FLORE	Arkansas Valley	3rd
Lee Creek	OKR08715-108	35.5236	-94.4926	SEQUOYAH	Boston Mountains	5th
Little River	OKR08715-109	35.1530	-96.7485	SEMINOLE	Cross Timbers	4th
Little Deep Fork Creek	OKR08715-112	35.7974	-96.2840	CREEK	Cross Timbers	5th

Waterbody Name	SITE ID	Latitude	Longitude	County	Ecoregion	Strahler Order
South Gaines Creek	OKR08715-114	34.8204	-95.3034	LATIMER	Ouachita Mountains	3rd
Deer Creek	OKR08715-121	35.5357	-96.6584	LINCOLN	Cross Timbers	2nd
Duck Creek	OKR08715-125	35.8546	-95.9561	OKMULGEE	Central Irregular Plains	4th
Taloka Creek	OKR08715-127	35.2929	-95.1428	HASKELL	Arkansas Valley	4th
	OKR08715-136	35.0135	-94.5485	LE FLORE	Arkansas Valley	2nd
Black Fork	OKR08715-138	34.7754	-94.4930	LE FLORE	Ouachita Mountains	4th
Flat Rock Creek	OKR08715-139	35.3755	-96.2472	OKFUSKEE	Cross Timbers	2nd
	OKR08715-146	34.7864	-94.7806	LE FLORE	Ouachita Mountains	3rd

All sampling and analyses performed during this project were conducted under a Quality Assurance Project Plan (QAPP) approved by EPA Region VI and on file at the OCC Water Quality Division, the Oklahoma Secretary of the Environment (OSE), and EPA Region VI in Dallas. The reader is encouraged to obtain and consult the QAPP for specific questions concerning laboratory analytical methods, detection limits, and accuracy and precision limits. All sampling and measurement activities of OCC Water Quality staff followed procedures outlined in the appropriate OCC Standard Operating Procedure (OCC 2009). Water quality chemical analyses were conducted by the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF) laboratory.

## WATER QUALITY MONITORING

Starting in June 2008, 33 sites were monitored for physical and chemical parameters on a fixed interval schedule of ten sampling events per year (five-week intervals) through May 2010 (usually 20 total events per site). This sampling frequency exceeds state data requirements for beneficial use assessment and meets a sample number necessary to provide a 90% level of confidence for principal water quality data (specifically phosphorus, a critical NPS concern) as determined from EPA's DEFT software. Samples were collected during both base flow and high flow conditions as they occurred on predetermined sampling dates. All sampling and measurement activities followed procedures outlined in the appropriate OCC SOP (OCC 2009).

One water sample was collected per site per 35-day interval in two, new, sample-rinsed HDPE bottles; one was preserved to a pH <2 with H<sub>2</sub>SO<sub>4</sub>, and both were stored and delivered on ice at 4° C or lower. Quality assurance/control samples were collected in accordance with Data Quality Objectives (DQOs) outlined in the project QAPP. Samples were submitted to the ODAFF Laboratory for analysis of the following parameters: nitrate (NO<sub>3</sub>), nitrite (NO<sub>2</sub>), orthophosphate (PO<sub>4</sub>), total phosphorus (TP), total Kjeldahl nitrogen (TKN), ammonia (NH<sub>4</sub>), chloride (Cl), sulfate (SO<sub>4</sub>), total suspended solids (TSS), and total dissolved solids (TDS). An estimate of total nitrogen was calculated by summing the values of nitrite, nitrate, and TKN for each sample. Available nitrogen was calculated by summing the values of ammonia, nitrite, and nitrate. In addition, *in-situ* water quality parameters were measured at each sampling locations and include the following: water temperature, dissolved oxygen, pH, conductivity, alkalinity, hardness, turbidity, and instantaneous discharge.

Separate samples were collected and submitted concurrently for analysis of *E. coli* and *Enterococcus* bacteria during the recreational season (May 1 – September 30), ensuring that a minimum of 10 samples were assessed per site over the two-year monitoring period. In addition, site observations of odor, excessive bottom deposits, surface scum, oil/grease, foam and other observations were recorded each time.

Probabilistic sites were visited only twice, once to collect the physical and chemical parameters described above, as well as the bacteria sample, and once to collect biological and habitat data as discussed in later sections below. Data was collected only during base-flow conditions at the probabilistic sites.

All data were compiled and entered into an Access database for later analysis. Upon retrieval, data were proofed and quality assured, and the descriptive statistics were generated for each parameter using the statistical software package *Minitab V. 14*.

## 2.3 BIOLOGICAL MONITORING

### 2.3.1 Habitat Assessment

In the summer of 2008, OCC staff began conducting instream and riparian habitat assessments at sites concurrent with fish collections; any sites not sampled in 2008 were sampled in the summer of 2009 (see Table 12 for exact dates). All assessments were conducted in accordance with procedures outlined in the OCC Habitat Assessment SOP (OCC 2009). The OCC's habitat assessment adheres to a modified version of the EPA Rapid Bioassessment Protocols (RBP) (Plafkin et al., 1989) and is designed to assess habitat quality in relation to its ability to support biological communities in the stream. The assessment is based on particular parameters grouped into three categories for a total of eleven components (Plafkin et al. 1989). The eleven components are discussed in more detail below. The three primary categories assessed include micro scale habitat, macro scale habitat, and riparian/bank structure. Micro scale habitat includes substrate makeup, stable cover, canopy, depth, and velocity. Macro scale assesses the channel morphology, sediment deposits, and other parameters. The third category looks at the riparian zone quality, width, and general makeup (trees, shrubs, vines, and grasses) as well as bank features. Bank erosion and streamside vegetative cover are incorporated into this section.

Each stream segment was surveyed for 400 meters upstream or downstream of the starting point (usually a road crossing). Investigators recorded data for the described parameters for 20 stations at 20 meter intervals. Habitat data were entered, metrics were computed, and a "total habitat score" was rendered via *Access* programming. The total habitat score, which can reach a maximum of 180 points, was calculated based on quantitative weighting given to each of the habitat parameters in relation to their biological significance. Scores were computed for each of the eleven categories, summed, and assigned as an evaluation of that stream section and riparian zone.

OCC's habitat assessment components include:

- (1) **Instream cover** is the component of habitat that organisms hide behind, within, or under. High quality cover consists of things like submerged logs, cobble and boulders, root wads, and

beds of aquatic plants. Cover required by smaller members of the stream community will consist of gravel, cobbles, small woody debris, and dense beds of fine aquatic plants. At least 50% of the stream's area should be occupied by a mixture of stable cover types for this category to be considered optimal.

(2) **Pool bottom substrate** describes the type of stream bed found in pools. Pools are depositional areas of the stream, and as such, are easily damaged by materials that settle. A loose shifting pool bottom will not provide substrate for burrowing organisms and will not allow bottom-spawning fish to successfully spawn. It will not provide habitat to the smaller vertebrates and invertebrates that are necessary to support many of the pool dwelling fish. At least 80% of all pool bottoms must have stable substrate for a reach to be considered optimal for this habitat component.

(3) **Pool variability** describes the depth of pools. A healthy, diverse community of aquatic organisms requires both deep and shallow pools. A fairly even mix of pool depths from a few centimeters to 0.5 meters or greater is optimal.

(4) **Canopy cover** assesses the shading of the stream section. Plants lie at the base of almost all food chains. Since plants require light for growth and survival, a stream that is functioning well needs some amount of light. Moderation is optimal, however, because light is associated with heat, and most aquatic organisms are more stressed by the warmer waters and the lower oxygen solubility and higher metabolic rates that accompany the warming of water.

(5) The **percent of rocky runs and riffles** is calculated for the fifth component. Rocky runs and riffles offer a unique combination of highly oxygenated, turbulent water, flowing over high quality cover and substrate. Turbulence prevents the formation of nutrient concentration gradients from cell membranes outward so that algae and other plants grow at a much higher rate than they would at the same concentration in pools. More food means more growth. Larger crops of algae are translated into larger invertebrate crops. It is these invertebrates, reared in riffle areas, that feed many of the fish in the stream. Because turbulent water is well oxygenated, there has been no selection pressure for riffle dwelling organisms to develop tolerance to poorly oxygenated waters. These are often the first animals to disappear from the stream if oxygen becomes scarce. The presence of rocky runs and riffles offers habitat for many highly adapted animals that will increase diversity of samples collected from the streams they occupy.

(6) **Discharge** at representative low flow reflects stream size. Water is the most basic requirement of aquatic organisms. Larger streams tend to have more water, and thus, more varied high quality habitat. Overall habitat quality should rise as streams increase in size and discharge, other factors being equal.

(7) **Channel alteration** is the seventh category. The presence of newly formed point bars and islands is very significant. Unstable streambeds support fewer types of animals than those that are stable. This is because unstable streambeds tend to have unstable pool bottom substrate, riffle areas whose cobbles are embedded in finer material, and little cover because it is continually being buried. Few or no signs of channel alteration are considered optimal.

(8) **Channel sinuosity** measures how far a channel deviates from a straight line. More sinuous channels tend to have more undercut banks, root wads, submerged logs, etc. IBI scores should be higher as channels become more sinuous. Sinuosity is calculated from digital ortho quad maps using Geographic Information System technology (GIS).

(9) The **bank erosion** index assesses the stability of the stream bank. Stable stream banks tend to increase IBI scores for many reasons. Most importantly, they do not contribute sediment to the stream channel. As a rule, channels with stable banks tend to be deeper and narrower than channels with unstable banks. Because of the increased depth and decreased width, they tend to be cooler and they also tend to grow less algae for a given amount of nutrients than do shallow, wide channels. Overall habitat quality should increase as bank stability increases.

(10) The **vegetative stability of the stream bank** is an important component. Stream banks can be stabilized with a number of materials including rock, concrete, and fabric. Banks that are stabilized with vegetation benefit the aquatic community more than those stabilized with other materials. This is because the vegetation offers several extra advantages beyond that of bank stability. The riparian plants of the stream bank offer a high quality source of food and shade to the aquatic community. Riparian vegetation stabilizes point bars and contributes greatly to structure in the form of root wads and woody debris. Overall habitat quality should improve as bank vegetative stability increases.

(11) The last category is **streamside cover**. A large part of the energy and food input to the stream comes from the terrestrial vegetation along the banks. A mixture of grasses, forbs, shrubs, vines, saplings, and large trees transfer these necessities to the stream more effectively than does any single type of vegetation. Habitat quality should increase as the form of bank vegetation increases in diversity.

### 2.3.2 Fish

Fish collections were obtained in the summer of 2008 or 2009 for each site. Fish were collected from a 400-meter reach at all sites using a combination of seining and electroshocking according to procedures outlined in OCC SOP (2009). The collection of fish follows a modified version of the EPA Rapid Bioassessment Protocol V (Plafkin et al., 1989) supplemented by other documents. Specific techniques and relative advantages of seining and electrofishing vary considerably according to stream type and conductivity. Depending upon workable habitat, seining was performed first at all sites and was accomplished by use of either 6' X 10' or 6' X 20' seines of 1/4 inch mesh equipped with 8' brailes. Electroshocking was undertaken at all sites with suitable conductivities (usually < 1000  $\mu\text{S}/\text{cm}$ ) and involved the use of a Smith Root LR24 backpack shocker. For sites possessing long pools too deep to seine or backpack shock, OCC field personnel employed a boat electrofishing unit consisting of a Smith-Root GPP 2.5 shocking unit powered by a Honda 5kw generator.

Except for those individuals readily identifiable, fish were placed in 10% formalin upon capture and identified to species by a professional taxonomist. Fish species identified and released in the field were photographed on print film for reference. All fixed fish samples were transferred to ethanol and retained for future reference.

Fish data were compiled and analyzed by site using state biocriteria and methods outlined in the state's *Use Support Assessment Protocols* (OWRB 2007). In addition, each site was assessed using a modified version of Karr's Index of Biotic Integrity (IBI) (adapted from Plafkin et al., 1989). Descriptive statistics were determined for each metric using the *Minitab V 14* software. The condition of the fish community was based on indices of species richness, community quality, trophic structure, and by comparison to the average scores of high-quality streams in that ecoregion. The modified IBI score was calculated using the following metrics:

- (1) The **total number of fish species** decreases with decreasing water or habitat quality.
- (2) The **number of sensitive benthic species (darters, madtoms, sculpins)** decreases with increasing siltation and increasing benthic oxygen demand. Many of these fish actually live within the cobble and gravel interstices and are very good indicators of conditions that make this environment inhospitable. These species are weak swimmers that do not readily travel up and down a stream, so their presence or absence at a site relates well to both past and present habitat and water quality conditions at that site.
- (3) The **number of sunfish species** decreases with decreasing pool quality and with decreasing cover. Sunfish also require a fairly stable substrate on which to spawn, so their long-term success is also tied to conditions that affect the amount of sediment that enters and leaves the stream.
- (4) The **number of intolerant species** is a characteristic of the fish community that separates high quality from moderate quality sites. A high quality stream will have several members of the fish community that are intolerant to environmental stress. A stream of only moderate quality will have fish that are moderately and highly tolerant of environmental stress. The intolerant species will not be present in the moderate quality stream.
- (5) The **proportion of tolerant individuals** is a characteristic that allows moderate quality streams to be separated from low quality streams. These are opportunistic, tolerant fish that dominate communities that have lost their competitors through loss of habitat or water quality.
- (6) The **proportion of individuals as insectivorous cyprinids** increases as the quality and quantity of the invertebrate food base increases. These are the dominant minnows in North American streams but are replaced by either omnivorous or herbivorous minnows as the quality of the food base deteriorates. Often, as the density of aquatic invertebrates decreases, the standing crop of algae increases. This is because the aquatic invertebrates are the largest group of primary consumers. Fish that can switch their diet to algae or fish that eat only algae will replace fish that cannot adapt to the new conditions.
- (7) The **proportion of individuals as lithophilic spawners** decreases as the quality of the stream decreases. Lithophilic spawners require cobble or gravel in order to spawn; hence, these fish are sensitive to siltation. This metric allows separation of excellent streams from moderate quality streams.

For each of these seven metrics, a score of 5, 3, or 1 was assigned (Table 3), and these scores were summed to get a total IBI score (35 point maximum) for each site. For all “proportion” metrics, the score was based on the actual metric. For all non-proportion metrics, the score was determined by dividing the monitoring site’s metric by the average high quality site metric of the same ecoregion. Each monitoring site’s total score was then compared to the high quality site total score in that ecoregion and given an integrity rating (as established and suggested by the EPA RBP; see Table 4, below). IBI scores that fell between the assessment ranges were classified in the closest scoring group. This score indicates the quality of the fish community (higher scores indicate higher quality) but says nothing about whether any deficiencies are due to degraded water quality or to degraded habitat.

**Table 3. Index of Biotic Integrity (IBI) scoring criteria for fish.**

Metrics	5	3	1
Number of species	>67%	33-67%	<33%
Number of sensitive benthic species	>67%	33-67%	<33%
Number of sunfish species	>67%	33-67%	<33%
Number of intolerant species	>67%	33-67%	<33%
Proportion tolerant individuals	<10%	10-25%	>25%
Proportion insectivorous cyprinid individuals	>45%	20-45%	<20%
Proportion individuals as lithophilic spawners	>36%	18-36%	<18%

**Table 4. Index of Biotic Integrity (IBI) score interpretation for fish.**

% Comparison to the Reference Score	Integrity Class	Characteristics
>97%	Excellent	Comparable to pristine conditions, exceptional species assemblage
80 - 87%	Good	Decreased species richness, especially intolerant species
67 - 73%	Fair	Intolerant and sensitive species rare or absent
47 - 57%	Poor	Top carnivores and many expected species absent or rare; omnivores and tolerant species dominant
26 - 37%	Very Poor	Few species and individuals present; tolerant species dominant; diseased fish frequent

### 2.3.3 Macroinvertebrates

Collection of macroinvertebrates was attempted at all fixed sites for both the winter and summer index periods of July 2008 through March 2010 according to procedures outlined in the OCC SOP (2009). A single macroinvertebrate collection was obtained during the summer period for each probabilistic site. Index periods represent seasons of relative community stability that afford opportunity for meaningful site comparisons. For Oklahoma, the summer index occurs from July 1 to September 15; the winter index occurs from January 1 to March 15. In order for macroinvertebrate collections to be obtained, flowing water must be present. Sampling efforts

included attempts to procure animals from all available habitats at a site; thus, total effort at a site may entail up to three total samples with one from each of the following habitats: rocky riffles, streamside vegetation, and woody debris.

Collection methods involved sampling each of the habitats similar to methods outlined in the EPA Rapid Bioassessment Protocols (Plafkin et al., 1989). Riffle sampling effort consisted of three, one meter squared kicknet samples in areas of rocky substrate reflecting the breadth of the velocity regime at a site. Riffles with substrates of bedrock or tight clay were not sampled. Any streamside vegetation in the current that appeared to offer fine structure was sampled by agitation within a #30 mesh dip net for three minutes total agitation time. Any dead wood with or without bark which was in current fast enough to offer suitable habitat for organisms was sampled by agitation or by scraping/brushing upstream of a #30 mesh dip net for 5 minutes. Woody debris sampled generally ranged in size from 1/4" to about 8" in diameter. Each sample type was preserved independently in quart mason jars with ethanol, labeled, and sent to a professional taxonomist for picking and identification.

Data was compiled, collated by year, season, and sample type and entered into a spreadsheet for metric calculations. The six metrics used to assess the macroinvertebrate community include the following:

- (1) The **number of taxa** refers to the total number of taxonomically different types of animals in the sample. As is the case with the fish, this number rises with increasing water and/or habitat quality (Plafkin et al., 1989).
- (2) The **Modified Hilsenhoff Biotic Index (HBI)** is a measure of the invertebrate community's tolerance to organic pollution. It ranges between 0 and 10 with 0 being the most pollution sensitive. The index used in the RBP Manual is based on the pollution tolerance of invertebrates from the upper midwest. The Index used here is calculated the same way, but uses tolerance values of North Carolina invertebrates (Plafkin et al., 1989).
- (3) The **percent EPT** is a measure of how many individuals in the sample are members of the EPT group. This metric helps to separate high quality streams from those of moderately high quality. The highest quality streams will have many individuals of many different taxa of EPT. As conditions deteriorate, animals will begin to die or to drift downstream. At this point, the community will still have many taxa of EPT, but there will be fewer individuals (Plafkin et al., 1989).
- (4) The **EPT Index** is the number of different taxa from the orders Ephemeroptera, Plecoptera, and Trichoptera, the mayflies, stoneflies, and caddis flies respectively. With few exceptions, these insects are more sensitive to pollution than any other groups. As a stream deteriorates in quality, members of this group will be the first to disappear. This robust metric allows discrimination between all but the worst of streams (Plafkin et al., 1989).
- (5) **Percent dominant two taxa** is the percentage of the collection composed of the most common two taxa. As more and more species are excluded by increasing pollution, the remaining species can increase in numbers due to the unused resources left by the excluded

animals. This metric helps to separate the high quality streams from those of moderate quality (Plafkin et al., 1989).

(6) The **Shannon-Weaver Species Diversity Index** measures the evenness of the species distribution. It increases as more and more taxa are found in the collection and as individual taxa become less dominant. This metric increases with increasing biotic quality (Plafkin et al., 1989).

Descriptive statistics of each season-specific sample type (e.g., summer riffle, winter vegetation, summer woody) for each site were determined via *Minitab V. 14* and were compared to the average respective metric of high-quality streams in the ecoregion. A bioassessment score was calculated similarly to the IBI score for fish. For each site, scores of 6, 4, 2, or 0 were assigned for each metric (according to the criteria in Table 5, below) and then summed to get a total bioassessment score for each site, with a maximum of 36 points. For taxa richness and EPT taxa richness, the percentages used to assign scores were obtained by dividing each monitoring site metric by the average high quality site metric in a particular ecoregion. For the HBI metric, the high quality site value was divided by the monitoring site value (high quality site metric / monitoring site metric). For the remaining metrics, the score was based on the actual values obtained instead of being relative to the high quality site metric. Each monitoring site's total score was then compared to the average high quality sites' total score (in that ecoregion) and classified according to the condition gradient outlined in Table 6 (adapted from Plafkin et al., 1989).

**Table 5. Bioassessment scoring criteria for macroinvertebrates. \*Modified HBI Using North Carolina Tolerance Values, \*\*RBP for Use in Streams and Rivers 1989, \*\*\*Modified by OCC**

Metrics	6	4	2	0
Taxa Richness**	>80%	60-80%	40-60%	<40%
Modified HBI* (**)	>85%	70-85%	50-70%	<50%
EPT/Total***	>30%	20-30%	10-20%	<10%
EPT Taxa**	>90%	80-90%	70-80%	<70%
% Dominant 2 Taxa**	<20%	20-30%	30-40%	>40%
Shannon-Weaver***	>3.5	2.5-3.5	1.5-2.5	<1.5

**Table 6. Bioassessment score interpretation for macroinvertebrates.**

% Comparison to the Reference Score	Biological Condition	Characteristics
>83%	Non-impaired	Comparable to the best situation expected in that ecoregion; balanced trophic and community structure for stream size
54 - 79%	Slightly Impaired	Community structure and species richness less than expected; percent contribution of tolerant forms increased and loss of some intolerant species
21 - 50%	Moderately Impaired	Fewer species due to loss of most intolerant forms; reduction in EPT index
<17%	Severely Impaired	Few species present; may have high densities of 1 or 2 taxa

## **2.4 WATERSHED ASSESSMENT**

To investigate potential sources of NPS pollution for streams showing beneficial use impairment, relevant data layers were explored using ArcView 3.2 Geographic Information System (GIS) software. Data explored included the 2001 USGS National Land Cover Dataset (NLCD), oil and gas wells, confined animal feeding operations, national pollution discharge elimination system permit holders, total retention sites, biosolid land application sites and other data layers. The NLCD was explored to determine percent occurrence of particular landuse types such as bare rock/sand/clay, vegetation (broken into several categories, both natural and agricultural), open water, and residential/commercial/industrial uses (divided into several categories).

## **2.5 BENEFICIAL USE SUPPORT ASSESSMENT**

Each fixed site's assigned beneficial uses were evaluated following the protocols outlined in the state's *Continuing Planning Process, Integrated Water Quality Report Listing Methodology* (Oklahoma Department of Environmental Quality, 2007) and per *Oklahoma Administrative Code 785, Chapter 46: Implementation of Oklahoma's Water Quality Standards, Subchapter 15: Use Support Assessment Protocols* (OWRB 2007). Streams were considered non-supporting when Oklahoma Water Quality Standards were violated as determined by criteria and rules listed in these documents. Parameters not addressed in OAC 785:46-15 were assessed using applicable state and federal rules and regulations to determine support status. Assessment results were submitted to the ODEQ for final assimilation in the state's 2010 Integrated Report submitted to EPA Region VI.

## **RESULTS AND DISCUSSION**

### **WATER QUALITY MONITORING**

All chemical and physical water quality data collected for the project are included in Appendix A.1; Appendix A.2 contains the bacteria data. Table 7 gives the mean values of all water quality parameters collected *in-situ* for each fixed site, regardless of elevated or base flow. Table 8 provides the means for all chemical analytes assessed, regardless of flow. Descriptive statistics for water quality parameters are presented by site in Appendix A.3.

**Table 7. Mean *in-situ* water quality values for Basin Group 3 Fixed Monitoring Sites, 2008-2010.**

Site Name	WBID	DO (mg/L)	DO % sat	Turbidity (NTU)	Alkalinity (CaCO <sub>3</sub> )	Hardness (mg/L)	Temperature (°C)	Conductivity (µS/cm)	pH (SU)	Flow (cfs)
Alabama Creek	OK520500-01-0200D	7.96	75.35	42.10	89.8	166.7	16.0	797.0	7.14	8.05
Bad Creek	OK520500-01-0170L	8.83	84.81	42.10	62.8	146.8	16.4	816.5	7.35	7.25
Ballard Creek	OK121700-03-0370G	9.08	88.11	8.20	96.2	119.8	15.4	264.2	7.50	40.53
Battle Creek	OK121700-06-0040G	9.56	91.77	2.36	66.7	95.6	14.3	193.0	7.31	18.42
Bird Creek	OK520800-01-0050G	9.32	97.04	61.80	162.1	348.9	18.8	1856.0	7.73	2.53
Brazil Creek	OK220100-03-0010G	7.78	77.29	46.22	72.0	81.7	17.9	185.1	7.10	32.30
Brushy Creek	OK220600-03-0010J	6.94	67.74	41.91	55.5	86.7	16.9	138.0	7.02	7.85
Butler Creek	OK120400-02-0160D	6.21	58.65	51.70	93.7	158.8	16.0	302.0	6.97	5.32
Camp Creek	OK520700-03-0220G	8.59	83.32	9.84	218.0	261.8	15.9	662.3	7.71	3.21
Canadian Sandy Creek	OK520600-03-0010D	8.39	81.67	72.90	250.4	253.3	16.1	542.6	7.87	25.90
Cloud Creek	OK120410-01-0100T	7.78	73.69	50.80	99.0	219.7	15.6	426.5	7.10	3.98
Coody Creek	OK120400-01-0400F	7.25	70.48	27.80	97.7	167.9	16.5	375.7	7.34	11.88
Deep Fork of N. Canadian R.	OK520710-01-0010G	9.03	90.41	53.80	244.8	274.3	16.9	751.3	8.16	35.83
Dirty Creek	OK120400-02-0010F	5.54	51.01	39.52	75.7	139.3	17.7	277.8	7.15	0.00
Dry Creek	OK520700-04-0020F	9.73	97.57	86.60	231.8	262.8	17.0	639.6	8.06	23.99
Elk Creek	OK120400-02-0190D	7.80	72.87	16.87	69.4	204.3	16.2	474.1	7.10	7.98
Fourche Maline Creek	OK220100-04-0020H	7.74	75.79	49.26	53.5	82.8	16.8	133.7	6.99	23.34
George's Fork of Dirty Creek	OK120400-02-0110D	6.12	58.61	29.57	98.4	138.1	16.5	241.2	7.28	17.71
Little Wewoka Creek	OK520500-02-0090D	9.23	89.99	77.10	97.8	156.9	16.9	643.6	7.48	15.57
Mill Creek	OK220600-01-0100P	7.98	75.58	58.20	75.4	106.7	15.6	194.7	7.19	7.12
Peaceable Creek	OK220600-03-0050F	6.78	67.02	37.77	82.1	146.7	17.0	448.7	7.16	6.52
Polecat Creek	OK120420-02-0050D	8.17	81.05	64.90	110.0	191.7	17.2	540.4	7.59	28.61
Quapaw Creek	OK520700-04-0260C	9.80	96.23	69.60	265.3	267.9	16.4	621.5	8.22	14.84
Sallisaw Creek: Lower	OK220200-03-0010C	9.58	97.14	12.36	67.8	85.6	17.6	163.9	7.45	76.30
Sallisaw Creek: Upper	OK220200-03-0010G	9.42	94.03	13.12	76.5	89.8	17.0	174.8	7.45	57.50
Salt Creek (Creek Co.)	OK520700-03-0100B	9.63	95.57	11.67	190.3	227.7	16.7	679.0	7.74	9.80
Salt Creek (Seminole Co.)	OK520800-03-0010D	9.51	94.01	147.20	253.2	458.6	16.3	2651.0	8.10	20.20
San Bois Creek	OK220200-04-0010G	7.75	77.86	54.61	100.2	110.9	17.7	416.7	7.36	18.28
Shady Grove Creek	OK120400-02-0240H	7.29	68.87	15.85	56.5	375.9	15.4	1034.0	6.19	3.86
Snake Creek	OK120410-01-0220G	8.29	79.17	35.99	97.9	149.2	16.2	353.8	7.43	15.49
South Fork of Dirty Creek	OK120400-02-0030F	6.95	66.04	21.68	128.0	221.7	15.4	518.2	7.37	4.87
Wewoka Creek	OK520500-02-0010M	10.10	101.65	94.10	122.9	222.3	16.8	1445.0	8.04	5.14
Wewoka Creek: Downstream	OK520500-02-0010C	9.40	92.16	102.60	118.2	205.4	17.2	960.0	7.76	40.70

**Table 8. Mean water quality values for Basin Group 3 Fixed Monitoring Sites, 2008-2010.**

Site Name	WBID	Chloride (mg/L)	Sulfate (mg/L)	TotDisSolids (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TKN (mg/L)	TotOrthoPhos (mg/L)	TotPhosphorus (mg/L)	TotSusSolids (mg/L)
Alabama Creek	OK520500-01-0200D	206.20	22.42	466.8	0.0320	0.1225	0.0200	0.3895	0.0174	0.0573	43.9
Bad Creek	OK520500-01-0170L	209.30	22.54	469.5	0.0349	0.2400	0.0200	0.5015	0.0179	0.0648	35.5
Ballard Creek	OK121700-03-0370G	9.59	9.15	151.7	0.0234	2.1770	0.0200	0.2450	0.1125	0.1439	13.4
Battle Creek	OK121700-06-0040G	11.19	6.94	114.0	0.0240	2.6395	0.0200	0.1250	0.0451	0.0787	10.0
Bird Creek	OK520800-01-0050G	584.00	31.52	1047.0	1.4420	0.2460	0.0350	2.2420	0.4410	0.5590	81.6
Brazil Creek	OK220100-03-0010G	5.85	25.77	125.5	0.0255	0.1170	0.0200	0.3130	0.0218	0.0874	16.9
Brushy Creek	OK220600-03-0010J	8.73	21.25	101.4	0.0336	0.0660	0.0225	0.3580	0.0211	0.0893	20.6
Butler Creek	OK120400-02-0160D	20.27	51.13	197.1	0.0785	0.0983	0.0200	0.5890	0.0466	0.1185	25.9
Camp Creek	OK520700-03-0220G	88.40	12.01	373.1	0.0480	0.0465	0.0200	0.3145	0.0081	0.0452	11.4
Canadian Sandy Creek	OK520600-03-0010D	34.31	18.97	336.6	0.0246	0.2720	0.0200	0.5130	0.0623	0.1363	112.7
Cloud Creek	OK120410-01-0100T	38.98	144.90	364.1	0.0670	0.2085	0.0225	0.5355	0.0329	0.0959	39.4
Coody Creek	OK120400-01-0400F	26.92	50.75	235.9	0.0482	0.1530	0.0275	0.3685	0.0411	0.1042	14.4
Deep Fork of N. Canadian River	OK520710-01-0010G	112.90	39.52	435.5	0.0893	1.0870	0.0585	0.6480	0.3270	0.4060	158.4
Dirty Creek	OK120400-02-0010F	18.27	50.47	183.9	0.0749	0.1684	0.0258	0.5289	0.0476	0.1191	30.1
Dry Creek	OK520700-04-0020F	84.20	15.88	384.0	0.0316	0.0655	0.0200	0.4950	0.0424	0.0986	68.2
Elk Creek	OK120400-02-0190D	25.10	183.10	324.8	0.0603	0.2965	0.0200	0.5120	0.0626	0.1086	14.4
Fourche Maline Creek	OK220100-04-0020H	7.80	15.73	93.4	0.0263	0.0850	0.0235	0.3060	0.0206	0.0785	18.4
George's Fork of Dirty Creek	OK120400-02-0110D	15.35	41.98	161.4	0.0850	0.1135	0.0210	0.5365	0.0350	0.0927	13.9
Little Wewoka Creek	OK520500-02-0090D	149.90	15.11	379.6	0.0297	0.0575	0.0200	0.4415	0.0218	0.0882	121.0
Mill Creek	OK220600-01-0100P	10.79	16.98	146.3	0.0317	0.0720	0.0245	0.4650	0.0219	0.0725	35.0
Peaceable Creek	OK220600-03-0050F	46.60	136.80	323.3	0.0501	0.4020	0.0455	0.5690	0.1432	0.3620	13.8
Polecat Creek	OK120420-02-0050D	98.62	25.48	320.1	0.1760	0.3870	0.0250	0.7370	0.0575	0.1276	70.1
Quapaw Creek	OK520700-04-0260C	38.66	27.66	360.0	0.0271	0.1495	0.0200	0.3370	0.0392	0.0782	100.9
Sallisaw Creek: Lower	OK220200-03-0010C	3.68	6.87	93.2	0.0208	0.1420	0.0200	0.1735	0.0128	0.0482	14.6
Sallisaw Creek: Upper	OK220200-03-0010G	3.45	6.56	101.8	0.0190	0.2955	0.0200	0.1945	0.0156	0.0462	12.4
Salt Creek (Creek Co.)	OK520700-03-0100B	121.40	20.52	407.8	0.0408	0.0500	0.0200	0.4390	0.0185	0.0447	11.4
Salt Creek (Seminole Co.)	OK520800-03-0010D	581.70	34.17	1240.0	0.0289	0.0765	0.0358	0.5860	0.0429	0.1200	207.0
San Bois Creek	OK220200-04-0010G	7.61	70.80	246.9	0.0349	0.0974	0.0221	0.3463	0.0281	0.0900	20.8
Shady Grove Creek	OK120400-02-0240H	9.92	646.00	973.0	0.1021	0.2075	0.0200	0.3135	0.0160	0.0358	11.3

Site Name	WBID	Chloride (mg/L)	Sulfate (mg/L)	TotDisSolids (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TKN (mg/L)	TotOrthoPhos (mg/L)	TotPhosphorus (mg/L)	TotSusSolids (mg/L)
Snake Creek	OK120410-01-0220G	44.21	30.99	247.2	0.0243	0.0670	0.0200	0.3400	0.0285	0.0728	26.1
South Fork of Dirty Creek	OK120400-02-0030F	7.91	155.30	350.5	0.0507	0.0910	0.0200	0.3325	0.0253	0.0661	13.1
Wewoka Creek	OK520500-02-0010M	343.60	25.29	677.0	0.0893	0.5430	0.0389	0.8580	0.2420	0.3970	267.0
Wewoka Creek: Downstream	OK520500-02-0010C	249.30	20.16	564.8	0.0834	0.1345	0.0290	0.8030	0.0679	0.1709	215.0

Tables 9 and 10 give the sample values for the probabilistic sites.

**Table 9. In-situ water quality values for Basin Group 3 Probabilistic Monitoring Sites.**

Site Name	WBID	DO (mg/L)	DO % sat	Turbidity (NTU)	Alkalinity (CaCO <sub>3</sub> )	Hardness (mg/L)	Temperature (°C)	Conductivity (uS/cm)	pH (SU)	Flow (cfs)
Deep Fork	OKR08715-002	8.34	96.1	20.10	270.0	303.0	22.3	1063.0	8.37	31.71
Unnamed Creek: Site # 004 (Cedar Cr)	OKR08715-004	6.38	74.5	4.87	15.3	184.0	23.3	47.1	6.41	0.36
Deep Fork River	OKR08715-007	5.61	76.0	128.00	115.0	183.0	30.5	527.0	7.28	
Fall Branch: Site # 010	OKR08715-010	6.86	76.6	1.76	64.0	77.0	20.7	175.1	7.07	0.87
Unnamed Creek: Site # 011	OKR08715-011	4.74	59.9	10.90	95.0	124.0	27.6	1127.0	7.57	4.48
Salt Creek: Site # 013	OKR08715-013	7.55	101.3	5.01	334.0	300.0	30.8	958.0	7.84	0.46
San Bois Creek: Site # 014	OKR08715-014	2.27	32.3	13.30	45.0	36.0	26.7	107.8	6.63	0.00
Unnamed Creek: Site # 016	OKR08715-016	4.30	52.3	35.90	29.0	430.0	24.0	133.2	7.00	0.00
Rock Creek	OKR08715-017	6.56	77.4	25.10	67.0	70.0	23.3	240.8	6.12	0.00
Cane Creek: Site # 019	OKR08715-019	7.34	98.4	8.85	89.0	132.0	30.9	652.0	7.48	0.70
Unnamed Creek: Site # 020	OKR08715-020	7.76	94.3	4.08	33.1	36.2	25.1	142.0		0.05
Baron Fork Creek: Site # 026	OKR08715-026	8.43	100.9	1.88	93.0	111.0	24.5	237.8	7.67	100.40
Big Skin Bayou: Site # 028	OKR08715-028	4.82	67.6	10.20	34.0	42.0	32.0	101.7	6.66	0.00
Salt Creek: Site # 029	OKR08715-029	8.65	115.4	3.17	282.0	468.0	30.8	256.5	8.13	4.28
Little Fourche Maline: Site # 030	OKR08715-030	3.94	49.7	3.86	29.2	40.0	27.3	159.0	6.43	0.00
Turkey Creek	OKR08715-034	4.54	50.6	43.10	71.0	356.0	21.0	1361.0	6.40	0.40
Unnamed Creek: Site # 036	OKR08715-036	4.15	50.8	137.00	1.0		26.5	85.7	3.21	0.00
Unnamed Creek: Site # 044	OKR08715-044	5.50	68.5	1.94	142.0	192.0	27.3	352.8	7.14	0.00
North Canadian River	OKR08715-045	8.28	107.0	35.70	165.0	250.0	28.7	837.0	8.30	145.35
Shady Grove Creek: Site # 047	OKR08715-047	4.41	55.2	4.71	28.5	986.0	27.1	1840.0	6.47	
Cache Creek: Site # 048	OKR08715-048	6.71	95.6	22.40	76.0	68.0	34.1	254.3	7.61	0.00
Little River: Site # 053	OKR08715-053	6.62	84.5	38.70	188.0	188.0	27.8	564.0	8.19	118.88
Tahlequah Creek: Site # 054	OKR08715-054	7.89	97.6	2.12	86.0	95.0	22.0	232.3	7.75	15.98
Unnamed Creek: Site # 060	OKR08715-060	3.73	45.7	58.00	42.0	583.0	24.2	186.9		0.00
North Canadian River	OKR08715-061	8.04	100.3	34.80	139.0	201.0	26.5	697.0	8.65	161.14
Poteau River	OKR08715-063	4.44	57.7	14.90	42.0	343.0	28.5	457.3	6.60	
Deep Fork	OKR08715-065	7.83	99.1	20.60	277.0	303.0	27.4	1025.0	8.45	41.25
Black Fork River	OKR08715-066	4.79	58.6	3.31	44.0	60.0	25.9	490.0	6.45	32.63
North Canadian River: Site # 075	OKR08715-075	7.27	94.6	17.00	205.0	380.0	28.8	1053.0	8.05	52.54
Cat Creek: Site # 079	OKR08715-079	10.54	141.5	3.63	387.0	580.0	30.9	856.0	7.89	0.31
North Canadian River: Site # 083	OKR08715-083	6.20	70.8	5.11	126.0	403.0	22.1	1310.0	7.93	21.41
Illinois River	OKR08715-085	7.95	102.7	6.88	92.0	102.0	28.5	293.2	7.55	
Sallisaw Creek: Site # 086	OKR08715-086	4.58	58.9	3.14	84.0	90.0	27.6	204.8	7.31	18.19
Sugar Loaf Creek: Site # 90	OKR08715-090	8.70	110.4	14.40	20.0	256.0	27.5	120.5	7.40	1.70
Fourche Maline Creek: Site # 094	OKR08715-094	2.68	33.7	13.20	107.0	74.0	28.0	226.9	7.04	0.00
North Canadian River: Site # 097	OKR08715-097	16.65		88.70	175.0	271.0	28.7	993.0	8.50	324.72
Coody Creek: Site # 098	OKR08715-098	2.88	36.5	6.00	127.0	161.0	27.5	552.0	7.35	0.44
Unnamed Creek: Site # 100 (Wolf Cr)	OKR08715-100	5.17	62.0	5.87	34.0	45.0	24.6	152.6	6.66	1.00
Lee Creek	OKR08715-108	7.63	102.3	3.47	62.0	57.0	30.8	111.6	7.69	74.82
Little River: Site # 109	OKR08715-109	8.73	115.0	32.30	182.0	175.0	29.7	546.0	7.85	115.21
Little Deep Fork Creek	OKR08715-112	7.49	75.5	0.00	143.0	265.0	18.5	1149.0	7.61	17.12
South Gaines Creek: Site # 114	OKR08715-114	3.36	42.0	13.90	18.0	21.1	26.7	79.2	6.14	0.00
Deer Creek	OKR08715-121	6.05	70.6	4.43	299.0	297.0	23.1	623.0	7.97	0.15

Site Name	WBID	DO (mg/L)	DO % sat	Turbidity (NTU)	Alkalinity (CaCO <sub>3</sub> )	Hardness (mg/L)	Temperature (°C)	Conductivity (µS/cm)	pH (SU)	Flow (cfs)
Duck Creek	OKR08715-125	5.72	71.4	19.80	193.0	225.0	26.6	605.0	7.47	0.59
Taloka Creek: Site # 127	OKR08715-127	5.97	72.0	3.10	325.0	332.0	25.1	2137.0	8.13	1.08
Unnamed Creek: Site # 136	OKR08715-136	7.41	94.7	26.20	41.7	473.0	28.1	160.0		0.60
Black Fork	OKR08715-138	4.64	51.7	10.50	66.0	69.0	20.7	201.8	6.92	
Flat Rock Creek: Site # 139	OKR08715-139	5.65	72.1				28.0	460.7	7.25	2.00
Unnamed Creek: Site # 146	OKR08715-146	6.19	70.0	21.30	14.7	101.0	21.0	40.5	6.20	0.99
<b>AVERAGE</b>		<b>6.37</b>	<b>76.9</b>	<b>21.48</b>	<b>116.6</b>	<b>224.2</b>	<b>26.5</b>	<b>534.4</b>	<b>7.3</b>	<b>29.4</b>

**Table 10. Water quality values for Basin Group 3 Probabilistic Monitoring Sites.**

Site Name	WBID	Chloride (mg/L)	Sulfate (mg/L)	TotDisSolids (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TKN (mg/L)	TotOrthoPhos (mg/L)	TotPhosphorus (mg/L)	TotSusSolids (mg/L)
Deep Fork	OKR08715-002	160.5	83.7	556	0.015	0.02	0.02	0.31	0.046	0.076	36
Unnamed Creek: Site # 004 (Cedar Cr)	OKR08715-004	2.8	3.5	31	0.015	0.13	0.02	0.11	0.005	0.031	10
Deep Fork River	OKR08715-007	75.1	33.9	300	0.018	0.61	0.02	0.17	0.128	0.168	94
Fall Branch: Site # 010	OKR08715-010	13.4	11.3	98	0.015	0.29	0.02	0.11	0.032	0.052	10
Unnamed Creek: Site # 011	OKR08715-011	40.5	430.9	752	0.093	0.79	0.02	0.9	0.562	0.562	10
Salt Creek: Site # 013	OKR08715-013	54.9	99.9	565	0.015	0.02	0.02	0.11	0.009	0.023	10
San Bois Creek: Site # 014	OKR08715-014	7.6	3.6	70	0.015	0.02	0.02	0.11	0.016	0.057	10
Unnamed Creek: Site # 016	OKR08715-016	7	14	98	0.067	0.21	0.02	0.33	0.03	0.106	11
Rock Creek	OKR08715-017	19	12.9	139	0.015	0.02	0.02	1.15	0.023	0.1	15
Cane Creek: Site # 019	OKR08715-019	111.9	45.4	316	0.015	0.02	0.02	0.11	0.015	0.025	10
Unnamed Creek: Site # 020	OKR08715-020	7.4	16.2	85	0.015	0.21	0.02	0.11	0.028	0.057	10
Baron Fork Creek: Site # 026	OKR08715-026	6.7	8.3	136	0.015	1.45	0.02	0.11	0.041	0.045	10
Big Skin Bayou: Site # 028	OKR08715-028	4.2	4.4	46	0.015	0.02	0.02	0.11	0.008	0.049	10
Salt Creek: Site # 029	OKR08715-029	604.4	74.1	1285	0.015	0.02	0.02	0.14	0.007	0.04	10
Little Fourche Maline: Site # 030	OKR08715-030	21.7	12.1	89	0.015	0.02	0.02	0.11	0.005	0.032	10
Turkey Creek	OKR08715-034	492.5	47.9	1067	0.113	0.29	0.02	0.84	0.016	0.257	10
Unnamed Creek: Site # 036	OKR08715-036	10.8	293.8	566	0.843	0.02	0.02	0.15	0.01	0.065	79
Unnamed Creek: Site # 044	OKR08715-044	3.1	10.9	187	0.015	0.23	0.02	0.11	0.02	0.036	10
North Canadian River	OKR08715-045	129.4	171.6	563	0.037	1.35	0.18	0.11	0.847	0.875	63
Shady Grove Creek: Site # 047	OKR08715-047	11.9	1649	1557	0.053	0.08	0.02	0.11	0.02	0.022	10
Cache Creek: Site # 048	OKR08715-048	10.7	76.6	149	0.015	0.02	0.02	0.41	0.005	0.069	12
Little River: Site # 053	OKR08715-053	51.3	18.4	301	0.015	0.13	0.02	0.11	0.033	0.072	65
Tahlequah Creek: Site # 054	OKR08715-054	20.5	16.6	169	0.015	1.33	0.02	0.11	0.057	0.097	10
Unnamed Creek: Site # 060	OKR08715-060	23.4	25.4	151	0.028	0.18	0.02	0.65	0.023	0.112	10
North Canadian River	OKR08715-061	125.2	94.4	415	0.056	0.14	0.02	0.73	0.578	0.734	65
Deep Fork	OKR08715-065	146.5	62.6	522	0.015	0.02	0.02	0.32	0.026	0.061	22
North Canadian River: Site # 075	OKR08715-075	157.2	295.1	879	0.015	0.02	0.02	1.04	0.077	0.109	37
Cat Creek: Site # 079	OKR08715-079	81.7	22.9	483	0.015	0.02	0.02	0.11	0.007	0.022	10
North Canadian River: Site # 083	OKR08715-083	193.2	244	886	0.04	0.08	0.02	0.11	0.006	0.07	10
Illinois River	OKR08715-085	13.1	12.5	161	0.125	1.68	0.02	0.11	0.084	0.1	10
Sallisaw Creek: Site # 086	OKR08715-086	3.5	4.2	116	0.015	0.09	0.02	0.11	0.01	0.025	10

Site Name	WBID	Chloride (mg/L)	Sulfate (mg/L)	TotDisSolids (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TKN (mg/L)	TotOrthoPhos (mg/L)	TotPhosphorus (mg/L)	TotSusSolids (mg/L)
Sugar Loaf Creek: Site # 90	OKR08715-090	19.6	10.7	80	0.015	0.12	0.02	0.11	0.005	0.041	10
Fourche Maline Creek: Site # 094	OKR08715-094	10.9	16.7	139	0.054	0.07	0.02	0.7	0.038	0.071	10
North Canadian River: Site # 097	OKR08715-097	155.5	130.3	564	0.015	0.19	0.02	2.26	0.137	0.625	187
Coody Creek: Site # 098	OKR08715-098	36.1	67.4	321	0.297	0.58	0.02	0.11	0.072	0.121	10
Unnamed Creek: Site # 100 (Wolf Cr)	OKR08715-100	11	22.5	86	0.015	0.09	0.02	0.11	0.005	0.019	10
Lee Creek	OKR08715-108	4.1	5.2	57	0.109	0.02	0.02	0.23	0.008	0.014	10
Little River: Site # 109	OKR08715-109	49.7	18.2	298	0.015	0.13	0.02	0.11	0.028	0.067	33
Little Deep Fork Creek	OKR08715-112	510.7	18.9	1008	0.015	0.02	0.02	0.57	0.022	0.043	10
South Gaines Creek: Site # 114	OKR08715-114	5.9	4.5	50	0.015	0.02	0.02	0.34	0.008	0.027	10
Deer Creek	OKR08715-121	7.4	8.4	197	0.028	0.02	0.02	1.08	0.014	0.074	28
Duck Creek	OKR08715-125	11	12	135	0.078	0.02	0.02	0.45	0.045	0.062	10
Taloka Creek: Site # 127	OKR08715-127	10.2	537	1408	0.015	0.1	0.02	0.11	0.007	0.04	10
Unnamed Creek: Site # 136	OKR08715-136	10.2	22.7	113	0.015	0.15	0.02	0.16	0.013	0.087	10
Black Fork	OKR08715-138	24.5	8.5	124	0.053	0.02	0.02	0.66	0.048	0.083	10
Unnamed Creek: Site # 146	OKR08715-146	3.5	3.6	50	0.015	0.02	0.02	0.11	0.005	0.03	10
<b>AVERAGE</b>		<b>73.5</b>	<b>116.3</b>	<b>383</b>	<b>0.114</b>	<b>0.29</b>	<b>0.03</b>	<b>0.40</b>	<b>0.084</b>	<b>0.133</b>	<b>23</b>

Most of the fixed sites are designated as Warm Water Aquatic Communities (WWAC) and have a critical dissolved oxygen (DO) level of 5.0 mg/L most of the year (6.0 mg/L from April 1 – June 15). Bird Creek and both Wewoka Creek sites have a Habitat Limited Aquatic Community (HLAC) designation, with a critical DO level of 3.0 mg/L most of the year (4.0 mg/L from April 1 – June 15). Ballard Creek and both of the Sallisaw Creek sites have Cool Water Aquatic Community (CWAC) designations, with a critical DO level of 6.0 mg/L most of the year (7.0 mg/L from March 1 – May 31). Table 11 shows all instances of criteria exceedance; nearly half of the streams in this rotation exceeded the DO standard. Alabama, Brushy, Butler, Cloud, Coody, Dirty, Elk, Fourche Maline, George's Fork of Dirty, Mill, Peaceable, Polecat, San Bois, Shady Grove, Snake, and South Fork of Dirty Creek all had more than 10% of samples below the criteria and are expected to be included on the state's 2012 303(d) list as impaired by low DO. Thirty-five percent of the probabilistic sites had DO values (in Table 9) below the WWAC standard, supporting the finding based on fixed site data that low DO is an issue in this basin.

**Table 11. Low dissolved oxygen values (based on OAC 785:46-15; OWRB 2011).**

% samples with low DO	SiteName	WBID	Date	DO	% samples with low DO	SiteName	WBID	Date	DO
30%	Alabama Creek	OK520500-01-0200D	02-Jun-08	5.39	10%	Deep Fork of North Canadian River	OK520710-01-0010G	07-Jul-09	4.1
			07-Jul-08	4.6				15-Sep-09	4.7
			27-Apr-09	5.89				10-Jun-08	4.6
			01-Jun-09	4.8				14-Jul-08	4.2
			06-Jul-09	4.25				17-Aug-09	4.4
			10-Aug-09	1.94				03-Jun-08	3.8
10%	Bad Creek	OK520500-01-0170L	06-Jul-09	4.46	37%	Fourche Maline Creek	OK220100-04-0020H	08-Jul-08	3.1
			10-Aug-09	3.18				23-Sep-08	4.6
10%	Brazil Creek	OK220100-03-0010G	10-Jun-08	4				28-Oct-08	4
			21-Jul-09	4.08				28-Apr-09	3.4
40%	Brushy Creek	OK220600-03-0010J	10-Jun-08	5.41				02-Jun-09	3.4
			18-Aug-08	4.58				07-Jul-09	1
			15-Sep-08	4.5				03-Jun-08	4.8
			20-Oct-08	3.93	17%	George's Fork of Dirty Creek	OK120400-02-0110D	08-Jul-08	4
			08-Jun-09	5.85				28-Jul-08	2.8
			08-Jul-09	4.72				09-Jun-08	3.2
			13-Jul-09	4.22				18-Aug-08	3.5
			17-Aug-09	4.8				15-Sep-08	4.8
			02-Jun-08	4.85	40%	Mill Creek	OK220600-01-0100P	20-Oct-08	4.8
			07-Jul-08	3.29				08-Jun-09	5.7
28%	Butler Creek	OK120400-02-0160D	29-Jul-08	1.47				30-Jun-09	4.8
			22-Sep-08	3.26				13-Jul-09	4.8
			27-Apr-09	3.06				17-Aug-09	4.4
5%	Camp Creek	OK520700-03-0220D	02-Jun-09	5.99	15%	Polecat Creek	OK120420-02-0050D	02-Jun-08	5.9
5%	Canadian Sandy Creek	OK520600-03-0010D	12-Jul-09	4.52				11-Aug-08	4
15%	Cloud Creek	OK120410-01-0100T	02-Jun-08	5.67				06-Jul-09	3.6
			06-Jul-09	4.75	5%	Sallisaw Creek: Upper	OK220200-03-0010G	26-Jun-09	4.9
			10-Aug-09	4.25				10-Jun-08	5
30%	Coody Creek	OK120400-01-0400F	03-Jun-08	5.14	11%	San Bois Creek	OK220200-04-0010G	04-May-09	5.5
			08-Jul-08	4.65				25-Jul-08	1.6

% samples with low DO	SiteName	WBID	Date	DO	% samples with low DO	SiteName	WBID	Date	DO
	Coody Creek, cont.		23-Jul-08	4.2		Shady Grove Creek, cont.		11-Aug-08	4.4
			28-Oct-08	4.96				01-Jun-09	5.4
			28-Apr-09	5.33				06-Jul-09	3.8
			02-Jun-09	5.01				10-Aug-09	4.2
44%	Dirty Creek	OK120400-02-0010F	03-Jun-08	3.26	15%	Snake Creek	OK120410-01-0220G	02-Jun-08	4.3
			08-Jul-08	4.71				30-Jul-08	4.8
			12-Aug-08	4.48				11-Aug-08	4.7
			24-Mar-09	3.77				03-Jun-08	4.8
			28-Apr-09	2.02				08-Jul-08	4.6
			02-Jun-09	4.02	35%	South Fork of Dirty Creek	OK120400-02-0030F	28-Apr-09	4.3
			07-Jul-09	1.12				02-Jun-09	4.2
			15-Sep-09	4.85				07-Jul-09	3
			02-Jun-08	4.8				23-Jul-09	3
			29-Jul-08	4.79				11-Aug-09	4.7
20%	Elk Creek	OK120400-02-0190D	06-Jul-09	4.03	5%	Wewoka Creek	OK520500-02-0010M	13-Jul-09	5
			10-Aug-09	3.36					

Table 12 shows the geometric mean of *Enterococcus* and *E.coli* bacteria samples for each site over the two-year monitoring period. Only Bird Creek is designated Secondary Body Contact Recreation (SBCR), which allows for a higher bacteria concentration; all other sites are designated Primary Body Contact Recreation (PBCR). Only three streams meet the *Enterococcus* standard (one was a SBCR standard), while about half of the streams meet the *E. coli* standard, as denoted by the asterisk in Table 12. Only Elk Creek, Polecat Creek, and Bird Creek (SBCR) are fully attaining the Recreation designated use, meeting the standards for both types of bacteria. To be listed on the state's 303(d) list, the geometric mean must exceed the set criteria for at least one of the bacteria types (OWRB 2011).

**Table 12. Geometric mean of bacteria values for Basin Group 3 fixed monitoring sites, 2008-2009 OCC data. An asterisk (\*) indicates that the stream meets state standards for that bacteria type. Most streams are impaired by bacteria, and these streams either will be added to the state 303(d) list, are currently on the 303(d) list, or have been moved to Category 4 for bacteria after a TMDL has been produced. Bird Creek has a SBCR designation, allowing higher bacteria concentrations.**

Site Name	WBID	<i>Enterococcus</i>	<i>E. coli</i>	Site Name	WBID	<i>Enterococcus</i>	<i>E. coli</i>
Alabama Creek	OK520500-01-0200D	179.98	94.92*	George's Fork of Dirty Creek	OK120400-02-0110D	92.36	66.48*
Bad Creek	OK520500-01-0170L	127.25	103.30*	Little Wewoka Creek	OK520500-02-0090D	148.36	153.96
Ballard Creek	OK121700-03-0370G	194.39	99.55*	Mill Creek	OK220600-01-0100P	290.88	114.52*
Battle Creek	OK121700-06-0040G	133.84	43.94*	Peaceable Creek	OK220600-03-0050F	94.77	123.73*
<b>Bird Creek</b>	<b>OK520800-01-0050M</b>	<b>89.71*</b>	<b>62.87*</b>	Polecat Creek	OK120420-02-0050D	29.20*	73.10*
Brazil Creek	OK220100-03-0010G	73.18	51.70*	Quapaw Creek	OK520700-04-0260C	182.99	78.59*
Brushy Creek	OK220600-03-0010J	79.79	132.21	Sallisaw Creek: Lower	OK220200-03-0010C	59.93	55.61*
Butler Creek	OK120400-02-0160D	114.36	287.28	Sallisaw Creek: Upper	OK220200-03-0010G	166.43	67.35*
Camp Creek	OK520700-03-0220D	324.19	36.71*	Salt Creek	OK520700-03-0100B	96.51	54.57*
Canadian Sandy Creek	OK520600-03-0010D	390.73	208.73	Salt Creek	OK520800-03-0010D	260.87	132.16
Cloud Creek	OK120410-01-0100T	34.52	69.46*	San Bois Creek	OK220200-04-0010G	59.31	51.96*
Coody Creek	OK120400-01-0400F	249.93	234.46	Shady Grove Creek	OK120400-02-0240H	44.36	62.68*
Deep Fork of North Canadian R.	OK520710-01-0010G	176.57	146.64	Snake Creek	OK120410-01-0220G	45.77	104.09*
Dirty Creek	OK120400-02-0010F	109.24	88.44*	South Fork of Dirty Creek	OK120400-02-0030F	180.91	72.17*
Dry Creek	OK520700-04-0020F	162.66	211.94	Wewoka Creek	OK520500-02-0010M	114.28	104.24*
Elk Creek	OK120400-02-0190D	27.87*	91.83*	Wewoka Creek: Downstream	OK520500-02-0010C	82.83	140.51
Fourche Maline Creek	OK220100-04-0020H	87.25	67.62*				

Based on a single grab sample at each of the 46 probabilistic sites (results in Table 13, below), the geomean of the probabilistic sites is 34.0 colonies per 100 mL for *E. coli* and 48.1 colonies per 100 mL for *Enterococcus*. This indicates that streams in this basin are attaining for *E. coli* bacteria (standard is 126 colonies/100 mL) but are impaired by *Enterococcus* bacteria (standard is 33 colonies/100 mL). It should be noted that all the probabilistic samples were taken at base flow, whereas samples at fixed sites are taken regardless of flow, which could result in higher bacteria levels being observed at the fixed sites.

**Table 13. Bacteria values for probabilistic sites.**

Site Name	WBID	<i>Enterococcus</i>	<i>E. coli</i>	Site Name	WBID	<i>Enterococcus</i>	<i>E. coli</i>
Deep Fork	OKR08715-002	620	130	Tahlequah Creek: Site # 054	OKR08715-054	55	105
Unnamed Creek: Site # 004 (Cedar Creek)	OKR08715-004	10	10	Unnamed Creek: Site # 060	OKR08715-060	40	10
Deep Fork River	OKR08715-007	90	10	North Canadian River	OKR08715-061	15	15
Fall Branch: Site # 010	OKR08715-010	370	10	Deep Fork	OKR08715-065	130	40
Unnamed Creek: Site # 011	OKR08715-011	250	40	North Canadian River: Site # 075	OKR08715-075	190	10
Salt Creek: Site # 013	OKR08715-013	50	190	Cat Creek: Site # 079	OKR08715-079	40	80
San Bois Creek: Site # 014	OKR08715-014	40	5	North Canadian River: Site # 083	OKR08715-083	80	20
Unnamed Creek: Site # 016	OKR08715-016	200	160	Illinois River	OKR08715-085	5	50
Rock Creek	OKR08715-017	0.5	100	Sallisaw Creek: Site # 086	OKR08715-086	115	45
Cane Creek: Site # 019	OKR08715-019	30	170	Sugar Loaf Creek: Site # 90	OKR08715-090	10	10
Unnamed Creek: Site # 020	OKR08715-020	60	200	Fourche Maline Creek: Site # 094	OKR08715-094	440	160
Baron Fork Creek: Site # 026	OKR08715-026	10	5	North Canadian River: Site # 097	OKR08715-097	220	980
Big Skin Bayou: Site # 028	OKR08715-028	15	2.5	Coody Creek: Site # 098	OKR08715-098	300	40
Salt Creek: Site # 029	OKR08715-029	110	140	Unnamed Creek: Site # 100 (Wolf Creek)	OKR08715-100	130	10
Little Fourche Maline: Site # 030	OKR08715-030	140	30	Lee Creek	OKR08715-108	2.5	5
Turkey Creek	OKR08715-034	140	5	Little River: Site # 109	OKR08715-109	80	40
Unnamed Creek: Site # 036	OKR08715-036	5	5	Little Deep Fork Creek	OKR08715-112	50	80
Unnamed Creek: Site # 044	OKR08715-044	20	2.5	South Gaines Creek: Site # 114	OKR08715-114	20	90
North Canadian River	OKR08715-045	110	180	Deer Creek	OKR08715-121	20	20
Shady Grove Creek: Site # 047	OKR08715-047	465	500	Taloka Creek: Site # 127	OKR08715-127	30	150
Cache Creek: Site # 048	OKR08715-048	30	60	Unnamed Creek: Site # 136	OKR08715-136	60	80
Little River: Site # 053	OKR08715-053	90	140	Black Fork	OKR08715-138	15	2.5
				Unnamed Creek: Site # 146	OKR08715-146	10	10

Select water quality parameters are summarized by box plots in Figure 2, below. To account for natural differences, sites were collated and analyzed by Level III ecoregions (Woods et al. 2005). Additionally, sites were compared to streams determined to be “high quality” sites in each ecoregion (see App. E for high quality streams details) to determine general stream condition. Figure 2 shows interquartile range plots by site for four important indicators of pollution: orthophosphorus, total phosphorus, estimated total nitrogen (TKN plus nitrate/nitrite), and turbidity. All elevated flow data were omitted in these analyses in order to standardize the results. The probabilistic samples were composited by ecoregion as if they were samples from a single site in order to show the range and mean of those sites. These values are shown in each boxplot labeled “probabilistic.” A few of the probabilistic sites are not shown in Figure 2 due to the extremely small number of sites in those ecoregions. Specifically, the two sites in the Central Great Plains ecoregion and the four sites in the Ouachita Mountains ecoregion are not represented in Figure 2, but all values are given in Tables 9 and 10.

Regarding boxplot composition, the median of each site is shown by a line within the box with most outliers denoted by asterisks. The extreme outliers are denoted by values within a box on the graph. The mean of the high quality stream sites in a particular ecoregion is represented by a solid horizontal line, while dashed lines indicate +/- two standard deviations (representing 95% of the high quality data) for high quality site parameters. In instances where only one dashed line is present, the lower value was below zero.

Sites in the Arkansas Valley (AV) ecoregion had significantly high nutrient values relative to the high quality sites for that ecoregion. Peaceable Creek had the highest nutrient values but the lowest turbidity values of the AV sites. In the Cross Timbers ecoregion, Bird Creek, Deep Fork of the North Canadian River, Polecat Creek, Wewoka Creek, and the downstream site on Wewoka Creek had high nutrient values relative to high quality sites. All sites in the Boston Mountains, Central Irregular Plains, and Ozark Highlands ecoregions were within two standard deviations of the high quality sites in the ecoregions, indicating no significant difference from the high quality sites.

None of the probabilistic averages were significantly greater than the high quality sites for turbidity; only four of the sites had turbidity values above the state standard of 50 NTU for turbidity. This represents less than 10% of the samples, so overall, base flow turbidity does not seem to be an issue in this basin. The average nutrient values of probabilistic sites in the Arkansas Valley and Cross Timbers ecoregions were on the high side relative to the high quality sites in those ecoregions. This is in agreement with the findings from the fixed sites in the basin.



Figure 2. Select parameters for each site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations (if only one dashed line, the lower standard deviation was below zero).

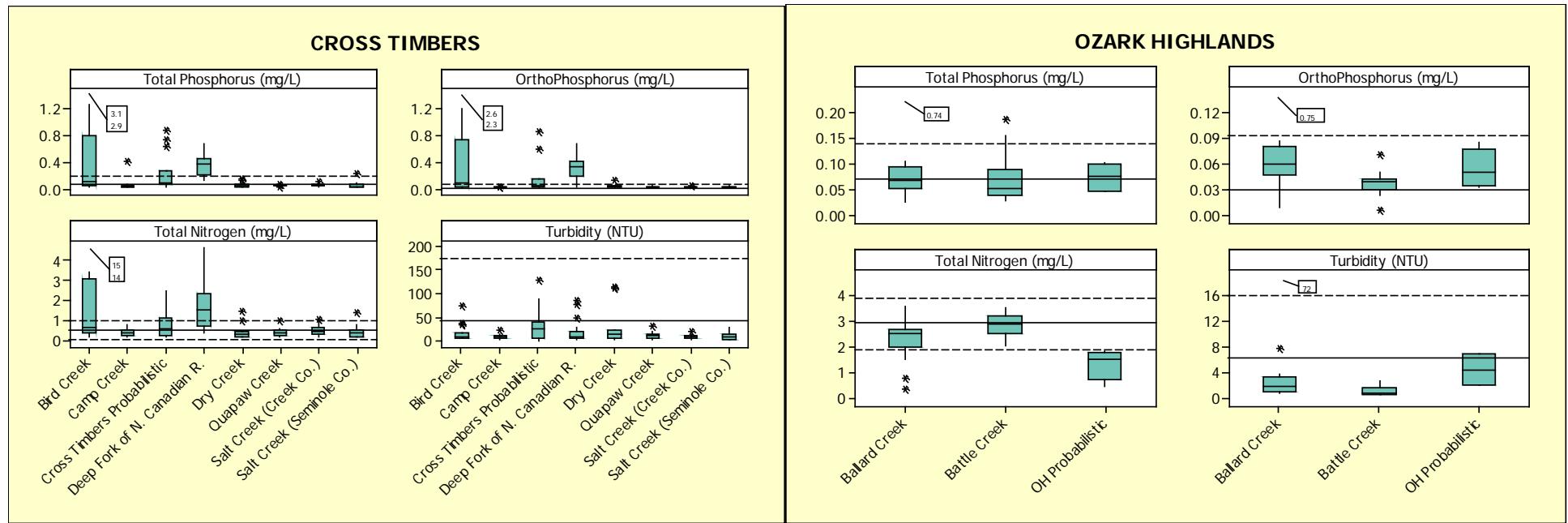


Figure 2, cont. Select parameters for each site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations (if only one dashed line, the lower standard deviation was below zero).

Table 14 shows a comparison between base flow water quality data (high flow data omitted) collected for the same site in the previous rotating basin cycle and the second cycle in order to examine whether water conditions have improved, worsened, or remained the same at a particular site. One-way ANOVAs were performed for each set of data. Only statistically significant differences between the means of each parameter are shown in the table. Level of significance is indicated by p-values, with any  $p < 0.050$  considered significant and  $0.050 < p < 0.100$  considered marginally significant.

Three streams had no significant changes in any parameter from cycle 1 to cycle 2: Ballard Creek, Battle Creek, and Fourche Maline Creek. Eighteen streams had significantly reduced levels of some form of phosphorus in the second cycle of monitoring as compared to the first cycle, while only 2 had higher phosphorus. Ammonia was increased in three streams, and another form of nitrogen was increased in 2 streams. Five streams had decreased nitrogen. Turbidity and/or TSS was significantly lower in 16 streams and was not significantly higher in any of the streams. Eighteen of the streams exhibited increased alkalinity and/or hardness values, and 14 of the streams had increased salt concentrations (sulfate, chloride, or TDS). Five streams had significantly higher dissolved oxygen (DO), while 3 had reduced DO.

**Table 14. Statistical comparisons of cycle one and cycle two Rotating Basin Project water quality data. "N" is the number of base flow samples included in the analyses.**

WBID	Site	Variable	RB Cycle	N	Mean	p value	
OK520500-01-0200D	Alabama Creek	alkalinity	2003-2005	17	58	0.001	increased
			2008-2010	17	98.06		
		conductivity	2003-2005	16	597.6	0.041	increased
			2008-2010	17	944.8		
		chloride	2003-2005	17	123.2	0.007	increased
			2008-2010	16	251.5		
		sulfate	2003-2005	17	18.694	0.008	increased
			2008-2010	16	25.106		
		hardness	2003-2005	17	114.61	0.006	increased
			2008-2010	16	193.13		
		TDS	2003-2005	17	337.8	0.016	increased
			2008-2010	16	543.9		
		ortho-phosphorus	2003-2005	17	0.023	0.062	decreased
			2008-2010	16	0.013		
		total phosphorus	2003-2005	17	0.081	0.000	decreased
			2008-2010	16	0.042		
		TSS	2003-2005	17	16	0.051	decreased
			2008-2010	16	11.438		
OK520500-01-0170L	Bad Creek	turbidity	2003-2005	18	29.58	0.052	decreased
			2008-2010	18	17.33		
		alkalinity	2003-2005	18	44.49	0.000	increased
			2008-2010	18	65.67		
		conductivity	2003-2005	17	662.5	0.016	increased
			2008-2010	18	913		
		chloride	2003-2005	18	152.53	0.005	increased
			2008-2010	17	238.45		

WBID	Site	Variable	RB Cycle	N	Mean	p value	
OK520800-01-0050M (site moved slightly)	Bird Creek	sulfate	2003-2005	18	20.3	0.020	increased
			2008-2010	17	24.494		
		hardness	2003-2005	18	106.69	0.000	increased
			2008-2010	17	158.82		
		TDS	2003-2005	18	376.4	0.006	increased
			2008-2010	17	514.4		
		total phosphorus	2003-2005	18	0.075	0.005	decreased
			2008-2010	17	0.043		
		TSS	2003-2005	18	14.944	0.019	decreased
			2008-2010	17	10.412		
OK220100-03-0010G	Brazil Creek	DO	2003-2005	20	11.553	0.027	decreased
			2008-2010	19	9.272		
		DO % sat	2003-2005	19	117.33	0.027	decreased
			2008-2010	19	97.69		
		alkalinity	2003-2005	19	140.32	0.021	increased
			2008-2010	20	170.9		
		conductivity	2003-2005	19	698	0.000	increased
			2008-2010	20	1999		
		ammonia	2003-2005	20	0.076	0.063	increased
			2008-2010	18	1.595		
		chloride	2003-2005	20	102.2	0.000	increased
			2008-2010	18	639.7		
		nitrate	2003-2005	20	2.587	0.001	decreased
			2008-2010	18	0.253		
		TKN	2003-2005	20	0.62	0.091	increased
			2008-2010	18	2.362		
		hardness	2003-2005	20	191.5	0.000	increased
			2008-2010	19	373.8		
		TDS	2003-2005	20	392.9	0.000	increased
			2008-2010	18	1136		
OK220600-03-0010J	Brushy Creek	ortho-phosphorus	2003-2005	20	1.146	0.011	decreased
			2008-2010	18	0.475		
		total phosphorus	2003-2005	20	1.313	0.012	decreased
			2008-2010	18	0.57		
		flow	2003-2005	18	3.656	0.074	decreased
			2008-2010	17	1.251		
		alkalinity	2003-2005	12	40.61	0.000	increased
			2008-2010	8	107		
		conductivity	2003-2005	14	168.57	0.000	increased
			2008-2010	8	245.81		

WBID	Site	Variable	RB Cycle	N	Mean	p value	
OK120400-02-0160D	Butler Creek		2008-2010	14	60.36		
		hardness	2003-2005	17	57.27	0.002	increased
			2008-2010	14	82.43		
		alkalinity	2003-2005	17	71	0.018	increased
			2008-2010	15	102.4		
		TKN	2003-2005	18	0.4184	0.053	increased
			2008-2010	14	0.6693		
		hardness	2003-2005	18	99.52	0.000	increased
			2008-2010	14	173.5		
		flow	2003-2005	13	7.41	0.029	decreased
			2008-2010	13	1.141		
OK520700-03-0220D (site moved slightly)	Camp Creek	DO %sat	2003-2005	19	70.61	0.079	increased
			2008-2010	19	83.43		
		turbidity	2003-2005	19	26.2	0.017	decreased
			2008-2010	20	8.56		
		nitrate	2003-2005	19	0.085	0.022	decreased
			2008-2010	18	0.042		
		available N	2003-2005	19	0.166	0.016	decreased
			2008-2010	18	0.099		
		ortho-phosphorus	2003-2005	19	0.018	0.014	decreased
			2008-2010	18	0.008		
		TSS	2003-2005	19	20.58	0.030	decreased
			2008-2010	18	11.11		
OK520600-03-0010D	Canadian Sandy Creek	DO %sat	2003-2005	19	94.53	0.020	decreased
			2008-2010	17	80.37		
		turbidity	2003-2005	19	63.69	0.095	decreased
			2008-2010	16	11.72		
		alkalinity	2003-2005	18	234.56	0.010	increased
			2008-2010	17	275		
		hardness	2003-2005	19	233.97	0.010	increased
			2008-2010	16	277.25		
		TDS	2003-2005	19	305.05	0.042	increased
			2008-2010	16	364.88		
		ortho-phosphorus	2003-2005	19	0.063	0.037	decreased
			2008-2010	16	0.035		
		total phosphorus	2003-2005	19	0.14	0.003	decreased
			2008-2010	16	0.072		
OK120410-01-0100T (site moved slightly)	Cloud Creek	TSS	2003-2005	19	56.79	0.030	decreased
			2008-2010	16	11.75		
		DO %sat	2003-2005	19	62.78	0.083	increased
			2008-2010	15	72.11		
		turbidity	2003-2005	17	37.42	0.009	decreased
			2008-2010	15	20.81		
		alkalinity	2003-2005	19	69.21	0.017	increased
			2008-2010	15	109.07		
		sulfate	2003-2005	19	32.2	0.000	increased
			2008-2010	14	192.4		

WBID	Site	Variable	RB Cycle	N	Mean	p value	
		hardness	2003-2005	19	99.9	0.000	increased
			2008-2010	14	262.2		
		TDS	2003-2005	19	209.9	0.002	increased
			2008-2010	14	445.4		
		total phosphorus	2003-2005	19	0.13	0.005	decreased
			2008-2010	14	0.064		
		TSS	2003-2005	19	43.11	0.027	decreased
			2008-2010	14	13.5		
OK120400-01-0400F	Coody Creek	turbidity	2003-2005	18	26.51	0.055	decreased
			2008-2010	15	16.99		
		alkalinity	2003-2005	20	84.15	0.064	increased
			2008-2010	15	107.27		
		hardness	2003-2005	20	124.77	0.011	increased
			2008-2010	14	174.01		
		TSS	2003-2005	20	18.65	0.010	decreased
			2008-2010	14	10.357		
OK520710-01-0010G	Deep Fork of the North Canadian River	alkalinity	2003-2005	16	221.38	0.070	increased
			2008-2010	19	260.79		
		sulfate	2003-2005	16	53.78	0.027	decreased
			2008-2010	18	42.49		
		ortho-phosphorus	2003-2005	16	1.17	0.000	decreased
			2008-2010	18	0.313		
		total phosphorus	2003-2005	16	1.284	0.000	decreased
			2008-2010	18	0.341		
OK120400-02-0010F	Dirty Creek	DO % sat	2003-2005	18	69.81	0.021	decreased
			2008-2010	15	47.98		
		turbidity	2003-2005	18	39.59	0.028	decreased
			2008-2010	15	23.07		
		sulfate	2003-2005	19	38.63	0.014	increased
			2008-2010	15	54.99		
		hardness	2003-2005	19	84.88	0.001	increased
			2008-2010	14	144.89		
OK520700-04-0020F	Dry Creek	TSS	2003-2005	119	22.53	0.017	decreased
			2008-2010	15	13.07		
		alkalinity	2003-2005	17	58	0.001	increased
			2008-2010	17	98.06		
		conductivity	2003-2005	16	597.6	0.041	increased
			2008-2010	17	944.8		
		chloride	2003-2005	17	123.2	0.007	increased
			2008-2010	16	251.5		
		sulfate	2003-2005	17	18.694	0.008	increased
			2008-2010	16	25.106		
		hardness	2003-2005	17	114.61	0.006	increased
			2008-2010	16	193.13		
		TDS	2003-2005	17	337.8	0.016	increased
			2008-2010	16	543.9		
		ortho-phosphorus	2003-2005	17	0.023	0.062	decreased

WBID	Site	Variable	RB Cycle	N	Mean	p value	
			2008-2010	16	0.013		
		total phosphorus	2003-2005	17	0.081	0.000	decreased
			2008-2010	16	0.042		
		TSS	2003-2005	17	16	0.051	decreased
			2008-2010	16	11.438		
OK120400-02-0190D	Elk Creek	trubidity	2003-2005	17	41.01	0.020	decreased
			2008-2010	16	10.69		
		sulfate	2003-2005	18	123.89	0.007	increased
			2008-2010	16	203.55		
		total phosphorus	2003-2005	18	0.168	0.100	decreased
			2008-2010	16	0.098		
		TSS	2003-2005	18	26.78	0.010	decreased
			2008-2010	16	11.44		
OK120400-02-0110D	George's Fork of Dirty Creek	turbidity	2003-2005	17	28.29	0.032	decreased
			2008-2010	18	18.99		
		total phosphorus	2003-2005	18	0.118	0.025	decreased
			2008-2010	17	0.082		
		TSS	2003-2005	18	26.17	0.009	decreased
			2008-2010	17	11.06		
OK520500-02-0090D	Little Wewoka Creek	total phosphorus	2003-2005	17	0.08	0.005	decreased
			2008-2010	16	0.044		
		TSS	2003-2005	17	20	0.083	decreased
			2008-2010	16	12.75		
OK220600-01-0100P	Mill Creek	DO % sat	2003-2005	20	62.3	0.063	increased
			2008-2010	17	75.18		
		TP	2003-2005	20	0.108	0.006	decreased
			2008-2010	17	0.059		
OK220600-03-0050F	Peaceable Creek	alkalinity	2003-2005	15	53.69	0.031	increased
			2008-2010	13	96.69		
		sulfate	2003-2005	16	95.5	0.077	increased
			2008-2010	12	211.4		
		chloride	2003-2005	16	44.53	0.082	increased
			2008-2010	12	67.12		
		nitrate	2003-2005	16	0.074	0.036	increased
			2008-2010	12	0.4725		
		available N	2003-2005	16	0.1416	0.037	increased
			2008-2010	12	0.5435		
		total N	2003-2005	16	0.6074	0.065	increased
			2008-2010	12	1.0158		
		hardness	2003-2005	16	101.95	0.010	increased
			2008-2010	13	173.35		
		TDS	2003-2005	16	293.6	0.087	increased
			2008-2010	12	435.3		
		ortho-phosphorus	2003-2005	16	0.051	0.000	increased
			2008-2010	12	0.192		
OK120420-02-0050D	Polecat Creek	turbidity	2003-2005	17	48.59	0.047	decreased
			2008-2010	13	27.38		

WBID	Site	Variable	RB Cycle	N	Mean	p value	
OK520700-04-0260C	Quapaw Creek	alkalinity	2003-2005	19	92.26	0.016	increased
			2008-2010	13	124.54		
		conductivity	2003-2005	19	487	0.023	increased
			2008-2010	12	632.3		
		chloride	2003-2005	19	73.24	0.000	increased
			2008-2010	12	123.27		
		sulfate	2003-2005	19	22.268	0.032	increased
			2008-2010	12	27.967		
		nitrate	2003-2005	19	0.1537	0.073	increased
			2008-2010	12	0.5258		
		TKN	2003-2005	19	0.455	0.034	increased
			2008-2010	12	0.7383		
		available N	2003-2005	19	0.2834	0.066	increased
			2008-2010	12	0.7829		
		total N	2003-2005	19	0.6334	0.016	increased
			2008-2010	12	1.2867		
		hardness	2003-2005	19	136.79	0.000	increased
			2008-2010	12	221.58		
		TDS	2003-2005	19	292.16	0.009	increased
			2008-2010	12	367.17		
OK220200-03-0010C	Sallisaw Creek: Lower	turbidity	2003-2005	19	47.46	0.024	decreased
			2008-2010	18	10.8		
		conductivity	2003-2005	19	541.3	0.009	increased
			2008-2010	18	675.3		
		chloride	2003-2005	19	31.55	0.015	increased
			2008-2010	17	42.26		
		sulfate	2003-2005	19	20.9	0.001	increased
			2008-2010	17	30.547		
		hardness	2003-2005	19	222.01	0.011	increased
			2008-2010	17	288.79		
		TDS	2003-2005	19	324.37	0.025	increased
			2008-2010	17	387.18		
		ortho-phosphorus	2003-2005	19	0.0357	0.004	decreased
			2008-2010	17	0.0135		
OK220200-03-0010G	Sallisaw Creek: Upper	total phosphorus	2003-2005	19	0.114	0.000	decreased
			2008-2010	17	0.031		
		TP	2003-2005	16	0.07	0.000	decreased
			2008-2010	15	0.03		
OK520700-03-0100B	Salt Creek (Creek Co.)	DO % sat	2003-2005	20	78.65	0.022	increased
			2008-2010	17	94.26		
		turbidity	2003-2005	20	29.98	0.002	decreased
			2008-2010	19	9.21		
		alkalinity	2003-2005	20	150.1	0.003	increased

WBID	Site	Variable	RB Cycle	N	Mean	p value	
			2008-2010	18	195.94		
		nitrate	2003-2005	20	0.11	0.008	decreased
			2008-2010	17	0.044		
		available N	2003-2005	20	0.184	0.013	decreased
			2008-2010	17	0.101		
		hardness	2003-2005	20	187.16	0.025	increased
			2008-2010	16	233.31		
		ortho-phosphorus	2003-2005	20	0.032	0.010	decreased
			2008-2010	17	0.015		
		total phosphorus	2003-2005	20	0.099	0.000	decreased
			2008-2010	17	0.039		
OK520800-03-0010D	Salt Creek (Seminole Co.)	turbidity	2003-2005	16	21.76	0.077	decreased
			2008-2010	15	8.82		
		alkalinity	2003-2005	16	226.19	0.016	increased
			2008-2010	16	284.63		
		chloride	2003-2005	18	536.1	0.062	increased
			2008-2010	15	743.6		
		sulfate	2003-2005	18	28.43	0.003	increased
			2008-2010	15	42.2		
		hardness	2003-2005	18	436.5	0.062	increased
			2008-2010	15	552.5		
		total phosphorus	2003-2005	18	0.131	0.038	decreased
			2008-2010	15	0.043		
OK220200-04-0010G	San Bois Creek	total N	2003-2005	17	0.426	0.080	decreased
			2008-2010	8	0.273		
		hardness	2003-2005	17	65.24	0.000	increased
			2008-2010	8	124.38		
		total phosphorus	2003-2005	17	0.099	0.038	increased
			2008-2010	8	0.064		
OK120400-02-0240H	Shady Grove Creek	turbidity	2003-2005	17	56.51	0.052	decreased
			2008-2010	18	12.23		
		ortho-phosphorus	2003-2005	19	0.021	0.042	decreased
			2008-2010	18	0.009		
		total phosphorus	2003-2005	19	0.071	0.000	decreased
			2008-2010	18	0.026		
OK120410-01-0220G	Snake Creek	turbidity	2003-2005	18	53.23	0.018	decreased
			2008-2010	17	22.56		
		ortho-phosphorus	2003-2005	19	0.032	0.025	decreased
			2008-2010	17	0.019		
		total phosphorus	2003-2005	19	0.124	0.000	decreased
			2008-2010	17	0.053		
		TSS	2003-2005	19	46.42	0.012	decreased
			2008-2010	17	11.94		
OK120400-02-0030F	South Fork of Dirty Creek	DO % sat	2003-2005	19	53.28	0.072	increased
			2008-2010	17	65.05		
		alkalinity	2003-2005	19	88.32	0.001	increased
			2008-2010	17	142.94		

WBID	Site	Variable	RB Cycle	N	Mean	p value	
		chloride	2003-2005	19	6.311	0.000	increased
			2008-2010	16	8.819		
		sulfate	2003-2005	19	84.7	0.008	increased
			2008-2010	16	182.4		
		nitrate	2003-2005	19	0.131	0.026	decreased
			2008-2010	16	0.056		
		available N	2003-2005	19	0.1921	0.072	decreased
			2008-2010	16	0.1181		
		total N	2003-2005	19	0.5589	0.036	decreased
			2008-2010	16	0.3413		
		hardness	2003-2005	19	140.76	0.001	increased
			2008-2010	17	247.12		
		TDS	2003-2005	19	240.6	0.022	increased
			2008-2010	16	396.3		
		total phosphorus	2003-2005	19	0.078	0.015	decreased
			2008-2010	16	0.047		
		TSS	2003-2005	19	16.105	0.045	decreased
			2008-2010	16	10.313		
		flow	2003-2005	7	15.98	0.047	decreased
			2008-2010	15	3.84		
OK520500-02-0010C	Wewoka Creek: Lower	ammonia	2003-2005	16	0.03	0.088	increased
			2008-2010	16	0.079		
OK520500-02-0010M	Wewoka Creek: Upper	ammonia	2003-2005	18	0.0236	0.083	increased
			2008-2010	15	0.1063		
		chloride	2003-2005	18	224.2	0.016	increased
			2008-2010	15	429.2		
		flow	2003-2005	10	16.57	0.008	decreased
			2008-2010	11	2.74		

### 3.2 BIOLOGICAL MONITORING

#### Habitat Assessment

Total habitat scores for each site and computed metric scores are listed below (Table 15). Lower Ballard and Battle Creeks had the highest habitat scores, while Salt Creek in Seminole Co. had the lowest habitat score. Table 16 presents the habitat scores for the probabilistic sites.

**Table 15. Habitat assessment metric values for fixed monitoring sites in the Rotating Basin Group 3, Cycle 2.**

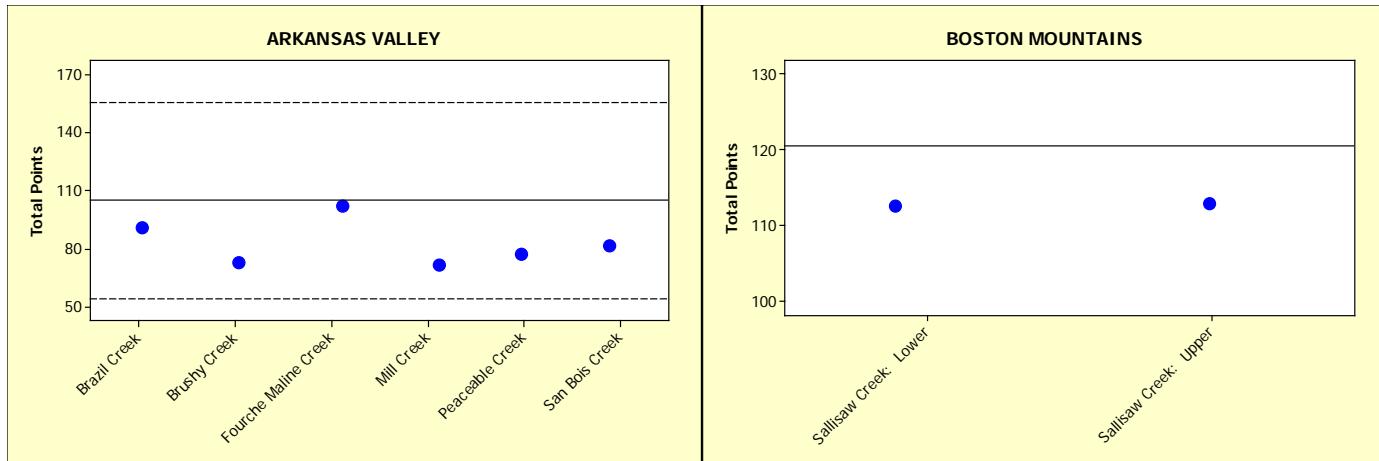
SiteName	WBID	Instream Cover	Pool Bottom Substrate	Pool Variability	Canopy Cover Shading	Presence of Rocky Runs or Riffles	Flow	Channel Alteration	Channel Siminity	Bank Stability	Bank Vegetation Stability	Streamsider Cover	Total Points
Alabama Creek	OK520500-01-0200D	12.9	6.9	19	14.5	9	6.5	5.8	0.3	5.9	4	8.7	93.5
Bad Creek	OK520500-01-0170L	6.5	3.6	13.6	4.9	4.1	10.4	16.5	0.5	7.1	6.4	9.7	83.3
Ballard Creek	OK121700-03-0370G	17.5	15.4	18.8	12.2	16.2	20	5	1.3	9	7.5	9.9	132.8
Battle Creek	OK121700-06-0040G	19	15.7	15	20	15.9	18.4	1	1	8.7	6.6	9.9	131.2
Bird Creek: Downstream	OK520800-01-0050G	0.7	0.9	11.3	9.9	0	10.9	2.8	1	7.4	5.7	9.1	59.7
Bird Creek: Upstream	OK520800-01-0050M	2.6	2	3.5	7.2	0	0	16.5	0	7	6.9	9.3	55
Brazil Creek	OK220100-03-0010G	9.6	12.9	15.9	15.3	7.5	1.7	4.2	2.8	5.9	5.3	9.6	90.7
Brushy Creek	OK220600-03-0010J	4.6	7.5	15	7	4.1	0	9.9	4.3	6.1	4.1	10	72.6
Butler Creek	OK120400-02-0160D	4.8	6.2	20.1	19.7	0	0	16.5	3.8	4.2	4.2	6.8	86.3
Camp Creek	OK520700-03-0220D	1.2	1.7	17.2	17.8	0	17.1	5.8	2.2	7.6	6.3	9.7	86.6
Canadian Sandy Creek	OK520600-03-0010D	2.6	1.9	20.2	13.5	2.2	15.7	0.4	0.9	7.5	3.4	6.8	75.1
Cloud Creek	OK120410-01-0100T	1.7	5.3	20.2	15.2	0	0	2.3	0.5	6.5	5.5	8.7	65.9
Coody Creek	OK120400-01-0400F	3.1	3.1	14.4	17.4	2.2	3.2	12.3	1.1	5.7	6	9.3	77.8
Deep Fork of N. Canadian R.	OK520710-01-0010G	0.8	2.4	17.2	2.7	0	19.9	11.1	1.3	7.1	5.5	9.2	77.2
Dry Creek	OK520700-04-0020F	1.2	1.6	18.8	15.3	0	20	12.3	0.1	5.3	4.3	7	85.9
Elk Creek	OK120400-02-0190D	2.1	3.8	18.5	7.2	2.2	1	8.7	1.5	6.1	5	9.7	65.8
Fourche Maline Creek	OK220100-04-0020H	8.1	8.5	13.2	13.6	4.1	20	11.1	2.5	6.1	4.9	9.9	102
George's Fork of Dirty Creek	OK120400-02-0110D	4.9	10.5	19.6	15.2	0	0	9.9	2.4	6.4	5.2	9.1	83.2
Little Wewoka Creek	OK520500-02-0090D	1.5	3.3	0	11	2.2	5.8	4.2	2.2	5.6	4.8	9.2	49.8
Mill Creek	OK220600-01-0100P	5.1	5.1	15.7	16	4.1	0.3	1.8	0.7	9	5	8.7	71.5
Peaceable Creek	OK220600-03-0050F	5.2	6.1	15.3	13.1	2.2	11.4	4.2	0	6.2	4.4	9.1	77.2
Polecat Creek	OK120420-02-0050D	4.7	8.5	13.4	0.3	5.9	16.4	13.7	1	6	0.9	4	74.8
Quapaw Creek	OK520700-04-0260C	0.9	0.4	0	5	0	17.2	1.8	0.2	7.6	2	9.1	44.2
Sallisaw Creek: Lower	OK220200-03-0010C	17.6	9.5	14.3	8.6	11.4	17.8	15.1	0.1	8.6	6.9	2.6	112.5
Sallisaw Creek: Upper	OK220200-03-0010G	18	17.9	0	11.3	16.1	20	2.8	1.1	8.7	7	10	112.9
Salt Creek (Creek Co.)	OK520700-03-0100B	0.9	1.9	13	15.9	0	17.3	2.3	0.6	6.8	4.8	6.4	69.9
Salt Creek (Seminole Co.)	OK520800-03-0010D	0.6	0.4	0	9.9	0	16.5	1	1.2	6	2.8	7.6	46
San Bois Creek	OK220200-04-0010G	2.9	5.5	16.1	10.7	4.1	9.9	9.9	1	5.9	5.2	10	81.2
Shady Grove Creek	OK120400-02-0240H	2.1	6.4	18.5	19.9	2.2	1	4.2	6.3	5.3	5.4	9.5	80.8
Snake Creek	OK120410-01-0220G	4.6	2.6	18.2	5.7	5.9	14	2.3	1.3	5.6	2.8	9.1	72.1
South Fork of Dirty Creek	OK120400-02-0030F	6.3	9.9	17.7	19.9	4.1	0	2.8	2.6	5.2	5.8	9.9	84.2
Wewoka Creek	OK520500-02-0010M	2	1.8	16.5	3.8	0	10.3	1.4	0.1	7.3	3.6	5	51.8
Wewoka Creek: Downstrm.	OK520500-02-0010C	1.6	2.7	13.5	1.9	0	19.3	3.5	2	4.8	1.3	9.5	60.1

**Table 16. Habitat assessment metric values for probabilistic monitoring sites in the Rotating Basin Group 3, Cycle 2.**

SiteName	WBID	Instream Cover	Pool Bottom Substrate	Pool Variability	Canopy Cover Shading	Presence of Rocky Runs or Riffles	Flow	Channel Alteration	Channel Sinuosity	Bank Stability	Bank Vegetation Stability	Streamsides Cover	Total Points
Deep Fork: Site 2	OKR08715-002	0.6	1.4	14.6	3.4	0	20	1.8	-0.1	7.4	6	9.5	64.6
Unnamed Cr: Site 4 (Cedar Cr.)	OKR08715-004	18.9	17.8	20.2	17.5	12.4	1.8	16.5	0.5	10	8.6	10	134.2
Deep Fork River: Site 7	OKR08715-007	1.6	1.3	14.6	4.9	0	20	16.5	-0.1	6.7	3.9	9.1	78.5
Fall Branch: Site 10	OKR08715-010	19.5	16.2	0	9.5	15.2	4.4	0.4	2.6	5.5	5.4	10	88.7
Unnamed Creek: Site 11	OKR08715-011	8.2	8.7	17.2	19.8	13.3	14.1	2.3	3.1	8.3	3.4	10	108.4
Salt Creek: Site 13	OKR08715-013	1.5	0.4	0	10.3	4.1	2.3	4.2	0	6.1	2.9	3.4	35.2
San Bois Creek: Site 14	OKR08715-014	5.7	5.3	16.7	12.1	0	0	16.5	2.5	8	3.1	9.9	79.8
Unnamed Creek: Site 16	OKR08715-016	1	2	18.8	20	0	0	16.5	4.2	5.7	1.3	7.2	76.7
Rock Creek: Site 17	OKR08715-017	1.7	2	14.6	10.4	0	0	6.7	1.8	9.1	6.6	10	62.9
Cane Creek: Site 19	OKR08715-019	3.7	3.7	17.2	3.6	4.1	3.5	0.5	3.6	2.4	0.4	6.8	49.5
Baron Fork Creek: Site 26	OKR08715-026	19.4	18.1	14.6	1.9	16.2	20	0.4	1.5	7.8	3.8	9.6	113.3
Big Skin Bayou: Site 28	OKR08715-028	3.5	2.9	13.6	11.1	0	0	11.1	3.1	7.1	4.4	10	66.8
Salt Creek: Site 29	OKR08715-029	0.4	0.4	0	11.2	0	13.8	0.4	0.2	9.4	3.6	9.5	48.9
Little Fourche Maline: Site 30	OKR08715-030	14.7	16.8	9	10.9	0	0	16.5	1.1	10	7.6	10	96.6
Turkey Creek: Site 34	OKR08715-034	5.1	2.2	20.2	20	4.1	2	5	4.5	7	5.4	10	85.5
Unnamed Creek: Site 44	OKR08715-044	11.4	13.4	0	17.3	7.5	0	5.8	0.7	10	8.1	10	84.2
Shady Grove Creek: Site 47	OKR08715-047	1.5	1.3	20	14.4	0	0	13.7	6.3	6.2	2	6.8	72.2
Cache Creek: Site 48	OKR08715-048	3.2	10.1	15	9.7	0	0	15.1	0.2	9.9	4.2	10	77.4
Little River: Site 53	OKR08715-053	0.6	0.4	15	8.4	0	20	0.4	6.6	8.8	2.3	8	70.5
Tahlequah Creek: Site 54	OKR08715-054	16.5	8.5	19.3	18.9	16.1	18.7	0.4	0.2	4.8	4.7	9.3	117.4
Unnamed Creek: Site 60	OKR08715-060	8.7	10.9	3.5	15.4	0	0	6.7	3.7	7.2	2.1	4.4	62.6
North Canadian River: Site 61	OKR08715-061	0.8	0.4	0	0	0	0	0.4	0.6	7.4	4.6	10	44.2
Poteau River: Site 63	OKR08715-063	6.3	8.8	14.6	10.5	0	20	16.5	0	5.6	2.1	10	94.4
Deep Fork: Site 65	OKR08715-065	1.2	0.4	0	8.8	0	20	8.7	-0.1	9.5	7	9.9	65.4
North Canadian River: Site 75	OKR08715-075	1.3	0.4	0	10.9	0	20	3.5	-0.1	9.9	5.8	9.9	61.6
Cat Creek: Site 79	OKR08715-079	3.5	1.5	0	0.9	5.9	1.6	0.5	0	6.1	2.3	8.7	31
North Canadian River: Site 83	OKR08715-083	0.6	0.4	14.6	1.1	0	17.7	0.4	1.6	10	3.1	9.3	58.8
Illinois River: Site 85	OKR08715-085	18.7	17.9	14.6	9.5	16.1	20	11.1	0.5	9.4	6.5	9.9	134.2
Sallisaw Creek: Site 86	OKR08715-086	19.5	14.1	13.5	4	14.1	19.4	16.5	0.2	10	7.6	10	128.9
Sugar Loaf Creek: Site 90	OKR08715-090	12.1	9.2	19.9	3.4	2.2	8.5	13.7	1.1	6.9	2.3	10	89.3
Fourche Maline Creek: Site 94	OKR08715-094	5	7.3	13.5	14.1	7.5	4.9	0.4	1.9	6.5	5	10	76.1
Coody Creek: Site 98	OKR08715-098	7.1	8.5	4.1	9.6	4.1	2.2	6.7	4.2	6.4	3.2	3.6	59.7
Unnamed Cr: Site 100 (Wolf Cr.)	OKR08715-100	10.3	6.7	17.2	4.2	4.1	5	1.4	5.8	5	1	8.5	69.2
Lee Creek: Site 108	OKR08715-108	12.9	14.4	13.6	7.5	5.9	20	0.4	1.1	9.7	5.3	10	100.8
Little River: Site 109	OKR08715-109	0.3	0.4	0	4.9	0	20	2.3	0	9.8	1.8	8.9	48.4
Little Deep Fork Creek: Site 112	OKR08715-112	2.7	1.9	0	11.9	2.2	19	5.8	0.8	6.9	5.6	10	66.8
South Gaines Creek: Site 114	OKR08715-114	16.5	16.4	3.8	15.5	0	0	16.5	3.7	6.9	3.8	10	93.1
Deer Creek: Site 121	OKR08715-121	9.5	3.7	1.8	17.3	0	0.8	1.4	5.7	5.9	4.4	10	60.5
Duck Creek: Site 125	OKR08715-125	9.4	4.4	14.6	9.1	4.1	3	7.7	1.5	6.6	3.8	9.6	73.8
Taloka Creek: Site 127	OKR08715-127	3.2	0.7	11.8	19.6	0	5.4	2.3	2.5	8.3	5.5	9.5	68.8

SiteName	WBID	Instream Cover	Pool Bottom Substrate	Pool Variability	Canopy Cover Shading	Presence of Rocky Runs or Riffles	Flow	Channel Alteration	Bank Stability	Bank Vegetation Stability	Streamsides Cover	Total Points	
Unnamed Creek: Site 136	OKR08715-136	3.1	12	1.8	14.3	7.5	3	0.7	2.2	8.6	2.4	9.3	64.9
Flat Rock Creek: Site 139	OKR08715-139	1.5	3.5	15.7	8.7	4.1	10	0.4	4.6	6.1	3.5	9.9	68
Unnamed Creek: Site 146	OKR08715-146	19	18.5	17.2	11.5	9	0	16.5	1	10	5.1	9.1	116.9

Sites were compared relative to the mean total habitat score of high quality sites in the respective ecoregion and a range determined by +/- two standard deviations (Figures 3 and 4). There were not enough reference sites in the Boston Mountains ecoregion to calculate standard deviation, so no “bounds” are shown in that graph. All sites were within the high quality range in all ecoregions. Sites with scores that are within +/- two standard deviations of the mean of the high quality sites do not necessarily have “reference” conditions; rather, sites outside of these values have either extremely good or extremely poor conditions which merit further investigation. Low habitat scores could be the result of anthropogenic activities, could be naturally occurring, or could indicate an unrepresentative reach.



**Figure 3. Total habitat score for each fixed site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.**

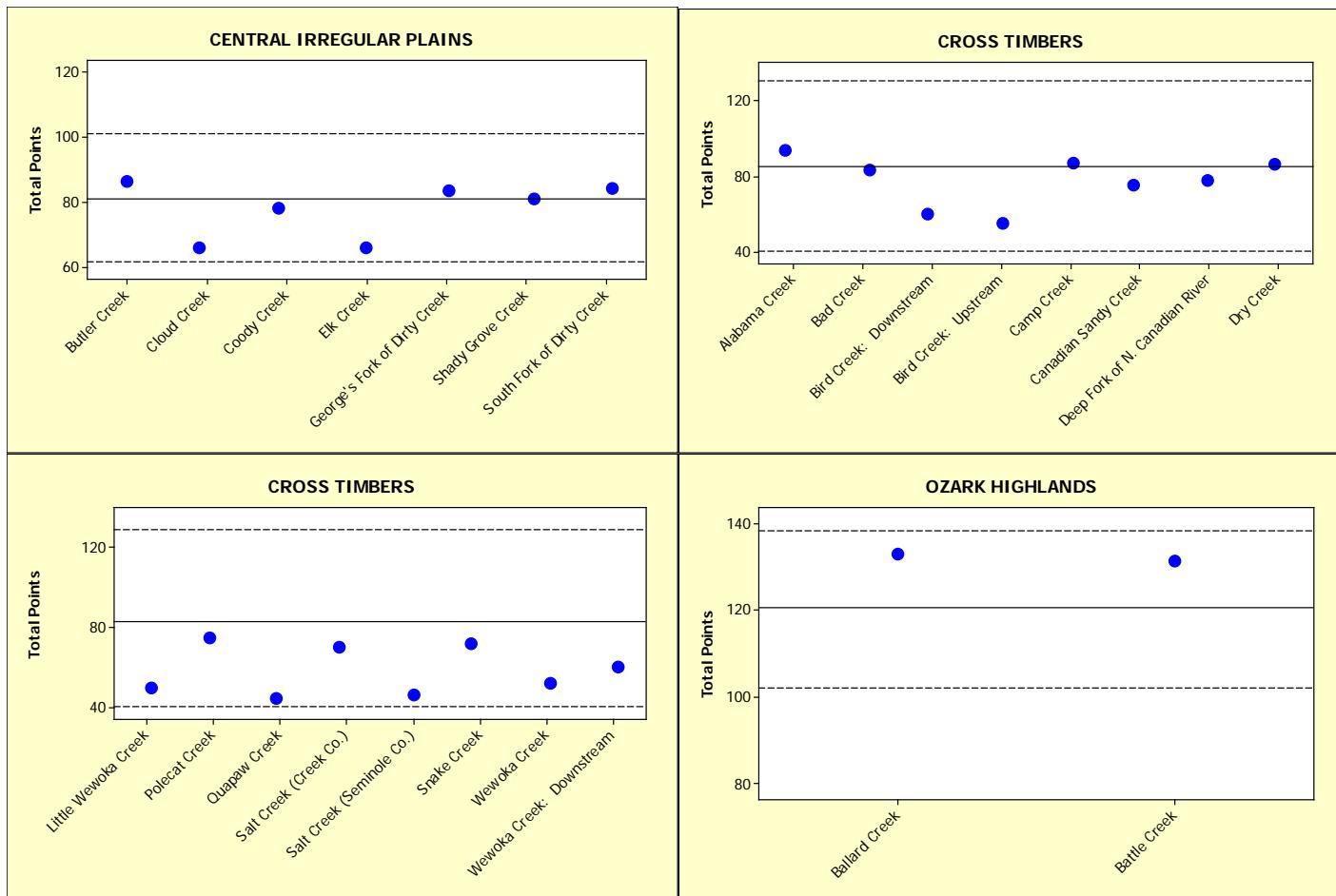


Figure 3, cont. Total habitat score for each fixed site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.

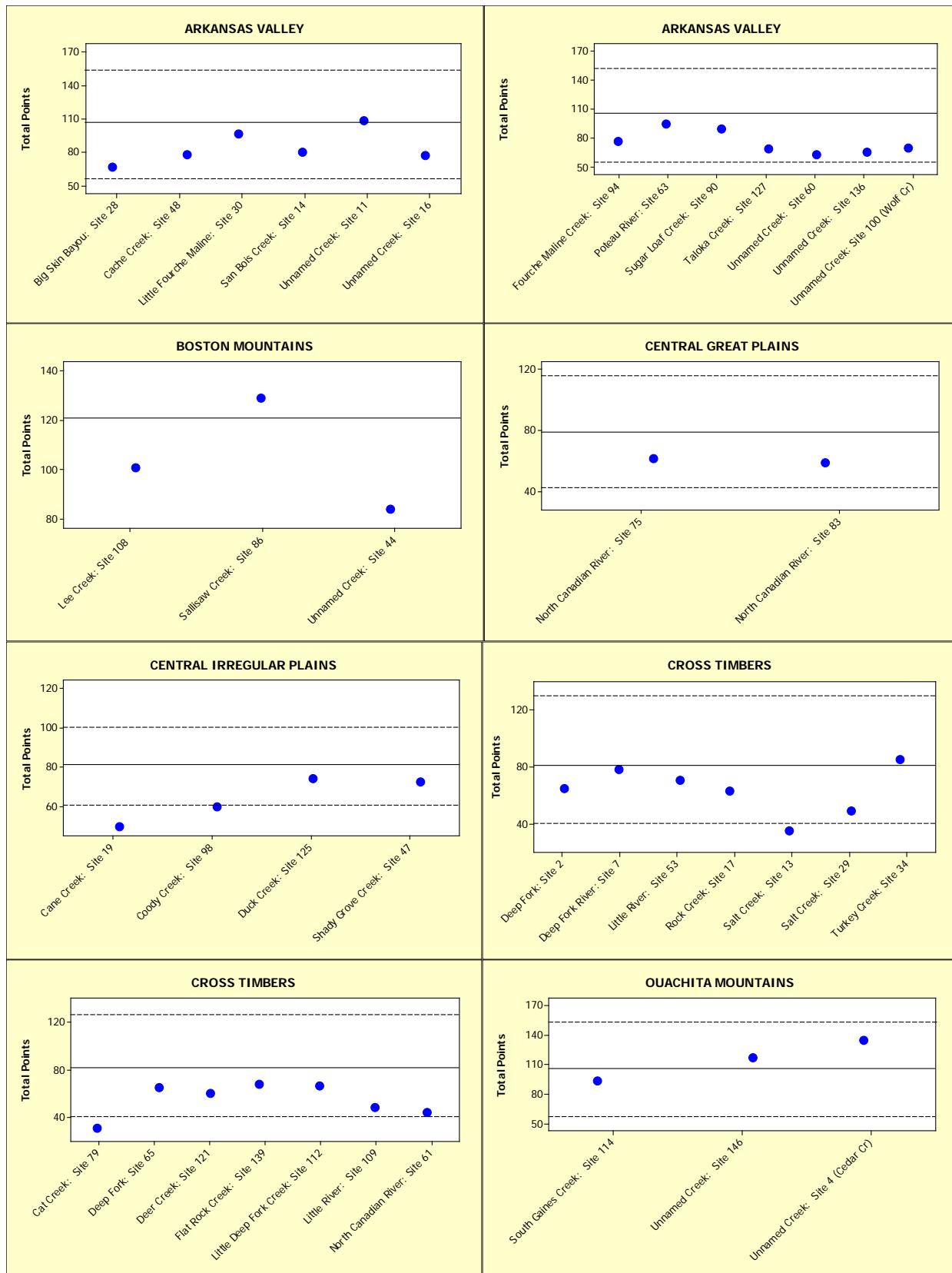
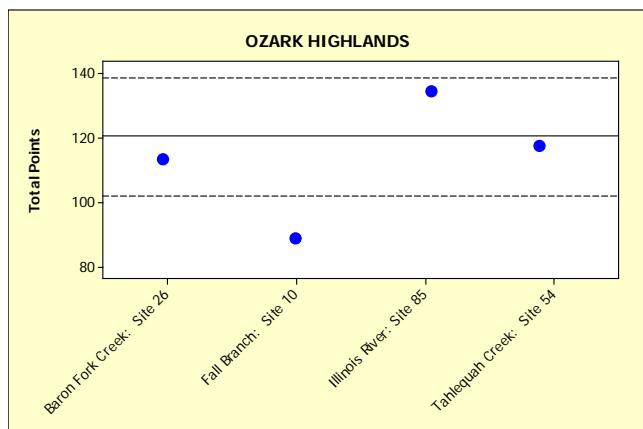


Figure 4. Total habitat score for each probabilistic site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.



**Figure 4, cont.** Total habitat score for each probabilistic site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.

### 3.2.2 Fish Collections

Fish metrics used to compute IBI scores for the Rotating Basin sites using the OCC method are listed in Tables 17 and 18. Use of this IBI method allows assessment of streams which lack definite support assignment using the state biocriteria method. For a complete listing of fish collection data, including species and numbers caught, consult Appendix B. All data was compared relative to the same mean of the high quality sites for the respective ecoregion in order to obtain the IBI score (OCC method). Although, ideally, one would use collections from the same years for comparison, multiyear collections at sites deemed “high quality” were not available.

Table 19 presents the results of the fixed site fish assessment based on the OCC’s modified RBP method compared with the fish assessment based on Oklahoma state biocriteria (as described in Oklahoma Water Resource Board, *Implementation of Oklahoma’s Water Quality Standards, Subchapter 15: Use Support Assessment Protocols* (USAP), OAC 785:46-15). The state biocriteria are based on older delineations of the level 3 ecoregions, so there were some differences in scoring based on the differences in grouping of sites. The OCC method allowed greater discrimination of the biological condition among sites. Four sites had fish communities that were “excellent” relative to high quality sites in the ecoregion, 11 sites had fish communities that were “good,” 8 sites were “fair,” and 10 sites were “poor” relative to high quality sites in the ecoregion. The OCC IBI calculated for Butler Creek was based on comparison of the shock-only results for the CIP high quality sites since seining was not possible in this stream; a determination of FWP support using the USAP was not possible (Table 19). Wewoka and Bird Creeks have a Habitat Limited Aquatic Community designation, indicating that irreversible, man-made conditions are constraining the fish and wildlife propagation use.

**Table 17. Metric values for calculation of fish IBI scores (OCC method) for Rotating Basin Group 3 Cycle 2 fixed monitoring sites.**

SiteName	WBID	Date	Total Number	Total Spp	Darter Spp	Sunfish Spp	Intolerant Spp	Percent Tolerant	Percent Insectivorous Cyprinids	Percent Lithophytic Spawners
Alabama Creek	OK520500-01-0200D	6/30/2008	318	25	1	8	2	83.33%	2.20%	11.32%
Bad Creek	OK520500-01-0170L	7/1/2008	295	25	1	7	2	64.41%	5.42%	27.80%
Ballard Creek	OK121700-03-0370G	7/24/2008	682	21	3	7	10	8.50%	54.11%	91.06%
Battle Creek	OK121700-06-0040G	5/28/2008	409	14	3	4	8	1.96%	11.49%	98.04%
Bird Creek: Downstream	OK520800-01-0050G	7/9/2008	868	21	0	6	1	92.51%	1.38%	1.04%
Bird Creek: Upstream	OK520800-01-0050M	7/1/2009	168	11	0	5	0	73.81%	0.60%	2.98%
Brazil Creek	OK220100-03-0010G	7/21/2009	333	26	3	5	6	31.83%	12.61%	24.32%
Brushy Creek	OK220600-03-0010J	7/8/2009	358	31	2	9	4	81.28%	0.56%	13.13%
Butler Creek	OK120400-02-0160D	7/29/2008	148	10	0	7	0	99.32%	0.00%	0.00%
Camp Creek	OK520700-03-0220D	6/26/2008	157	12	0	5	0	100.00%	0.00%	0.00%
Canadian Sandy Creek	OK520600-03-0010D	7/11/2008	464	14	0	4	1	85.34%	9.91%	4.53%
Cloud Creek	OK120410-01-0100T	9/8/2008	429	26	1	9	3	65.50%	12.82%	1.86%
Coody Creek	OK120400-01-0400F	7/23/2008	200	14	1	6	1	87.50%	0.00%	7.50%
Deep Fork of North Canadian R.	OK520710-01-0010G	7/21/2008	345	12	0	5	0	94.49%	4.35%	0.00%
Dry Creek	OK520700-04-0020F	6/27/2008	332	15	1	4	2	99.40%	0.30%	0.30%
Elk Creek	OK120400-02-0190D	7/29/2008	397	20	0	8	2	80.35%	1.01%	8.56%
Fourche Maline Creek	OK220100-04-0020H	7/20/2009	371	36	3	10	7	75.74%	7.55%	15.63%
George's Fork of Dirty Creek	OK120400-02-0110D	8/4/2009	59	9	1	6	2	96.61%	0.00%	1.69%
Little Wewoka Creek	OK520500-02-0090D	7/17/2008	587	14	1	5	2	78.02%	16.18%	5.62%
Mill Creek	OK220600-01-0100P	7/28/2008	346	21	1	10	1	71.39%	0.29%	21.68%
Peaceable Creek	OK220600-03-0050F	6/30/2009	163	17	2	7	2	73.62%	9.20%	14.11%
Polecat Creek	OK120420-02-0050D	9/10/2008	326	20	1	6	2	94.17%	2.76%	2.15%
Quapaw Creek	OK520700-04-0260C	6/5/2008	910	16	0	6	0	99.56%	0.44%	0.00%
Sallisaw Creek: Lower	OK220200-03-0010C	7/10/2009	479	32	3	9	13	25.26%	19.00%	51.15%
Sallisaw Creek: Upper	OK220200-03-0010G	6/26/2009	559	30	4	9	12	21.82%	38.46%	73.17%
Salt Creek (Creek Co.)	OK520700-03-0100B	7/2/2008	200	12	1	4	3	96.00%	0.50%	0.50%
Salt Creek (Seminole Co.)	OK520800-03-0010D	7/11/2008	349	12	0	5	1	97.71%	0.86%	0.00%
San Bois Creek	OK220200-04-0010G	7/15/2009	195	26	2	7	4	70.26%	9.23%	20.00%
Shady Grove Creek	OK120400-02-0240H	7/25/2008	93	10	0	6	0	92.47%	0.00%	7.53%
Snake Creek	OK120410-01-0220G	7/30/2008	130	16	1	5	2	91.54%	3.85%	3.85%
South Fork of Dirty Creek	OK120400-02-0030F	7/23/2009	262	19	1	7	3	72.90%	0.00%	8.40%
Wewoka Creek	OK520500-02-0010M	7/17/2008	255	12	0	5	1	98.04%	0.78%	0.78%
Wewoka Creek: Downstream	OK520500-02-0010C	7/10/2008	438	15	0	5	1	88.81%	10.50%	0.46%

**Table 18. Metric values for calculation of fish IBI scores (OCC method) for Rotating Basin Group 3 Cycle 2 probabilistic monitoring sites.**

SiteName	WBID	Date	Total Number	Total Spp	Darter Spp	Sunfish Spp	Intolerant Spp	Percent Tolerant	Percent Insectivorous Cyprinids	Percent Lithophytic Spawners
Deep Fork	OKR08715-002	6/11/2009	1602	13	0	4	1	99.94%	0.06%	0.00%
Unnamed Creek: Site # 004 (Cedar Cr.)	OKR08715-004	7/17/2008	1017	17	3	4	5	7.08%	2.06%	90.27%
Deep Fork River	OKR08715-007	6/22/2009	40	10	0	0	0	97.50%	2.50%	0.00%
Fall Branch: Site # 010	OKR08715-010	8/6/2008	869	5	1	0	1	1.38%	0.00%	98.62%
Unnamed Creek: Site # 011	OKR08715-011	7/24/2008	419	18	1	6	2	81.38%	0.24%	5.73%
Salt Creek: Site # 013	OKR08715-013	7/8/2008	305	13	0	4	1	97.38%	2.62%	0.00%
San Bois Creek: Site # 014	OKR08715-014	7/22/2008	429	18	3	5	3	35.20%	0.47%	8.16%
Unnamed Creek: Site # 016	OKR08715-016	8/4/2008	164	19	0	9	1	28.46%	5.36%	0.23%
Rock Creek	OKR08715-017	5/27/2009	241	18	0	8	1	91.70%	0.00%	1.24%
Cane Creek: Site # 019	OKR08715-019	7/30/2008	475	21	1	7	2	90.11%	9.05%	0.42%
Unnamed Creek: Site # 020	OKR08715-020	6/25/2008	96	12	1	5	1	39.58%	7.29%	47.92%
Baron Fork Creek: Site # 026	OKR08715-026	8/28/2008	1843	26	4	7	14	7.92%	25.77%	90.88%
Big Skin Bayou: Site # 028	OKR08715-028	7/9/2009	191	27	4	9	4	71.20%	1.57%	26.70%
Salt Creek: Site # 029	OKR08715-029	7/10/2008	418	14	0	6	1	94.74%	5.26%	0.00%
Little Fourche Maline: Site # 030	OKR08715-030	7/22/2008	745	14	3	4	3	30.87%	5.10%	62.68%
Turkey Creek	OKR08715-034	6/3/2009	188	15	1	6	2	89.36%	2.13%	7.98%
Unnamed Creek: Site # 044	OKR08715-044	7/31/2008	1145	9	3	1	5	0.17%	0.87%	99.83%
Shady Grove Creek: Site # 047	OKR08715-047	8/6/2008	164	12	0	5	1	89.63%	0.00%	7.93%
Cache Creek: Site # 048	OKR08715-048	7/15/2008	1022	22	1	8	2	39.14%	1.96%	54.79%
Little River: Site # 053	OKR08715-053	7/13/2009	307	19	0	8	1	95.77%	2.93%	0.00%
Tahlequah Creek: Site # 054	OKR08715-054	7/30/2008	671	22	3	7	11	4.32%	33.53%	93.74%
Unnamed Creek: Site # 060	OKR08715-060	6/26/2008	370	15	1	6	1	79.73%	7.30%	1.62%
North Canadian River	OKR08715-061	7/20/2009	387	8	0	1	0	100.00%	0.00%	0.00%
Poteau River	OKR08715-063	7/22/2009	1599	20	0	7	0	99.37%	0.19%	0.38%
Deep Fork	OKR08715-065	6/16/2009	723	12	0	3	1	96.96%	3.04%	0.00%
Black Fork River	OKR08715-066	7/24/2009	202	22	3	7	6	57.92%	7.43%	26.73%
North Canadian River: Site # 075	OKR08715-075	7/24/2008	289	13	0	3	0	99.31%	0.69%	0.00%
Cat Creek: Site # 079	OKR08715-079	7/8/2008	884	18	0	7	1	52.71%	31.00%	16.18%
North Canadian River: Site # 083	OKR08715-083	7/31/2008	232	14	1	4	0	91.38%	0.00%	0.00%
Illinoian River	OKR08715-085	6/24/2009	359	33	3	8	13	35.65%	30.92%	52.92%
Sallisaw Creek: Site # 086	OKR08715-086	7/31/2008	601	30	7	10	13	36.44%	13.64%	57.24%
Sugar Loaf Creek: Site # 90	OKR08715-090	7/16/2008	2856	21	3	6	5	6.90%	2.73%	85.71%
Fourche Maline Creek: Site # 094	OKR08715-094	7/25/2008	237	26	6	7	5	30.80%	2.53%	49.37%
Coody Creek: Site # 098	OKR08715-098	8/5/2008	804	12	1	6	1	93.28%	0.00%	6.09%
Unnamed Creek: Site # 100 (Wolf Creek)	OKR08715-100	7/16/2008	686	22	2	5	4	32.36%	3.06%	49.85%
Lee Creek	OKR08715-108	6/25/2009	252	25	5	7	10	22.62%	36.11%	65.87%
Little River: Site # 109	OKR08715-109	7/14/2008	425	15	0	4	1	97.65%	2.59%	0.00%
Little Deep Fork Creek	OKR08715-112	6/4/2009	672	15	0	7	1	98.21%	0.00%	0.45%
South Gaines Creek: Site # 114	OKR08715-114	7/21/2008	668	18	4	4	6	26.50%	3.29%	50.90%

SiteName	WBID	Date	Total Number	Total Spp	Darter Spp	Sunfish Spp	Intolerant Spp	Percent Tolerant	Percent Insectivorous Cyprinids	Percent Lithophytic Spawners
Deer Creek	OKR08715-121	6/12/2009	386	10	0	5	0	99.22%	0.26%	0.52%
Duck Creek	OKR08715-125	6/10/2009	261	24	1	8	1	90.04%	2.30%	1.15%
Taloka Creek: Site # 127	OKR08715-127	7/15/2008	69	10	2	4	1	69.57%	0.00%	17.39%
Unnamed Creek: Site # 136	OKR08715-136	6/25/2008	690	18	2	6	3	43.19%	4.78%	41.88%
Flat Rock Creek: Site # 139	OKR08715-139	7/10/2008	605	20	1	7	2	77.52%	6.12%	13.22%
Unnamed Creek: Site # 146	OKR08715-146	7/17/2008	186	13	2	2	4	18.28%	3.23%	75.27%

**Table 19. IBI scores based on Use Support Assessment Protocol biocriteria (OWRB 2008) and OCC's modified RBP method. WWAC=warm water aquatic community, HLAC=habitat limited aquatic community. S=supporting, NS=not supporting, U=undetermined.**

SiteName	WBID	IBI Total Score (USAP)	FWPropSupport (USAP)	IBI Total Score (OCC)	Percent of Reference	Score Interpretation (OCC)
Alabama Creek	OK520500-01-0200D	33	FS	21	84.00%	good
Bad Creek	OK520500-01-0170L	35	FS	23	92.00%	excellent
Ballard Creek	OK121700-03-0370G	43	FS	35	140.00%	excellent
Battle Creek	OK121700-06-0040G	39	FS	31	124.00%	excellent
Bird Creek: Downstream	OK520800-01-0050G	29	FS	17	68.00%	fair
Bird Creek: Upstream	OK520800-01-0050M	25	U	13	52.00%	poor
Brazil Creek	OK220100-03-0010G	39	FS	23	85.19%	good
Brushy Creek	OK220600-03-0010J	31	U	21	77.78%	good
Butler Creek	OK120400-02-0160D			13	56.52%	poor
Camp Creek	OK520700-03-0220D	25	U	13	52.00%	poor
Canadian Sandy Creek	OK520600-03-0010D	27	FS	15	60.00%	poor
Cloud Creek	OK120410-01-0100T	33	FS	21	84.00%	good
Coody Creek	OK120400-01-0400F	27	U	15	60.00%	poor
Deep Fork of North Canadian R.	OK520710-01-0010G	23	U	13	52.00%	poor
Dry Creek	OK520700-04-0020F	23	U	19	76.00%	fair
Elk Creek	OK120400-02-0190D	29	U	17	68.00%	fair
Fourche Maline Creek	OK220100-04-0020H	39	FS	21	77.78%	good
George's Fork of Dirty Creek	OK120400-02-0110D	21	NS	17	68.00%	fair
Little Wewoka Creek	OK520500-02-0090D	27	FS	21	84.00%	good
Mill Creek	OK220600-01-0100P	31	U	17	62.96%	fair
Peaceable Creek	OK220600-03-0050F	27	U	19	70.37%	fair
Polecat Creek	OK120420-02-0050D	27	FS	21	84.00%	good

SiteName	WBID	IBI Total Score (USAP)	FWPropSupport (USAP)	IBI Total Score (OCC)	Percent of Reference	Score Interpretation (OCC)
Quapaw Creek	OK520700-04-0260C	23	U	15	60.00%	poor
Sallisaw Creek: Lower	OK220200-03-0010C	43	FS	27	81.82%	good
Sallisaw Creek: Upper	OK220200-03-0010G	43	FS	31	93.94%	excellent
Salt Creek (Creek Co.)	OK520700-03-0100B	27	FS	17	68.00%	fair
Salt Creek (Seminole Co.)	OK520800-03-0010D	23	U	15	60.00%	poor
San Bois Creek	OK220200-04-0010G	33	U	23	85.19%	good
Shady Grove Creek	OK120400-02-0240H	25	U	13	52.00%	poor
Snake Creek	OK120410-01-0220G	25	U	21	84.00%	good
South Fork of Dirty Creek	OK120400-02-0030F	29	U	21	84.00%	good
Wewoka Creek	OK520500-02-0010M	23	U	15	60.00%	poor
Wewoka Creek: Downstream	OK520500-02-0010C	25	U	17	68.00%	fair

The watersheds for the probabilistic sites were not delineated at the time of this report, so the State biocriteria were not applied to assess these sites; table 20 shows the results of the OCC fish assessments for the probabilistic sites. Twelve of the 45 sites had “excellent” fish communities, 6 were “good,” 13 were “fair,” 12 were “poor,” and 2 were “very poor.” Overall, this indicates that approximately 40% of the streams in the basin have at least good fish communities and about 30% have poor communities relative to high quality sites in the ecoregions of this basin. The fixed sites had about the same breakdown as the probabilistic sites, with 45% of sites being either excellent or good, and 30% being poor.

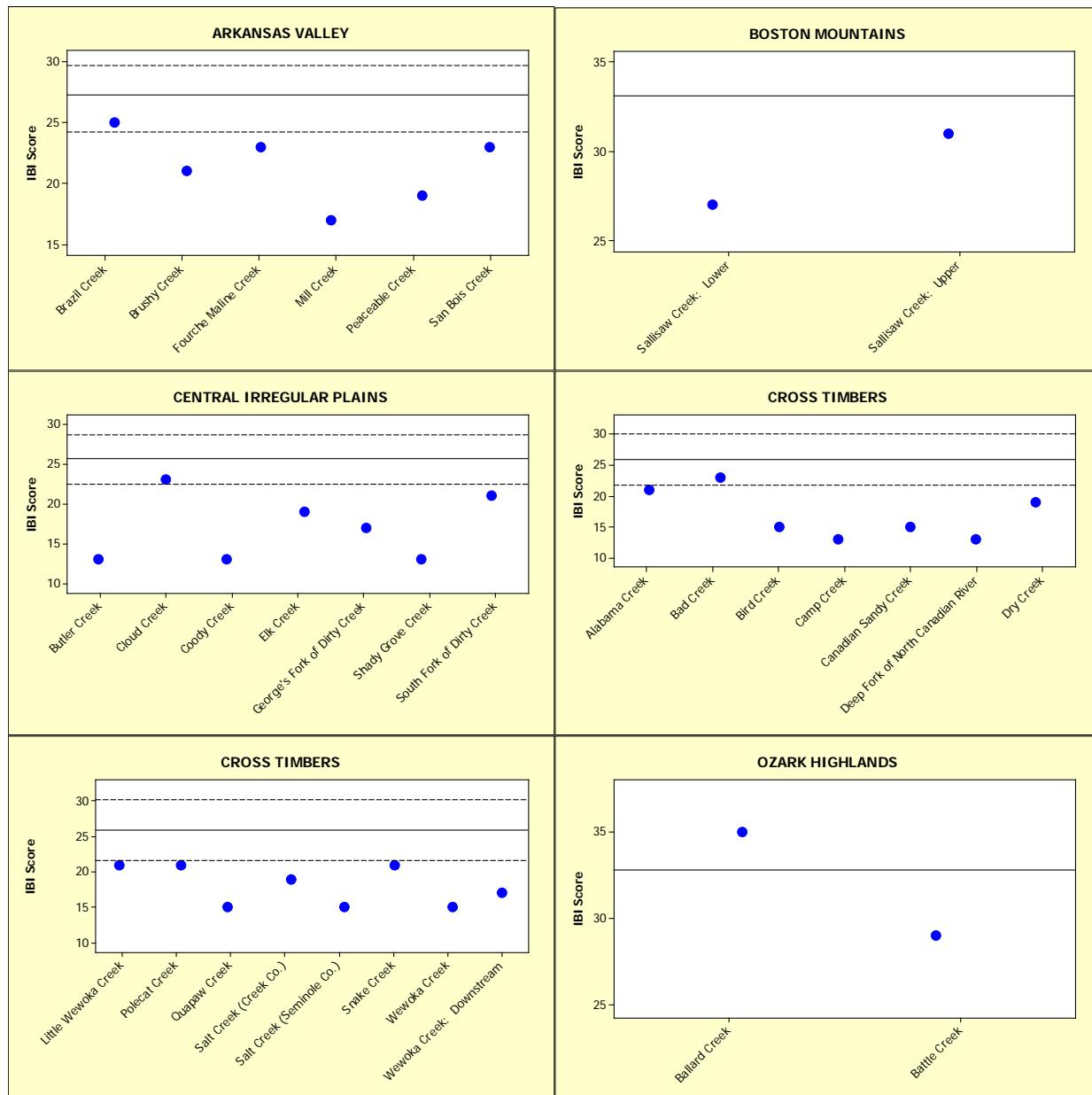
**Table 20. IBI scores for probabilistic sites based on OCC’s modified RBP method.**

SiteName	WBID	IBI Total Score (OCC)	Percent of Reference	Score Interpretation (OCC)
Deep Fork	OKR08715-002	13	52.00%	poor
Unnamed Creek: Site # 004 (Cedar Creek)	OKR08715-004	31	114.81%	excellent
Deep Fork River	OKR08715-007	8	32.00%	very poor
Fall Branch: Site # 010	OKR08715-010	15	60.00%	poor
Unnamed Creek: Site # 011	OKR08715-011	17	62.96%	fair
Salt Creek: Site # 013	OKR08715-013	11	44.00%	poor
San Bois Creek: Site # 014	OKR08715-014	19	70.37%	fair
Unnamed Creek: Site # 016	OKR08715-016	15	55.56%	poor
Rock Creek	OKR08715-017	17	68.00%	fair
Cane Creek: Site # 019	OKR08715-019	19	76.00%	fair
Unnamed Creek: Site # 020	OKR08715-020	17	62.96%	fair

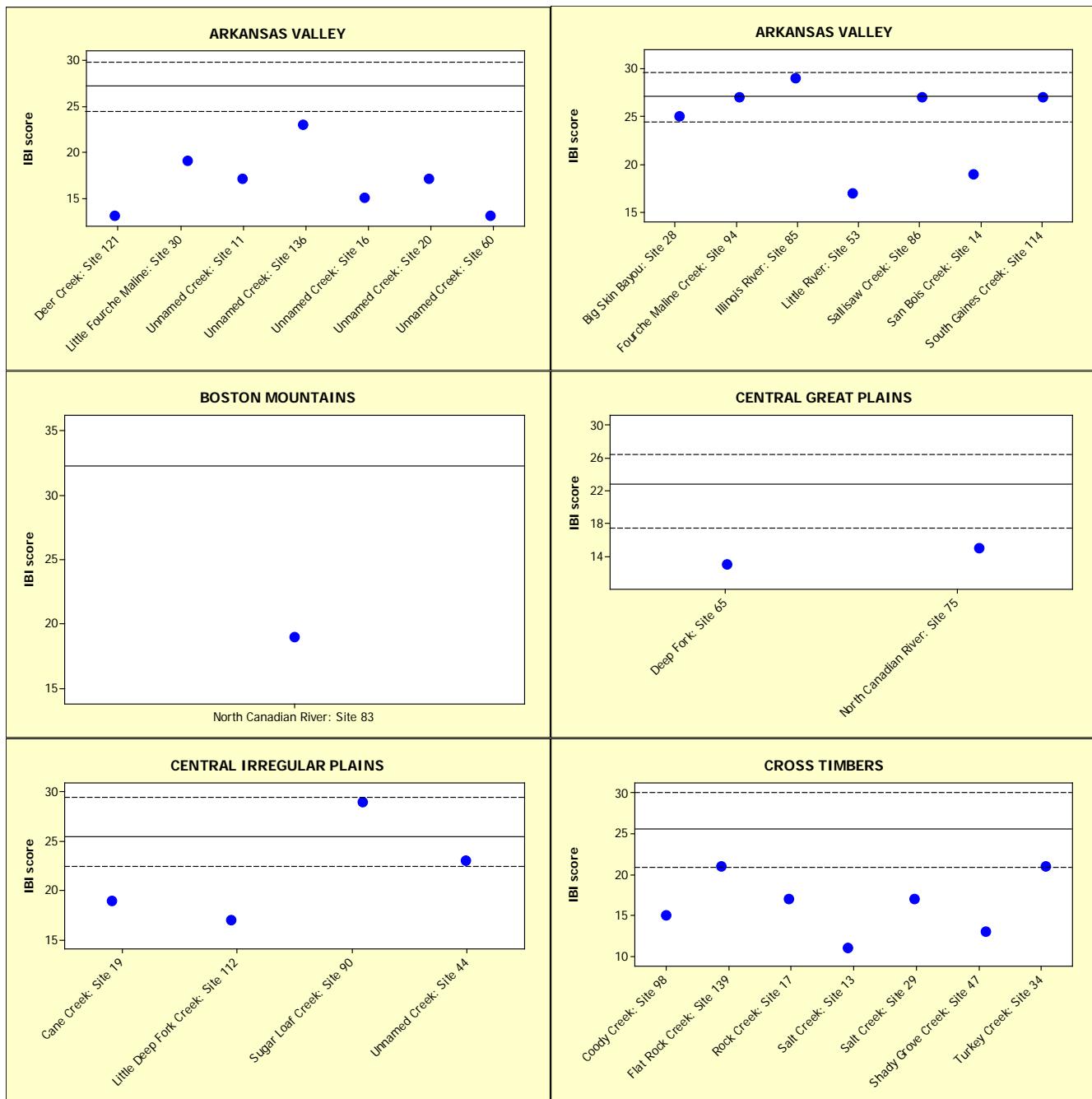
SiteName	WBID	IBI Total Score (OCC)	Percent of Reference	Score Interpretation (OCC)
Baron Fork Creek: Site # 026	OKR08715-026	33	132.00%	excellent
Big Skin Bayou: Site # 028	OKR08715-028	25	92.59%	excellent
Salt Creek: Site # 029	OKR08715-029	17	68.00%	fair
Little Fourche Maline: Site # 030	OKR08715-030	19	70.37%	fair
Turkey Creek	OKR08715-034	21	84.00%	good
Unnamed Creek: Site # 044	OKR08715-044	23	69.70%	fair
Shady Grove Creek: Site # 047	OKR08715-047	13	52.00%	poor
Cache Creek: Site # 048	OKR08715-048	21	77.78%	good
Little River: Site # 053	OKR08715-053	17	68.00%	fair
Tahlequah Creek: Site # 054	OKR08715-054	33	132.00%	excellent
Unnamed Creek: Site # 060	OKR08715-060	13	48.15%	poor
North Canadian River	OKR08715-061	9	36.00%	very poor
Poteau River	OKR08715-063	15	55.56%	poor
Deep Fork	OKR08715-065	13	52.00%	poor
Black Fork River	OKR08715-066	25	92.59%	excellent
North Canadian River: Site # 075	OKR08715-075	15	68.18%	fair
Cat Creek: Site # 079	OKR08715-079	19	76.00%	fair
North Canadian River: Site # 083	OKR08715-083	19	86.36%	good
Illinois River	OKR08715-085	29	116.00%	excellent
Sallisaw Creek: Site # 086	OKR08715-086	27	81.82%	good
Sugar Loaf Creek: Site # 90	OKR08715-090	29	107.41%	excellent
Fourche Maline Creek: Site # 094	OKR08715-094	27	100.00%	excellent
Coody Creek: Site # 098	OKR08715-098	15	60.00%	poor
Unnamed Creek: Site # 100 (Wolf Creek)	OKR08715-100	25	92.59%	excellent
Lee Creek	OKR08715-108	31	93.94%	excellent
Little River: Site # 109	OKR08715-109	15	60.00%	poor
Little Deep Fork Creek	OKR08715-112	17	68.00%	fair
South Gaines Creek: Site # 114	OKR08715-114	27	100.00%	excellent
Deer Creek	OKR08715-121	13	52.00%	poor
Duck Creek	OKR08715-125	17	68.00%	fair
Taloka Creek: Site # 127	OKR08715-127	13	48.15%	poor
Unnamed Creek: Site # 136	OKR08715-136	23	85.19%	good
Flat Rock Creek: Site # 139	OKR08715-139	21	84.00%	good
Unnamed Creek: Site # 146	OKR08715-146	27	100.00%	excellent

Figure 5 shows the IBI score for each fixed site (indicated by a blue dot) relative to the mean value for the high quality sites in that ecoregion (indicated by a solid line), while Figure 6 shows the probabilistic site scores. The dashed lines in each graph represent +/- two standard deviations of the mean IBI score of the high quality sites in that ecoregion. The Boston

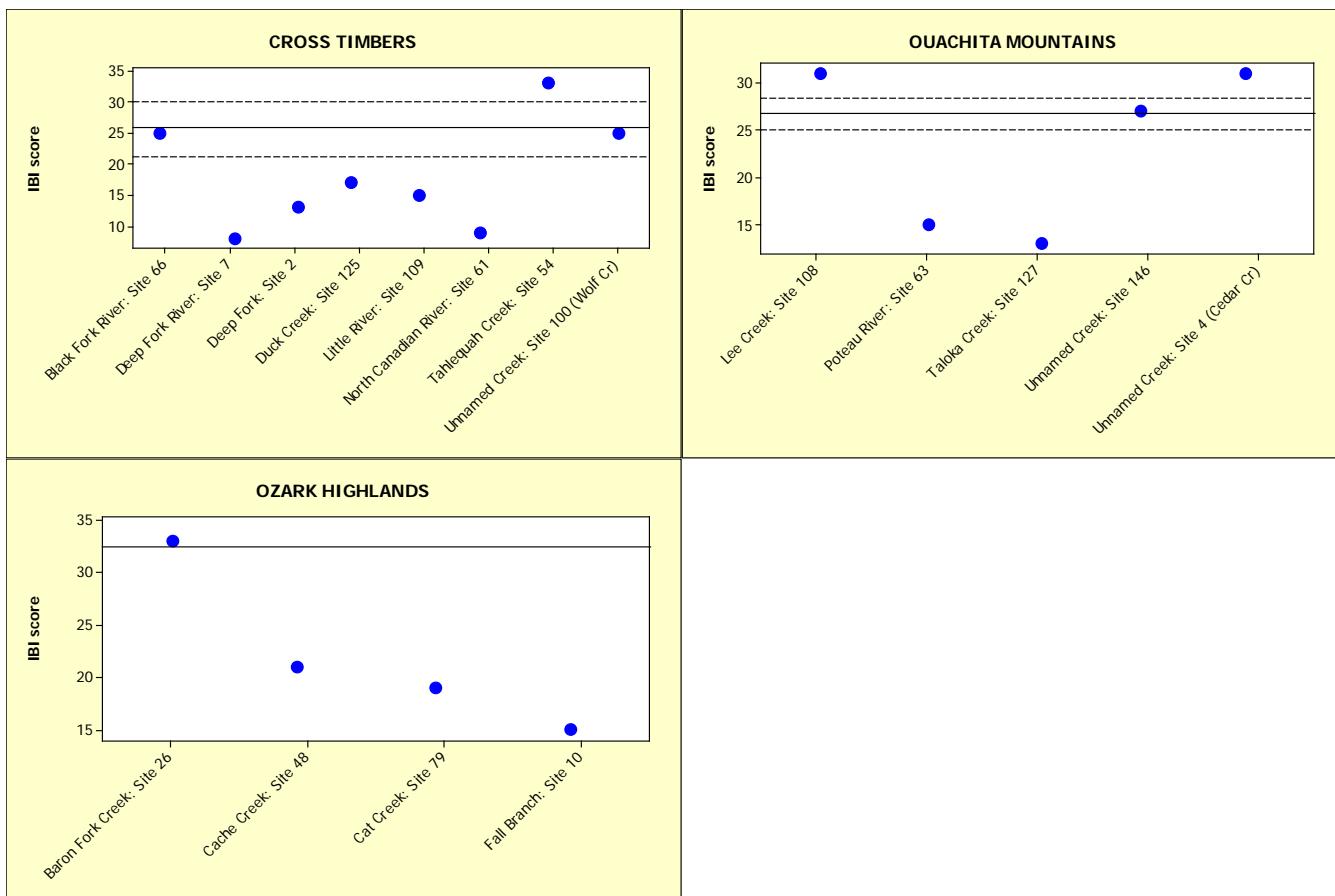
Mountains and Ozark Highlands ecoregions only had one high quality site, so no range is given for these ecoregions.



**Figure 5. IBI score (fish) for each fixed site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.**



**Figure 6. IBI score (fish) for each probabilistic site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.**



**Figure 6, cont. IBI score (fish) for each probabilistic site by ecoregion. Solid lines indicate the mean value of high quality sites in each ecoregion; dashed lines represent +/- two standard deviations.**

Most sites had significantly lower IBI scores than the high quality sites, as indicated by an IBI score below the bottom dashed line in Figures 5 and 6. Usually, the only sites that fall out of the high quality range score “fair,” “poor,” or “very poor” using the OCC IBI method (Table 19); however, only a few of the “good” sites were within two standard deviations of the high quality sites in this rotation. Conditions were drier during this monitoring cycle, in general, so it is likely that this contributed to these low fish scores relative to the high quality site scores, which were collected in previous years. There tended to be more variability among the probabilistic sites than among the fixed sites, especially in the Cross Timbers ecoregion. This could be an artifact of the selection process for the fixed sites; only sites with consistent flow have been maintained as part of the regular rotation, while probabilistic sites were included if there was water present at the time of the initial site visit.

Table 21 shows a comparison between fish data collected in cycle 1 (2003 or 2004) and cycle 2 (2008 or 2009) of the rotating basin project in order to examine whether biological conditions have improved, worsened, or remained the same at a particular site. IBI scores were calculated relative to the same high quality sites data for both cycles, so any change in condition is due only to a change in the rotating basin cycle 2 collection, not to a change in the high quality sites. The fish community remained in the same condition for 10 of the 31 sites compared. Eleven streams had worse fish community conditions in cycle 2 relative to cycle 1, while 9 streams had

improved fish communities. Two streams had different monitoring locations, so they are not included in this comparison.

**Table 21. Comparison of fish data from Cycle 1 (2003-2004) to Cycle 2 (2008-2009).**

SiteName	WBID	Year	Total Score	% of Ref IBI	Condition
Alabama Creek	OK520500-01-0200D	2003	26	0.65	fair
Alabama Creek	OK520500-01-0200D	2008	21	0.84	good
Bad Creek	OK520500-01-0170L	2003	32	0.80	good
Bad Creek	OK520500-01-0170L	2008	23	0.92	excellent
Ballard Creek	OK121700-03-0370G	2003	44	0.96	excellent
Ballard Creek	OK121700-03-0370G	2008	35	1.40	excellent
Battle Creek	OK121700-06-0040G	2003	40	0.91	good
Battle Creek	OK121700-06-0040G	2008	31	1.24	excellent
Bird Creek: Downstream	OK520800-01-0050G	2003	28	0.70	fair
Bird Creek: Downstream	OK520800-01-0050G	2008	17	0.68	fair
Brazil Creek	OK220100-03-0010G	2004	40	1.00	excellent
Brazil Creek	OK220100-03-0010G	2009	23	0.85	good
Brushy Creek	OK220600-03-0010J	2004	42	1.05	excellent
Brushy Creek	OK220600-03-0010J	2009	21	0.78	good
Canadian Sandy Creek	OK520600-03-0010D	2003	24	0.60	poor
Canadian Sandy Creek	OK520600-03-0010D	2008	15	0.60	poor
Coody Creek	OK120400-01-0400F	2003	34	0.85	good
Coody Creek	OK120400-01-0400F	2008	15	0.60	poor
Deep Fork N. Canadian River	OK520710-01-0010G	2003	18	0.45	poor
Deep Fork N. Canadian River	OK520710-01-0010G	2008	13	0.52	poor
Dry Creek	OK520700-04-0020F	2003	24	0.60	poor
Dry Creek	OK520700-04-0020F	2008	19	0.76	fair
Elk Creek	OK120400-02-0190D	2003	32	0.80	good
Elk Creek	OK120400-02-0190D	2008	17	0.68	fair
George's Fork of Dirty Creek	OK120400-02-0110D	2003	30	0.75	fair
George's Fork of Dirty Creek	OK120400-02-0110D	2009	17	0.68	fair
Little Wewoka Creek	OK520500-02-0090D	2003	26	0.65	fair
Little Wewoka Creek	OK520500-02-0090D	2008	21	0.84	good
Mill Creek	OK220600-01-0100P	2003	36	0.90	good
Mill Creek	OK220600-01-0100P	2008	17	0.63	fair
Peaceable Creek	OK220600-03-0050F	2004	38	0.95	excellent
Peaceable Creek	OK220600-03-0050F	2009	19	0.70	fair
Polecat Creek	OK120420-02-0050D	2004	36	0.90	good
Polecat Creek	OK120420-02-0050D	2008	21	0.84	good
Quapaw Creek	OK520700-04-0260C	2003	26	0.65	fair
Quapaw Creek	OK520700-04-0260C	2008	15	0.60	poor
Sallisaw Creek: Lower	OK220200-03-0010C	2003	42	0.91	good
Sallisaw Creek: Lower	OK220200-03-0010C	2009	27	0.82	good
Sallisaw Creek: Upper	OK220200-03-0010G	2003	40	0.87	good
Sallisaw Creek: Upper	OK220200-03-0010G	2009	31	0.94	excellent

SiteName	WBID	Year	Total Score	% of Ref IBI	Condition
Salt Creek (Creek Co.)	OK520700-03-0100B	2003	26	0.65	fair
Salt Creek (Creek Co.)	OK520700-03-0100B	2008	17	0.68	fair
Salt Creek (Seminole Co.)	OK520800-03-0010D	2003	16	0.40	very poor
Salt Creek (Seminole Co.)	OK520800-03-0010D	2008	15	0.60	poor
San Bois Creek	OK220200-04-0010G	2004	24	0.60	poor
San Bois Creek	OK220200-04-0010G	2009	23	0.85	good
Shady Grove Creek	OK120400-02-0240H	2003	26	0.65	fair
Shady Grove Creek	OK120400-02-0240H	2008	13	0.52	poor
Snake Creek	OK120410-01-0220G	2003	38	0.95	excellent
Snake Creek	OK120410-01-0220G	2008	21	0.84	good
South Fork of Dirty Creek	OK120400-02-0030F	2003	40	1.00	excellent
South Fork of Dirty Creek	OK120400-02-0030F	2009	21	0.84	good
Wewoka Creek	OK520500-02-0010M	2003	28	0.70	fair
Wewoka Creek	OK520500-02-0010M	2008	15	0.60	poor
Wewoka Creek: Downstream	OK520500-02-0010C	2003	26	0.65	fair
Wewoka Creek: Downstream	OK520500-02-0010C	2008	17	0.68	fair
Camp Creek	OK520700-03-0220G	2003	22	0.55	poor
Camp Creek	OK520700-03-0220D	2008	13	0.52	poor

### 3.2.3 Macroinvertebrate Collections

The complete macroinvertebrate dataset, including species and numbers captured per site, can be found in Appendix C. Macroinvertebrates were collected for most sites at least once during the project period. Four sites had no macroinvertebrate collections due to inadequate flow conditions during the sample index periods: Butler Creek, Camp Creek, Shady Grove Creek, and Wewoka Creek. Lack of flow during the collection periods prevented collection of all planned samples over the cycle at many other sites as well; only 13 sites had four collections over the two-year project period.

Table 22 presents the mean values, by season and sample type, for each metric at each site for the two-year cycle 2 monitoring period. Riffle samples were collected at most sites and, generally, best reflect the macroinvertebrate community as a single habitat (Plafkin et al. 1989).

**Table 22. Macroinvertebrate metric values determined for each fixed monitoring site, averaged per season and habitat. NI=non-impaired, SI=slightly impaired, MI=moderately impaired.**

SiteName	WBID	Sample Type	Winter or Summer	Number of samples	Total Species	EPT Taxa	Percent EPT	HBI	Percent Dominant 2 Taxa	Shannon Diversity	Total Points	% of Reference	Condition
Brazil Creek	OK220100-03-0010G	riffle	S	1	15	6	46.67%	5.02	42.96%	2.23	20	77%	SI
		riffle	W	1	13	8	57.76%	4.97	51.72%	2.02	24	92%	NI
Brushy Creek	OK220600-03-0010J	riffle	S	1	20	13	80.00%	4.35	59.20%	2.02	22	85%	NI

Sitename	WBID	Sample Type	Winter or Summer	Number of samples	Total Species	EPT Taxa	Percent EPT	HBI	Percent Dominant 2 Taxa	Shannon Diversity	Total Points	% of Reference	Condition
Fourche Maline Creek	OK220100-04-0020H	riffle	S	1	18	9	30.16%	4.78	57.14%	2.11	20	77%	SI
		riffle	W	1	17	8	27.42%	5.46	45.97%	2.14	24	92%	NI
Mill Creek	OK220600-01-0100P	riffle	S	2	14.5	4.5	67.76%	4.56	53.96%	1.98	20	77%	SI
		riffle	W	1	10	4	25.21%	5.74	78.15%	1.36	12	46%	MI
Peaceable Creek	OK220600-03-0050F	riffle	S	1	21	10	32.76%	4.51	43.68%	2.39	20	77%	SI
San Bois Creek	OK220200-04-0010G	riffle	S	1	11	2	2.83%	5.13	84.91%	0.98	8	31%	MI
		riffle	W	1	17	5	29.14%	5.07	41.72%	2.13	18	69%	SI
Sallisaw Creek: Lower	OK220200-03-0010C	riffle	S	2	20.5	10	26.22%	5.59	55.32%	2.17	22	73%	SI
		riffle	W	1	16	7	60.59%	4.84	63.53%	1.77	16	62%	SI
		veg	S	1	7	2	52.17%	5.22	13.04%	1.60	20	83%	NI
		veg	W	1	8	4	16.07%	5.99	35.71%	1.57	12	40%	MI
Sallisaw Creek: Upper	OK220200-03-0010G	riffle	S	2	20.5	10.5	53.82%	4.73	34.23%	2.50	28	88%	NI
		riffle	W	1	21	8	22.03%	5.32	66.95%	1.81	18	53%	SI
		veg	S	1	13	3	12.00%	6.80	3.00%	1.54	18	75%	SI
		veg	W	1	11	5	5.61%	5.88	82.24%	0.86	8	27%	MI
Cloud Creek	OK120410-01-0100T	riffle	W	1	15	6	54.26%	5.56	38.30%	2.27	28	119%	NI
Coody Creek	OK120400-01-0400F	riffle	S	2	16.5	7.5	46.23%	5.01	55.79%	1.94	26	100%	NI
		riffle	W	1	11	3	10.34%	6.16	54.31%	1.81	12	51%	SI
Elk Creek	OK120400-02-0190D	riffle	S	2	13.5	3.5	14.44%	6.56	43.33%	2.27	14	54%	SI
George's Fork of Dirty Creek	OK120400-02-0110D	riffle	S	2	13.5	2.5	25.46%	6.08	44.57%	2.05	16	62%	SI
		riffle	W	1	8	2	7.14%	6.39	58.93%	1.74	8	34%	MI
South Fork of Dirty Creek	OK120400-02-0030F	riffle	S	1	16	3	28.75%	5.73	41.25%	2.21	18	69%	SI
Alabama Creek	OK520500-01-0200D	riffle	S	1	18	5	33.92%	5.73	46.20%	2.14	20	74%	SI
		riffle	W	1	14	3	16.67%	6.04	43.86%	2.15	14	56%	SI
Bad Creek	OK520500-01-0170L	riffle	S	1	14	5	39.20%	5.42	53.60%	1.84	18	67%	SI
		riffle	W	1	15	6	47.93%	4.94	30.58%	2.34	28	112%	NI
Bird Creek	OK520800-01-0050G	riffle	S	1	14	2	3.00%	6.82	71.00%	1.70	10	37%	MI
		woody	W	1	6	1	4.55%	6.55	50.00%	1.43	8	36%	MI
Canadian Sandy Creek	OK520600-03-0010D	riffle	S	2	27.5	10	39.06%	5.37	30.23%	2.68	30	111%	NI
		riffle	W	1	19	4	9.84%	6.01	42.62%	2.36	14	56%	SI
		woody	S	1	13	3	12.90%	5.29	16.13%	2.31	22	86%	NI
		woody	W	1	14	1	4.00%	6.61	5.00%	1.98	20	91%	NI
Deep Fork of N. Canadian R.	OK520710-01-0010G	riffle	S	2	11	3.5	37.52%	6.23	67.58%	1.63	14	52%	SI
		riffle	W	1	12	1	14.29%	5.70	65.08%	1.62	14	56%	SI
Dry Creek	OK520700-04-0020F	woody	S	2	8	2.5	18.08%	6.83	34.80%	1.34	10	39%	MI
		woody	W	1	11	4	35.05%	5.65	5.15%	1.89	28	127%	NI
Little Wewoka Creek	OK520500-02-0090D	riffle	S	1	19	9	15.09%	6.23	57.86%	1.93	20	74%	SI
		riffle	W	1	16	6	27.82%	5.49	46.62%	2.16	24	96%	NI
		woody	W	1	12	6	20.88%	5.78	3.30%	1.84	30	136%	NI
Polecat Creek	OK120420-02-0050D	riffle	S	2	14.5	8.5	53.92%	5.51	63.82%	1.78	24	89%	NI
		riffle	W	1	13	3	52.21%	5.56	57.35%	1.86	18	72%	SI
Quapaw Creek	OK520700-04-0260C	woody	S	2	12.5	3.5	14.17%	6.53	28.50%	1.73	20	78%	SI

Sitename	WBID	Sample Type	Winter or Summer	Number of samples	Total Species	EPT Taxa	Percent EPT	HBI	Percent Dominant 2 Taxa	Shannon Diversity	Total Points	% of Reference	Condition
		woody	W	1	10	3	7.48%	6.56	42.06%	1.72	12	55%	SI
Salt Creek (Creek Co.)	OK520700-03-0100B	woody	S	2	10.5	3.5	9.80%	6.61	35.68%	1.58	14	55%	SI
		woody	W	1	11	3	3.88%	6.39	31.07%	1.73	14	64%	SI
		riffle	S	1	14	8	44.88%	5.03	51.18%	2.10	24	89%	NI
Salt Creek (Seminole Co.)	OK520800-03-0010D	woody	S	1	13	7	21.21%	6.64	67.68%	1.67	24	94%	NI
		woody	W	1	9	2	1.64%	6.64	12.30%	1.39	16	73%	SI
		riffle	S	2	17	7.5	63.33%	4.83	61.65%	1.95	26	96%	NI
Snake Creek	OK120410-01-0220G	riffle	W	1	16	8	77.12%	4.44	69.49%	1.63	26	104%	NI
		riffle	S	2	15	7	51.26%	5.82	45.19%	2.17	22	81%	NI
		riffle	W	1	8	3	31.13%	6.06	61.32%	1.69	16	64%	SI
Wewoka Creek: Downstream	OK520500-02-0010C	woody	S	1	8	4	72.66%	4.83	8.59%	1.61	22	86%	NI
		riffle	S	2	52	25	46.29%	5.02	20.91%	3.31	32	117%	NI
		riffle	W	1	21	13	30.00%	5.49	58.82%	1.99	24	78%	SI
Ballard Creek	OK121700-03-0370G	woody	S	2	12	5	9.14%	5.79	26.34%	1.75	16	53%	SI
		riffle	S	2	34	18	67.51%	4.54	46.80%	2.64	28	103%	NI
		riffle	W	1	40	23	65.02%	4.48	38.61%	2.91	30	98%	NI

Most fixed sites had either non-impaired or slightly impaired macroinvertebrate communities overall (when averaging the scores across sample types); only one stream (Bird Creek) was moderately impaired overall. The overall results were similar for the probabilistic sites, as shown in Table 23. Thirty-four percent of the sites indicated non-impaired macroinvertebrate communities, 47% of the sites had slightly impaired communities, and 19% had moderately impaired communities.

Poor macroinvertebrate scores could indicate water quality problems where habitat scores are acceptable; however, it is possible that the macroinvertebrate collection was not taken at a time which would best represent the community there (i.e., drought influences). The larger percentage of moderately impaired macroinvertebrate communities at the probabilistic sites could be the result of a single assessment versus up to four collections at the fixed monitoring sites. The summer index period, when all the probabilistic samples were obtained, tends to be more stressful for benthic macroinvertebrates than the winter, so this may have skewed the probabilistic results downward, in general.

**Table 23. Macroinvertebrate metric values determined for each probabilistic monitoring site. NI=non-impaired, SI=slightly impaired, MI=moderately impaired, SVI=severely impaired.**

Sitename	WBID	Sample Type	Total Species	EPT Taxa	Percent EPT	HBI	Percent Dominant 2 Taxa	Shannon Diversity	Total Points	% of Reference	Condition
Unnamed Creek: Site # 004 (Cedar Creek)	OKR08715-004	riffle	15	4	20.61%	5.71	50.38%	1.98	16	62%	SI
Fall Branch: Site # 010	OKR08715-010	riffle	22	9	68.37%	4.01	25.51%	2.76	32	117%	NI
Salt Creek: Site # 013	OKR08715-013	riffle	12	5	72.50%	4.77	53.33%	1.89	18	67%	SI
Cane Creek: Site # 019	OKR08715-019	riffle	16	6	49.55%	4.94	59.46%	1.98	24	92%	NI
Unnamed Creek: Site # 020	OKR08715-020	riffle	15	7	56.41%	4.21	53.85%	1.97	20	77%	SI
Baron Fork Creek: Site # 026	OKR08715-026	riffle	20	9	75.66%	4.41	44.44%	2.34	26	95%	NI
Salt Creek: Site # 029	OKR08715-029	woody	9	5	55.00%	5.45	40.00%	2.03	18	70%	SI
Turkey Creek	OKR08715-034	riffle	13	4	49.75%	5.56	71.86%	1.60	18	67%	SI
Unnamed Creek: Site # 044	OKR08715-044	riffle	18	9	41.75%	4.68	49.51%	2.21	24	80%	NI
North Canadian River	OKR08715-045	woody	10	3	13.00%	6.69	74.00%	1.50	12	47%	MI
Shady Grove Creek: Site # 047	OKR08715-047	veg	16	8	8.57%	7.48	69.52%	1.55	16	64%	SI
Cache Creek: Site # 048	OKR08715-048	veg	16	2	6.85%	7.92	45.21%	2.16	10	38%	SVI
		woody	12	3	4.41%	7.71	83.09%	1.24	8	31%	MI
Little River: Site # 053	OKR08715-053	veg	22	9	47.01%	5.44	24.79%	2.78	30	115%	NI
		woody	18	9	54.55%	5.60	40.91%	2.40	26	102%	NI
Tahlequah Creek: Site # 054	OKR08715-054	riffle	12	5	58.20%	5.20	72.95%	1.62	16	59%	SI
Unnamed Creek: Site # 060	OKR08715-060	veg	9	2	20.27%	7.70	74.32%	1.43	8	31%	MI
Black Fork River	OKR08715-066	riffle	11	5	52.94%	4.29	29.41%	2.31	20	77%	SI
Cat Creek: Site # 079	OKR08715-079	riffle	12	5	67.89%	4.84	58.72%	1.86	18	67%	SI
North Canadian River: Site # 083	OKR08715-083	veg	12	3	2.67%	7.59	80.67%	1.18	8	29%	MI
		woody	7	2	2.13%	7.48	79.43%	1.14	6	21%	MI
Illinois River	OKR08715-085	riffle	25	15	74.02%	4.20	47.64%	2.38	26	95%	NI
Sallisaw Creek: Site # 086	OKR08715-086	riffle	16	9	61.54%	4.04	43.27%	2.31	24	80%	NI
Sugar Loaf Creek: Site # 90	OKR08715-090	riffle	17	8	70.63%	5.64	46.83%	1.98	18	69%	SI
Fourche Maline Creek: Site # 094	OKR08715-094	riffle	8	3	80.99%	4.00	80.17%	1.08	14	54%	SI
North Canadian River: Site # 097	OKR08715-097	woody	8	6	48.42%	6.31	71.58%	1.51	22	86%	NI
Coody Creek: Site # 098	OKR08715-098	riffle	9	3	11.30%	6.49	84.35%	1.19	8	31%	MI
Unnamed Creek: Site # 100 (Wolf Creek)	OKR08715-100	riffle	10	5	87.40%	4.52	54.33%	1.75	16	62%	SI
		veg	8	3	2.29%	7.85	92.37%	0.58	4	15%	SVI
Lee Creek	OKR08715-108	riffle	15	10	79.71%	3.93	40.58%	2.36	24	80%	NI
Little River: Site # 109	OKR08715-109	veg	6	3	76.67%	4.57	83.33%	1.04	12	46%	MI
		woody	23	10	38.24%	5.87	31.37%	2.70	30	117%	NI
Little Deep Fork Creek	OKR08715-112	riffle	24	15	53.17%	4.98	29.37%	2.73	32	119%	NI
South Gaines Creek: Site # 114	OKR08715-114	riffle	16	5	56.04%	4.69	47.25%	2.22	18	69%	SI
Taloka Creek: Site # 127	OKR08715-127	veg	18	4	3.81%	4.72	71.43%	1.53	14	54%	SI
		woody	11	5	20.00%	5.83	49.57%	2.00	22	85%	NI
Unnamed Creek: Site # 136	OKR08715-136	riffle	14	4	60.75%	5.20	52.34%	2.00	18	69%	SI
Unnamed Creek: Site # 146	OKR08715-146	riffle	30	17	47.83%	4.98	34.78%	2.75	30	115%	NI

### 3.2.4 Overall Biological Assessment

In order to synthesize the biological findings into a meaningful representation of the overall quality of each site, the biological assessments were compared with the habitat and water chemistry results. For the fixed sites, a water quality score was computed similarly to the other index scores by comparing rotating basin site values relative to high quality site values. The parameters included in this score were phosphorus, nitrogen, DO, turbidity, and salts (TDS, chloride, and sulfate). Then, the habitat, fish, water quality, and macroinvertebrate scores (relative to the mean of high quality sites in the respective ecoregions) were examined in concert with one another (Figure 6). The water quality index score was not calculated for the probabilistic sites since only a single sample was obtained; Figure 7 shows the habitat, fish, and macroinvertebrate scores for each site relative to the average score of high quality sites in that ecoregion.

A determination of “good” or “excellent” stream health is indicated by a relatively high score for all categories. Most streams had relatively good agreement among the categories, but there are instances where one score is quite different than the others. It is generally recognized that fish communities are especially sensitive to habitat degradation and that macroinvertebrates more quickly integrate effects of water quality decline. Thus, sites with a high habitat and fish score yet a low macroinvertebrate and water chemistry score could indicate potential water quality impairment. Low habitat scores correlated with low fish scores yet high bug scores suggests that habitat impairments are the predominant cause of the poor fish community, as exemplified in Figure 7 by Salt Creek in Seminole Co.

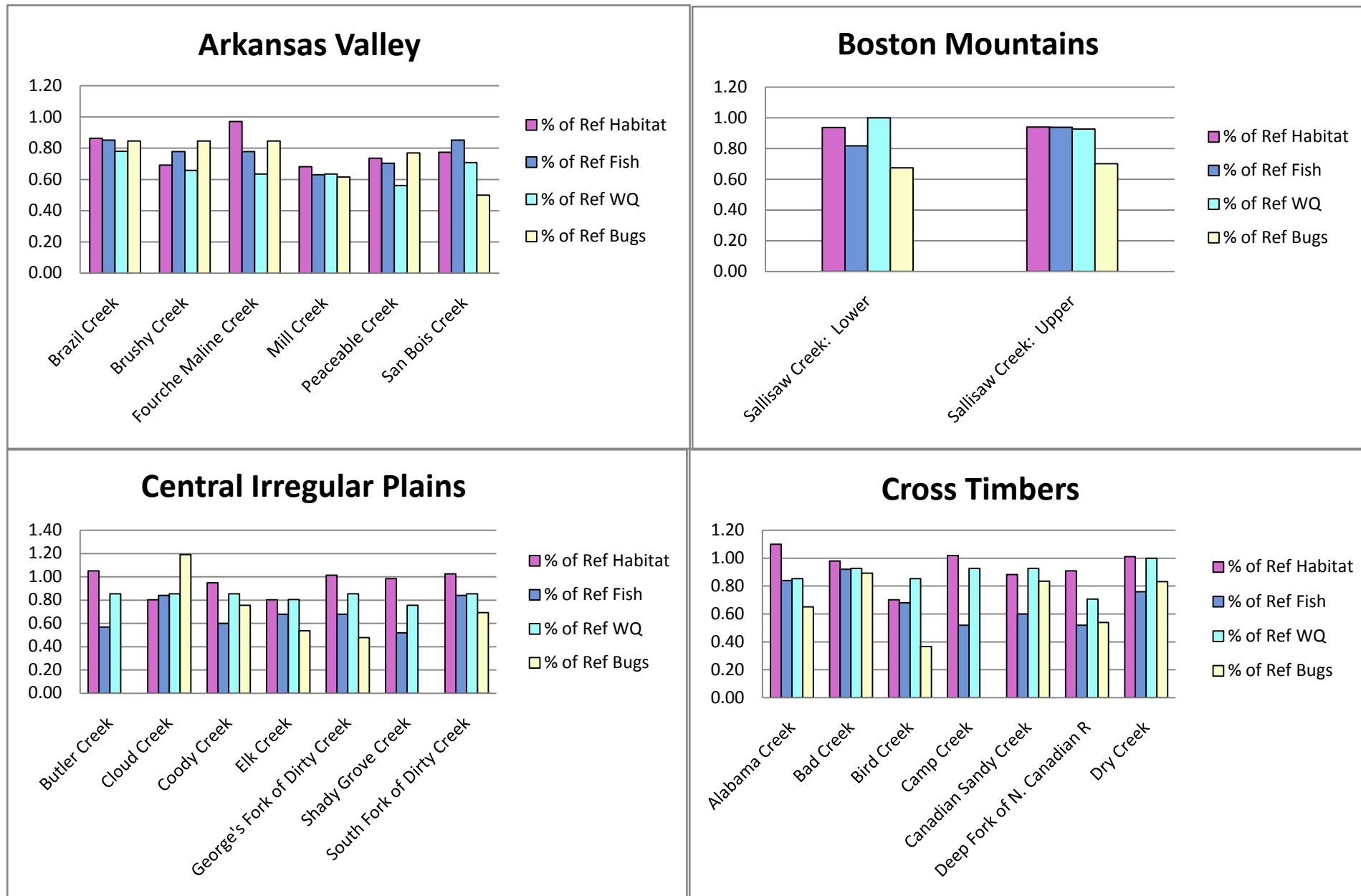


Figure 7. Comparison of habitat, fish, and bug scores for fixed sites relative to the average high quality site in each ecoregion.

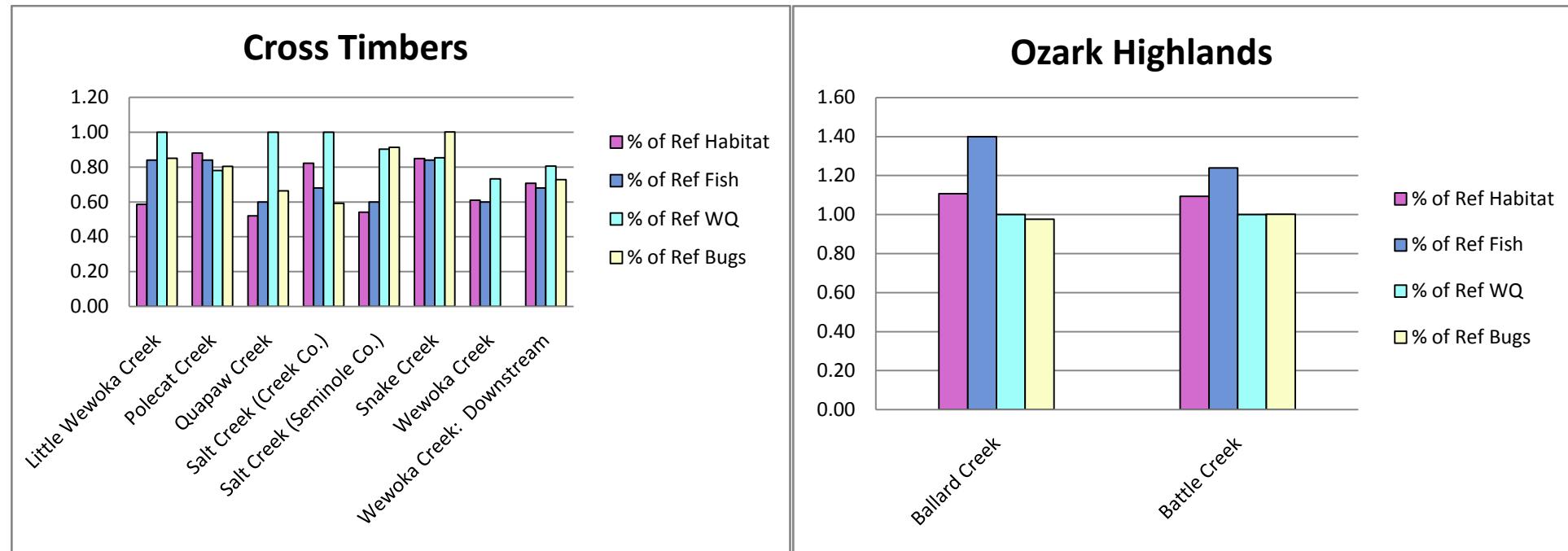


Figure 7, cont. Comparison of habitat, fish, and bug scores for fixed sites relative to the average high quality site in each ecoregion.

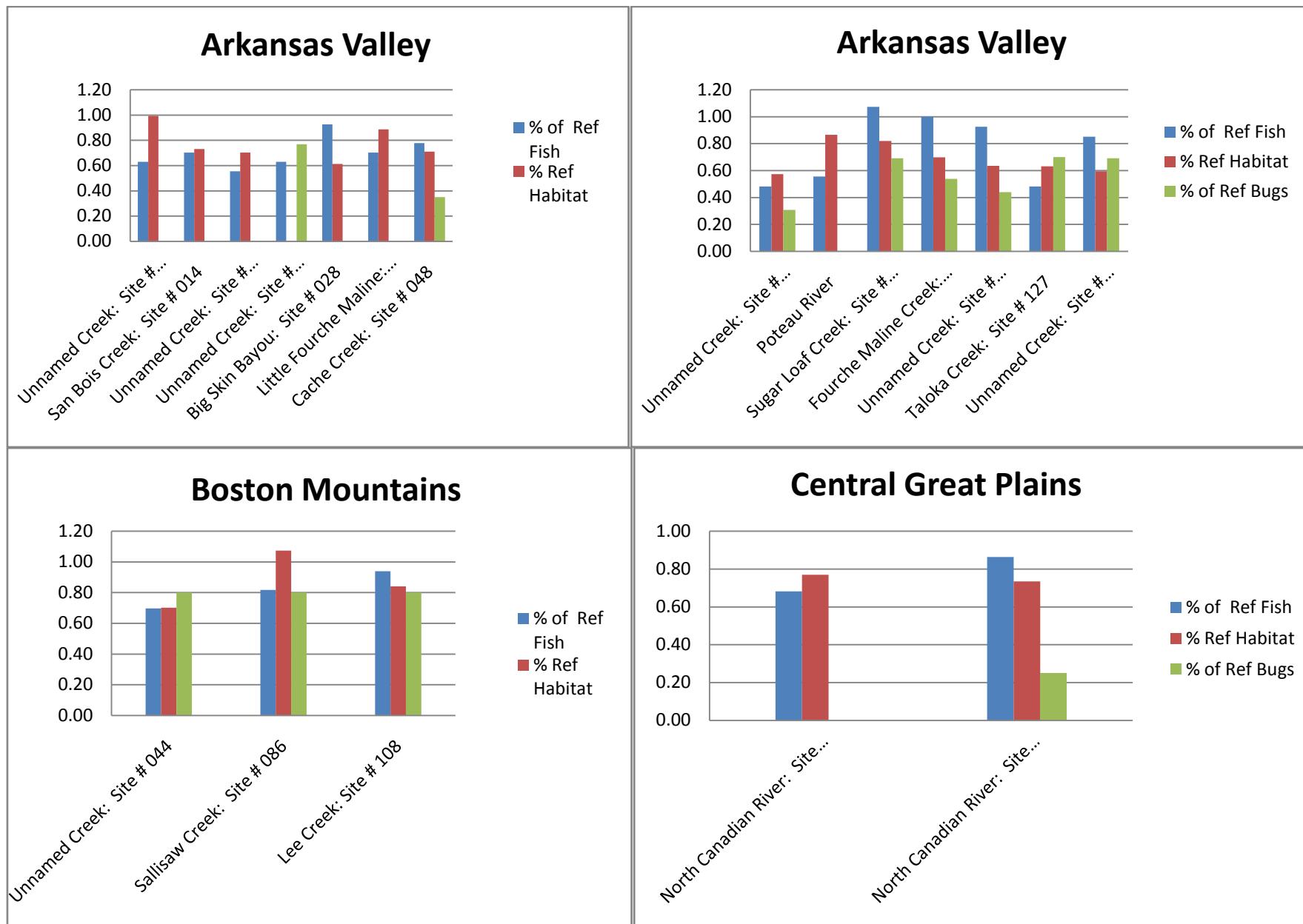


Figure 8. Comparison of habitat, fish, and bug scores for probabilistic sites relative to the average high quality site in each ecoregion.

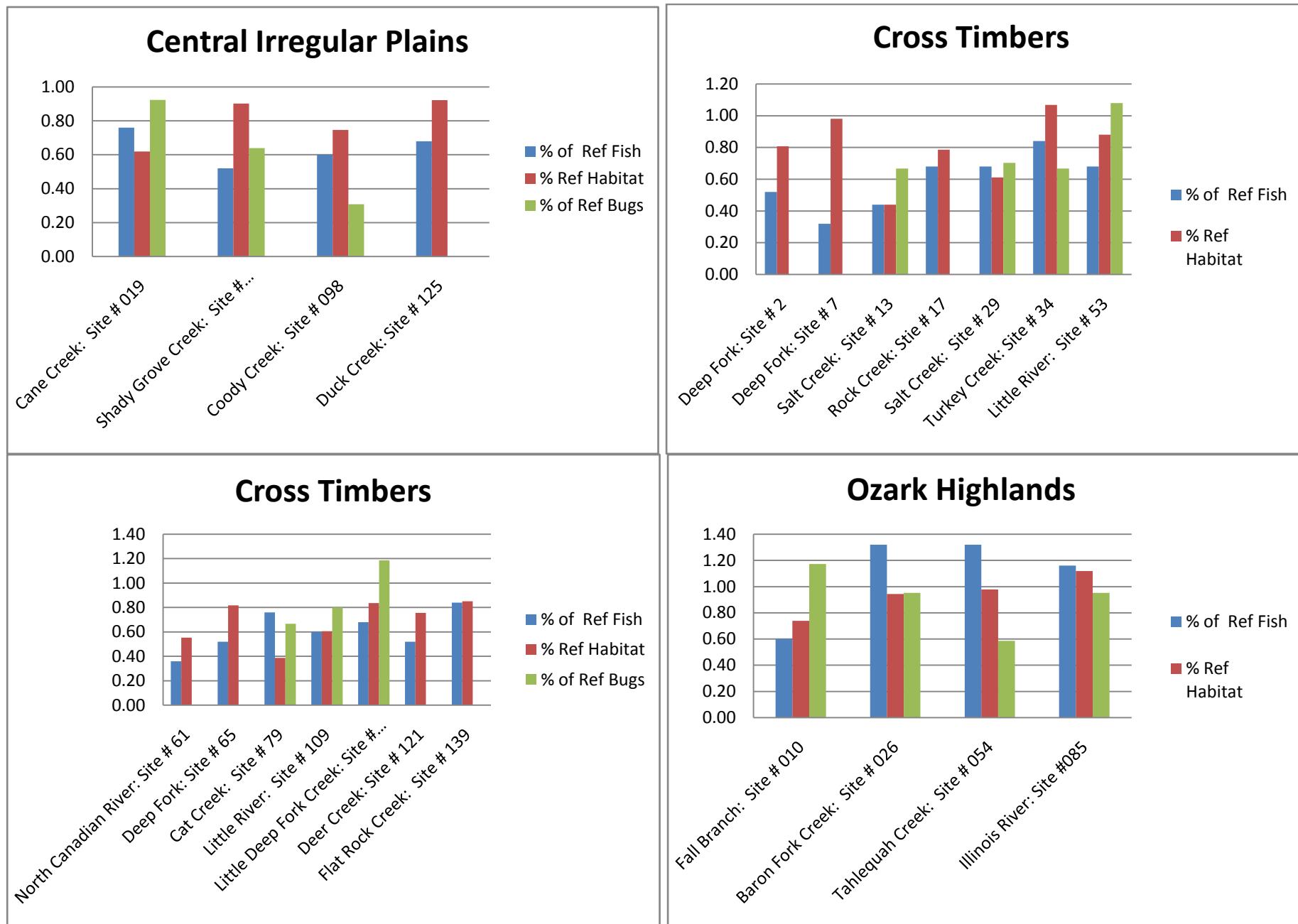


Figure 8, cont. Comparison of habitat, fish, and bug scores for probabilistic sites relative to the average high quality site in each ecoregion.

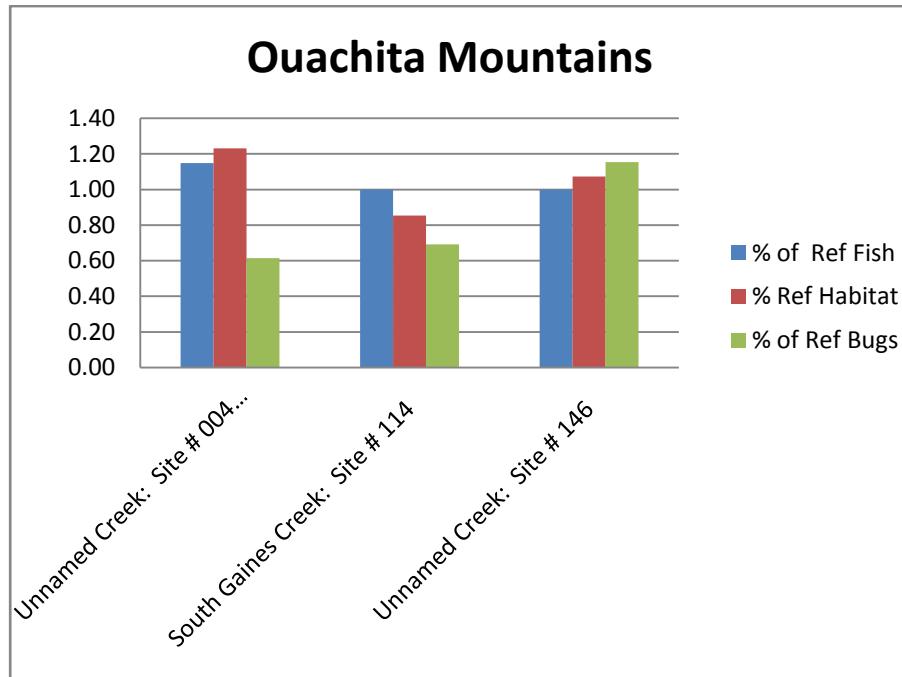


Figure 8, cont. Comparison of habitat, fish, and bug scores for probabilistic sites relative to the average high quality site in each ecoregion.

### 3.3 WATERSHED ASSESSMENT

Table 24 shows the landuse upstream of each monitoring site as obtained through GIS using the 2001 NRCS National Land Cover Dataset. As compared to the data reported in the 2006 report on these streams (Rotating Basin Group 3 Cycle 1), which was based on 1992 satellite imagery, there was very little change in landuse; however, the categories were slightly different than in the previous report. In general, the Arkansas Valley watersheds are primarily deciduous forest (41%), with another 26% of the acres in the watersheds being pastureland. The Boston Mountains sites' watersheds are also mainly forest (63% of watershed acres) and pasture (21% of watershed acres). The Central Irregular Plains and Ozark Highlands watersheds have more pasture than forest overall: 53% of the CIP watershed acres are pasture, with 15% forest and 20% grasslands; 60% of the OH watershed acres are pasture, with 29% forest. Finally, the Cross Timbers sites' watersheds are 36% forest, 34% grassland, and 16% pasture.

Table 25 presents the types and number of permitted activities that occur in the watershed upstream of each site. The Ballard and Battle Creek watersheds had no permitted activities in them, indicating relatively little potential human impact apart from the large amount of pastureland in each watershed. Six other sites had only oil/gas permits in the watershed. Twenty-two of the 33 sites currently have national pollution discharge elimination system (NPDES) permits. NPDES are classified as either major or minor based upon their size and/or their potential to impact the receiving stream, with majors having larger effects than minors. Dirty, Polecat, Peaceable, and Wewoka Creeks and the Deep Fork of the North Canadian River had at least one major NPDES, while the other sites only had minor NPDES. The report on the cycle 1 data examined the effects of point source versus non-point source pollution on nutrient levels at the monitoring sites and found that nutrients tended to be significantly higher at sites with a NPDES in the watershed. The significant effect of a major NPDES on water quality is also evident in Figure 2, since all of those sites had mean values which exceeded the high quality range with the exception of Dirty Creek. Bird Creek was the only site without a major NPDES that had significantly high nutrient values. Further examination of the landuse in this watershed will be conducted to attempt to explain what is causing this. Potential sources of pollution for impaired streams are included on the 2008 303(d) list (ODEQ 2008).

**Table 24. Watershed landuse (% of total watershed area) for each Group 3 fixed monitoring site based on the most recent NLCD (USGS 2001).**

Water Body	WBID	% Barren Land (Rock/Sand/Clay)	% Cultivated Crops	% Deciduous Forest	% Developed, High Intensity	% Developed, Low Intensity	% Developed, Medium Intensity	% Developed, Open Space	% Emergent Herbaceous Wetlands	% Evergreen Forest	% Grassland/ Herbaceous	% Mixed Forest	% Open Water	% Pasture/ Hay	% Shrub/ Scrub	% Woody Wetlands	Total Acres in Watershed
Alabama Creek	OK520500-01-0200D	0.0	1.1	49.9	0.0	0.4	0.1	6.2	0.0	0.0	25.6	1.1	0.0	15.6	0.0	0.0	16,280
Bad Creek	OK520500-01-0170L	0.0	0.5	46.2	0.0	0.5	0.1	6.2	0.0	0.0	24.4	0.3	0.0	21.7	0.0	0.0	14,949
Ballard Creek	OK121700-03-0370G	0.0	0.1	26.2	0.1	0.8	0.4	7.3	0.0	0.8	1.0	0.3	0.0	62.8	0.0	0.2	13,996
Battle Creek	OK121700-06-0040G	0.0	0.0	36.2	0.0	0.0	0.0	3.9	0.0	0.4	6.8	0.1	0.0	51.7	0.9	0.0	5,552
Bird Creek	OK520800-01-0050G	0.0	2.6	40.6	0.2	1.9	0.3	5.4	0.0	0.1	29.0	0.3	0.0	19.6	0.0	0.0	22,173
Brazil Creek	OK220100-03-0010G	0.3	0.3	39.3	0.0	0.0	0.0	2.4	0.0	12.2	8.0	8.0	0.3	27.0	1.1	1.1	117,287
Brushy Creek	OK220600-03-0010J	0.0	0.1	44.2	0.0	0.2	0.1	2.4	0.0	5.7	10.6	2.9	0.4	30.4	2.2	0.8	93,791
Butler Creek	OK120400-02-0160D	0.0	0.2	16.5	0.0	0.5	0.0	6.0	0.0	0.1	20.2	0.4	0.0	56.0	0.0	0.0	25,244
Camp Creek	OK520700-03-0220	0.0	1.8	44.1	0.1	0.1	0.4	5.8	0.0	0.2	36.4	3.6	0.0	7.5	0.0	0.0	18,272
Canadian Sandy Creek	OK520600-03-0010D	0.0	5.0	27.9	0.2	1.5	0.3	4.7	0.0	0.0	43.1	0.6	0.0	16.7	0.0	0.0	132,250
Cloud Creek	OK120410-02-0010H	0.0	4.4	11.7	0.0	0.0	0.0	5.0	0.0	0.0	24.9	0.9	0.0	53.0	0.0	0.0	97,629
Coody Creek	OK120400-01-0400F	0.0	0.8	11.0	2.2	10.1	3.2	17.7	0.1	0.1	18.3	0.3	0.0	36.2	0.0	0.0	26,491
Deep Fork N. Canadian R.	OK520710-01-0010G	0.0	5.1	28.4	6.8	11.8	0.5	5.0	0.0	0.3	30.6	0.4	2.3	8.2	0.7	0.0	121,173
Dry Creek	OK520700-04-0020F	0.0	4.0	28.3	0.0	0.3	0.2	5.3	0.0	0.6	51.3	0.7	0.0	9.3	0.0	0.0	113,905
Elk Creek	OK120400-02-0190D	0.0	4.1	11.2	0.1	1.3	0.4	6.0	0.0	0.1	17.1	0.6	0.0	59.1	0.0	0.0	57,253
Fourche Maline Creek	OK220100-04-0010M	0.1	0.1	43.7	0.1	0.4	0.1	2.7	0.0	14.9	5.2	10.6	0.5	18.9	1.0	1.7	170,496
George's Fk Dirty Creek	OK120400-02-0110D	0.0	0.4	26.5	0.1	1.1	0.3	6.8	0.0	0.0	10.8	0.6	0.0	53.5	0.0	0.0	33,345
Little Wewoka Creek	OK520500-02-0090D	0.0	2.8	35.4	0.0	0.1	0.0	4.6	0.0	0.0	28.9	1.3	0.0	26.9	0.0	0.0	39,793
Mill Creek	OK220600-01-0100P	0.0	0.6	52.6	0.0	0.2	0.0	3.7	0.0	0.4	24.5	0.2	0.0	17.7	0.0	0.0	41,669
Peaceable Creek	OK220600-03-0050F	0.1	0.3	40.3	0.2	0.8	0.4	5.3	0.0	0.1	25.8	0.0	1.1	25.4	0.1	0.1	86,535
Polecat Creek	OK120420-02-0010D	0.0	0.4	51.5	0.4	2.2	0.9	10.4	0.0	0.0	22.5	0.7	0.0	11.0	0.0	0.0	223,182
Quapaw Creek	OK520700-04-0260C	0.0	3.5	32.5	0.0	0.4	0.0	5.1	0.0	0.0	48.0	1.1	0.0	9.2	0.0	0.0	95,381
Sallisaw Creek: Lower	OK220200-03-0010C	0.1	0.2	60.7	0.0	0.3	0.0	3.1	0.0	0.5	8.5	0.5	0.6	23.6	1.5	0.3	116,199
Sallisaw Creek: Upper	OK220200-03-0010G	0.1	0.1	67.3	0.0	0.2	0.0	3.1	0.0	0.6	8.0	0.4	0.5	18.1	1.3	0.2	82,270
Salt Creek (Seminole Co.)	OK520800-03-0010D	0.0	1.0	42.5	0.0	0.2	0.0	4.9	0.0	0.0	43.2	0.0	1.3	6.9	0.0	0.0	135,257
Salt Creek (Creek Co.)	OK520700-03-0100B	0.0	1.5	38.8	0.1	0.5	0.3	4.9	0.0	0.1	40.8	0.0	1.5	11.4	0.0	0.0	59,364
San Bois Creek	OK220200-04-0010G	0.2	0.3	35.5	0.0	0.2	0.0	2.3	0.0	9.3	9.0	6.4	0.5	33.5	1.5	1.4	187,380
Shady Grove Creek	OK120400-02-0240H	0.0	0.5	24.3	0.0	0.3	0.2	5.0	0.2	0.1	23.0	0.0	1.5	44.9	0.0	0.0	9,726
Snake Creek	OK120410-01-0220G	0.0	2.4	33.4	0.0	0.5	0.1	5.0	0.0	0.0	21.8	0.3	0.0	36.5	0.0	0.0	104,703
South Fk Dirty Creek	OK120400-02-0030F	0.0	0.7	22.6	0.0	0.4	0.1	5.2	0.0	0.1	17.9	0.8	0.0	52.2	0.0	0.0	31,589

Water Body	WBID	% Barren Land (Rock/Sand/Clay)	% Cultivated Crops	% Deciduous Forest	% Developed, High Intensity	% Developed, Low Intensity	% Developed, Medium Intensity	% Developed, Open Space	% Emergent Herbaceous Wetlands	% Evergreen Forest	% Grassland/ Herbaceous	% Mixed Forest	% Open Water	% Pasture/Hay	% Shrub/Scrub	% Woody Wetlands	Total Acres in Watershed
Wewoka Creek: Lower	OK520500-02-0010C	0.0	2.1	31.7	0.1	1.0	0.2	6.4	0.0	0.1	29.7	1.7	0.0	26.9	0.0	0.0	268,657
Wewoka Creek: Upper	OK520500-02-0010M	0.1	1.0	39.7	0.1	1.9	0.5	7.4	0.0	0.0	33.4	2.2	0.0	13.7	0.0	0.0	95,468

**Table 25. Permitted landuse for each Group 3 fixed monitoring site. For the NPDES category, the total number of NPDES in the watershed is given, followed by the number of major NPDES in parentheses, if applicable.**

### 3.4 DESIGNATED USE SUPPORT ASSESSMENT

The designated uses assessed for the monitoring sites are presented in Table 26 below, along with the current attainment status of each use based on the 2008 Integrated Report (ODEQ 2008). The causes and potential source(s) (if known) of any impairments can be found in the Integrated Report. All streams in this basin are on the 303(d) list for at least one impairment.

**Table 26. Beneficial use support assessment. F=fully supporting, N=not supporting, I=insufficient information, X=use not assessed, \*=antidegradation designation.**

SITENAME	WBID	AESTHETICS	AGRICULTURE	COOL WATER AQ. COMM.	HABITAT LIMITED AQ. COMM.	WARM WATER AQ. COMM.	FISH CONSUMPTION	PRIMARY CONTACT (RECR)	SECONDARY CONTACT (RECR)	EMERGENCY WATER SUPPLY	PUBLIC/PRIVATE WATER SUP.	HIGH QUALITY WATER	OUTSTANDING RESOURCE WATER
Coody Creek	OK120400-01-0400F	F	F			N	X	N			I		
South Fork of Dirty Creek	OK120400-02-0030F	I	F			N	X	N					
George's Fork of Dirty Creek	OK120400-02-0110D	F	F			N	X	N		F	I		
Butler Creek	OK120400-02-0160D	F	F			N	X	N					
Elk Creek	OK120400-02-0190D	F	N			N	X	N					
Shady Grove Creek	OK120400-02-0240H	F	N			N	X	F					
Cloud Creek	OK120410-01-0100T	I	F			N	X	F			I		
Snake Creek	OK120410-01-0220G	F	F			N	X	N			I		
Polecat Creek	OK120420-02-0050D	I	F			I	X	N					
Ballard Creek	OK121700-03-0370G	F	F	F			X	N			X		*
Battle Creek	OK121700-06-0040G	F	F			F	X	N					
Brazil Creek	OK220100-03-0010G	I	F			F	X	N			I		
Fourche Maline Creek	OK220100-04-0020H	I	F			N	F	N			I		
Sallisaw Creek: Lower	OK220200-03-0010C	I	N	F			X	F			I	*	
Sallisaw Creek: Upper	OK220200-03-0010G	I	F	F			X	N			I	*	
San Bois Creek	OK220200-04-0010G	I	N			N	X	N			I		
Mill Creek	OK220600-01-0100P	I	F			N	X	N			I		
Brushy Creek	OK220600-03-0010J	N	N			N	N	N			N		
Peaceable Creek	OK220600-03-0050F	F	F			N	I	N			I		
Bad Creek	OK520500-01-0170L	F	F			F	X	N			I		
Alabama Creek	OK520500-01-0200D	F	F			N	X	F			I		
Wewoka Creek: Downstream	OK520500-02-0010C	I	N		N		X	N		F	I		
Wewoka Creek	OK520500-02-0010M	I	N		N		X	N		F	I		
Little Wewoka Creek	OK520500-02-0090D	F	F			N	X	F			I		
Canadian Sandy Creek	OK520600-03-0010D	F	F			N	X	N			I		
Salt Creek (Creek Co.)	OK520700-03-0100B	F	F			N	X	N			I		
Camp Creek	OK520700-03-0220G	I	F			N	X	I			I		
Dry Creek	OK520700-04-0020F	F	F			N	X	N			I		
Quapaw Creek	OK520700-04-0260C	F	F			I	X	N			I		
Deep Fork of N. Canadian R.	OK520710-01-0010G	F	F			I	X	F			I		
Bird Creek	OK520800-01-0050G	I	F		F		X		F				
Salt Creek (Seminole Co.)	OK520800-03-0010D	N	N			N	X	I			I		

## SUMMARY

In general, the Rotating Basin Group 3 monitoring sites have remained stable as compared to the first cycle. The number of sites which had improved biological communities, declining biological communities, and unchanged biological communities was approximately equal. Nitrogen and phosphorus concentrations were decreased at many sites, while mineral concentrations were increased. These results could be the result of different hydrologic conditions between the first cycle of monitoring and the second cycle.

More in depth analysis is planned for the probabilistic data in order to explore more extensive uses for this data. Based on the initial, rather cursory analyses described in this report, the probabilistic sampling supported the results obtained from the fixed monitoring sites, and, overall, the results suggest that the Small Watershed Rotating Basin program is accurately capturing the water quality conditions in the larger basins as a whole.

When looking at the probabilistic sites as one population of data to assess the entire basin, the results corroborated the fixed site results which indicate that low dissolved oxygen is a problem: 35% of the probabilistic values were below state criteria, while 48% of the fixed sites were below the state criteria. The probabilistic bacteria results also showed similar results to the findings based on the fixed sites. The *Enterococcus* geomean of the probabilistic sites was above the state standard, but the *E. coli* geomean was supporting the state standard. For the fixed sites, only three streams were attaining the *Enterococcus* standard, while most of the sites (24 of the 33) were attaining the *E. coli* standard. Since the fixed site data is obtained across a range of environmental conditions, and the probabilistic data is only obtained at base flow, it is logical that the fixed sites would be likely to have higher geomeans.

When examining the probabilistic sites within level 3 ecoregions, average nutrient concentrations from the probabilistic sites were higher than high quality sites in the Arkansas Valley ecoregion. This correlates to the high nutrient values observed at most of the fixed sites in that ecoregion.

The results of the fish assessments also showed very high concordance between the fixed and probabilistic sites. The probabilistic sites had a larger range, with more IBI scores that were “excellent” and more sites that were “very poor.” Overall, approximately 45% of all sites scored either excellent or good, and about 30% were poor. Specifically, 12% of fixed sites scored “excellent,” 33% were “good,” 24% were “fair,” and 30% were “poor.” For the probabilistic site, 29% were “excellent,” 13% were “good,” 27% were “fair,” 27% were “poor,” and 4% were “very poor.”

Most fixed sites had either non-impaired (45% of sites) or slightly impaired (48% of sites) macroinvertebrate communities overall (when averaging the scores across sample types); only one stream (Bird Creek) was moderately impaired overall. The probabilistic sites had about the same percentage of slightly impaired communities (47% of sites), but there were fewer non-impaired macroinvertebrate communities (34% of sites) and more moderately impaired communities (19% of sites). The larger percentage of moderately impaired macroinvertebrate communities at the probabilistic sites could be the result of a single assessment versus up to four collections at the fixed monitoring sites. In addition, the summer index period, when all the probabilistic samples were obtained, tends to be more stressful for benthic macroinvertebrates than the winter, so this may have skewed the probabilistic results downward, in general.



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## APPENDICES



























#### **Appendix A.1 Raw chemical and physical water quality data.**

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Alabama Creek	OK520500-01-0200D	40395	02-Jun-08	430	440
Alabama Creek	OK520500-01-0200D	40816	07-Jul-08	60	50
Alabama Creek	OK520500-01-0200D	41148	11-Aug-08 >	10000	10000
Alabama Creek	OK520500-01-0200D	41475	15-Sep-08	1540	1820
Alabama Creek	OK520500-01-0200D	43719	01-Jun-09 <	30	50
Alabama Creek	OK520500-01-0200D	43978	06-Jul-09 <	10 <	10
Alabama Creek	OK520500-01-0200D	44352	10-Aug-09 <	10	10
Alabama Creek	OK520500-01-0200D	44583	14-Sep-09	840	1800
Alabama Creek	OK520500-01-0200D	45261	04-May-10 <	10	110
Bad Creek	OK520500-01-0170L	40394	02-Jun-08	700	570
Bad Creek	OK520500-01-0170L	40815	07-Jul-08	90	50
Bad Creek	OK520500-01-0170L	41147	11-Aug-08 >	10000	10000
Bad Creek	OK520500-01-0170L	41474	15-Sep-08	1260	660
Bad Creek	OK520500-01-0170L	43718	01-Jun-09 <	20	10
Bad Creek	OK520500-01-0170L	43977	06-Jul-09 <	50	150
Bad Creek	OK520500-01-0170L	44351	10-Aug-09 <	10 <	10
Bad Creek	OK520500-01-0170L	44582	14-Sep-09 <	540	620
Bad Creek	OK520500-01-0170L	45260	04-May-10 <	10	10
Ballard Creek: Lower	OK121700-03-0370G	40449	10-Jun-08 >	2000	2000
Ballard Creek: Lower	OK121700-03-0370G	40612	24-Jun-08	780	660
Ballard Creek: Lower	OK121700-03-0370G	40871	15-Jul-08	80	260
Ballard Creek: Lower	OK121700-03-0370G	41185	18-Aug-08	30	200
Ballard Creek: Lower	OK121700-03-0370G	41508	23-Sep-08	30	165
Ballard Creek: Lower	OK121700-03-0370G	43509	05-May-09	160	290
Ballard Creek: Lower	OK121700-03-0370G	43765	09-Jun-09 <	10	30
Ballard Creek: Lower	OK121700-03-0370G	44032	14-Jul-09 <	110	80
Ballard Creek: Lower	OK121700-03-0370G	44389	18-Aug-09	110	190
Ballard Creek: Lower	OK121700-03-0370G	44645	22-Sep-09 >	1000	1000
Ballard Creek: Lower	OK121700-03-0370G	45285	11-May-10 <	35	10
Battle Creek: Battle Branch	OK121700-06-0040G	40448	10-Jun-08	740	1920
Battle Creek: Battle Branch	OK121700-06-0040G	40613	24-Jun-08	30	10
Battle Creek: Battle Branch	OK121700-06-0040G	40870	15-Jul-08	60	125
Battle Creek: Battle Branch	OK121700-06-0040G	41184	18-Aug-08 <	10	90
Battle Creek: Battle Branch	OK121700-06-0040G	41507	23-Sep-08	15	180
Battle Creek: Battle Branch	OK121700-06-0040G	43508	05-May-09	100	240
Battle Creek: Battle Branch	OK121700-06-0040G	43764	09-Jun-09 <	90	10
Battle Creek: Battle Branch	OK121700-06-0040G	44031	14-Jul-09 <	10	130
Battle Creek: Battle Branch	OK121700-06-0040G	44388	18-Aug-09	70	370
Battle Creek: Battle Branch	OK121700-06-0040G	44644	22-Sep-09 >	1000	1000
Battle Creek: Battle Branch	OK121700-06-0040G	45284	11-May-10 <	15	55
Bird Creek: Downstream	OK520800-01-0050G	40398	02-Jun-08	90 <	10
Bird Creek: Downstream	OK520800-01-0050G	40819	07-Jul-08	10	50
Bird Creek: Downstream	OK520800-01-0050G	41151	11-Aug-08 >	10000	10000
Bird Creek: Downstream	OK520800-01-0050G	41478	15-Sep-08	1760	1120
Bird Creek: Upstream	OK520800-01-0050M	43722	01-Jun-09 <	10	10
Bird Creek: Upstream	OK520800-01-0050M	43981	06-Jul-09 <	10	10
Bird Creek: Upstream	OK520800-01-0050M	44355	10-Aug-09 <	10	10
Bird Creek: Upstream	OK520800-01-0050M	44586	14-Sep-09	100	420
Bird Creek: Upstream	OK520800-01-0050M	45283	10-May-10 <	155	320

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Brazil Creek	OK220100-03-0010G	40442	10-Jun-08	300	160
Brazil Creek	OK220100-03-0010G	40586	24-Jun-08	40	180
Brazil Creek	OK220100-03-0010G	40864	14-Jul-08	70	30
Brazil Creek	OK220100-03-0010G	41182	18-Aug-08	200	180
Brazil Creek	OK220100-03-0010G	41486	15-Sep-08	700	1080
Brazil Creek	OK220100-03-0010G	43502	04-May-09	200	1600
Brazil Creek	OK220100-03-0010G	43771	08-Jun-09	< 20	10
Brazil Creek	OK220100-03-0010G	44025	13-Jul-09	< 20	< 5
Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	20	< 20
Brazil Creek	OK220100-03-0010G	44636	21-Sep-09	< 10	20
Brazil Creek	OK220100-03-0010G	45291	17-May-10	< 60	240
Brushy Creek	OK220600-03-0010J	40440	10-Jun-08	> 2000	1740
Brushy Creek	OK220600-03-0010J	40584	24-Jun-08	< 20	20
Brushy Creek	OK220600-03-0010J	40862	14-Jul-08	60	20
Brushy Creek	OK220600-03-0010J	41180	18-Aug-08	240	100
Brushy Creek	OK220600-03-0010J	41484	15-Sep-08	780	680
Brushy Creek	OK220600-03-0010J	43500	04-May-09	400	100
Brushy Creek	OK220600-03-0010J	43769	08-Jun-09	< 80	70
Brushy Creek	OK220600-03-0010J	44023	13-Jul-09	> 500	10
Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	< 20	20
Brushy Creek	OK220600-03-0010J	44634	21-Sep-09	60	70
Brushy Creek	OK220600-03-0010J	45289	17-May-10	< 200	360
Butler Creek	OK120400-02-0160D	40409	02-Jun-08	5300	2600
Butler Creek	OK120400-02-0160D	40574	23-Jun-08	120	60
Butler Creek	OK120400-02-0160D	40829	07-Jul-08	70	20
Butler Creek	OK120400-02-0160D	41141	11-Aug-08	> 9900	10000
Butler Creek	OK120400-02-0160D	41515	22-Sep-08	200	50
Butler Creek	OK120400-02-0160D	43732	01-Jun-09	< 1200	< 10
Butler Creek	OK120400-02-0160D	43968	06-Jul-09	< 210	130
Butler Creek	OK120400-02-0160D	44574	14-Sep-09	480	660
Butler Creek	OK120400-02-0160D	45272	04-May-10	< 10	< 10
Camp Creek	OK520700-03-0220G	40400	03-Jun-08	140	390
Camp Creek	OK520700-03-0220D	40821	08-Jul-08	240	130
Camp Creek	OK520700-03-0220D	41153	12-Aug-08	80	1440
Camp Creek	OK520700-03-0220D	41480	16-Sep-08	200	100
Camp Creek	OK520700-03-0220D	43725	02-Jun-09	< 120	150
Camp Creek	OK520700-03-0220D	43984	07-Jul-09	< 10	60
Camp Creek	OK520700-03-0220D	44358	11-Aug-09	< 10	700
Camp Creek	OK520700-03-0220D	44589	15-Sep-09	< 20	> 2000
Camp Creek	OK520700-03-0220D	45267	05-May-10	< 30	430
Canadian Sandy Creek	OK520600-03-0010D	40447	09-Jun-08	9500	9400
Canadian Sandy Creek	OK520600-03-0010D	40869	14-Jul-08	65	45
Canadian Sandy Creek	OK520600-03-0010D	41191	19-Aug-08	> 1460	2000
Canadian Sandy Creek	OK520600-03-0010D	41505	22-Sep-08	25	260
Canadian Sandy Creek	OK520600-03-0010D	43504	04-May-09	1400	2000
Canadian Sandy Creek	OK520600-03-0010D	43760	08-Jun-09	< 270	510
Canadian Sandy Creek	OK520600-03-0010D	44027	12-Jul-09	< 90	45
Canadian Sandy Creek	OK520600-03-0010D	44384	17-Aug-09	< 20	40
Canadian Sandy Creek	OK520600-03-0010D	44640	21-Sep-09	210	260

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Canadian Sandy Creek	OK520600-03-0010D	45282	10-May-10 <	780	790
Cloud Creek	OK120410-01-0100T	40405	02-Jun-08	2700	1200
Cloud Creek	OK120410-01-0100T	40573	23-Jun-08	80	200
Cloud Creek	OK120410-01-0100T	40826	07-Jul-08	220	10
Cloud Creek	OK120410-01-0100T	41138	11-Aug-08 >	2000	2000
Cloud Creek	OK120410-01-0100T	41512	22-Sep-08	10	5
Cloud Creek	OK120410-01-0100T	43729	01-Jun-09 <	10 <	10
Cloud Creek	OK120410-01-0100T	43969	06-Jul-09 <	10 <	10
Cloud Creek	OK120410-01-0100T	44343	10-Aug-09 <	220 <	10
Cloud Creek	OK120410-01-0100T	44571	14-Sep-09	100	80
Cloud Creek	OK120410-01-0100T	45269	04-May-10 <	20	10
Coody Creek	OK120400-01-0400F	40414	03-Jun-08	440	300
Coody Creek	OK120400-01-0400F	40581	23-Jun-08	560	160
Coody Creek	OK120400-01-0400F	40834	08-Jul-08	700	180
Coody Creek	OK120400-01-0400F	41146	12-Aug-08 >	2000	2000
Coody Creek	OK120400-01-0400F	41520	23-Sep-08	60	40
Coody Creek	OK120400-01-0400F	43737	02-Jun-09 <	210	160
Coody Creek	OK120400-01-0400F	43976	07-Jul-09 <	660	200
Coody Creek	OK120400-01-0400F	44350	11-Aug-09 >	1000	> 1000
Coody Creek	OK120400-01-0400F	44581	15-Sep-09	28	860
Coody Creek	OK120400-01-0400F	45279	05-May-10 <	50	50
Deep Fork of North Canadian River	OK520710-01-0010G	40402	03-Jun-08	190	140
Deep Fork of North Canadian River	OK520710-01-0010G	40823	08-Jul-08	10	70
Deep Fork of North Canadian River	OK520710-01-0010G	41155	12-Aug-08	1100	1400
Deep Fork of North Canadian River	OK520710-01-0010G	41482	16-Sep-08	100	200
Deep Fork of North Canadian River	OK520710-01-0010G	43723	02-Jun-09 <	100	20
Deep Fork of North Canadian River	OK520710-01-0010G	43982	07-Jul-09 <	30 <	10
Deep Fork of North Canadian River	OK520710-01-0010G	44356	11-Aug-09 >	10000	> 10000
Deep Fork of North Canadian River	OK520710-01-0010G	44587	15-Sep-09	500	760
Deep Fork of North Canadian River	OK520710-01-0010G	45265	05-May-10 <	80	80
Dirty Creek	OK120400-02-0010F	40412	03-Jun-08	220	80
Dirty Creek	OK120400-02-0010F	40579	23-Jun-08	140	360
Dirty Creek	OK120400-02-0010F	40831	08-Jul-08	30 <	10
Dirty Creek	OK120400-02-0010F	41144	12-Aug-08	3200	> 10000
Dirty Creek	OK120400-02-0010F	41518	23-Sep-08	220	10
Dirty Creek	OK120400-02-0010F	43735	02-Jun-09 <	600	200
Dirty Creek	OK120400-02-0010F	43974	07-Jul-09 <	10	100
Dirty Creek	OK120400-02-0010F	44348	11-Aug-09 <	10	30
Dirty Creek	OK120400-02-0010F	44579	15-Sep-09	200	140
Dirty Creek	OK120400-02-0010F	45277	05-May-10 <	60	200
Dry Creek	OK520700-04-0020F	40444	09-Jun-08	5600	8500
Dry Creek	OK520700-04-0020F	40866	14-Jul-08	3100	3900
Dry Creek	OK520700-04-0020F	41188	19-Aug-08	200	720
Dry Creek	OK520700-04-0020F	41502	22-Sep-08	140	230
Dry Creek	OK520700-04-0020F	43507	04-May-09	1100	500
Dry Creek	OK520700-04-0020F	43763	08-Jun-09 <	40	60
Dry Creek	OK520700-04-0020F	44030	13-Jul-09 <	120 <	5
Dry Creek	OK520700-04-0020F	44387	17-Aug-09	20 <	20
Dry Creek	OK520700-04-0020F	44643	21-Sep-09	190	30

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Dry Creek	OK520700-04-0020F	45280	10-May-10 <	150	105
Elk Creek	OK120400-02-0190D	40408	02-Jun-08	220	180
Elk Creek	OK120400-02-0190D	40575	23-Jun-08	200	20
Elk Creek	OK120400-02-0190D	40828	07-Jul-08	30 <	10
Elk Creek	OK120400-02-0190D	41140	11-Aug-08	320	980
Elk Creek	OK120400-02-0190D	41514	22-Sep-08	20	20
Elk Creek	OK120400-02-0190D	43731	02-Jun-09 <	690 <	10
Elk Creek	OK120400-02-0190D	43967	06-Jul-09 <	130 <	10
Elk Creek	OK120400-02-0190D	44341	10-Aug-09 <	450	20
Elk Creek	OK120400-02-0190D	44573	14-Sep-09	100	160
Elk Creek	OK120400-02-0190D	45271	04-May-10 <	20	10
Fourche Maline Creek: Leflore	OK220100-04-0020H	40441	10-Jun-08	980	400
Fourche Maline Creek: Leflore	OK220100-04-0020H	40585	24-Jun-08	80	40
Fourche Maline Creek: Leflore	OK220100-04-0020H	40863	14-Jul-08	30	10
Fourche Maline Creek: Leflore	OK220100-04-0020H	41181	18-Aug-08	120	200
Fourche Maline Creek: Leflore	OK220100-04-0020H	41485	15-Sep-08	380	560
Fourche Maline Creek: Leflore	OK220100-04-0020H	43501	04-May-09	200	180
Fourche Maline Creek: Leflore	OK220100-04-0020H	43770	08-Jun-09 <	70	10
Fourche Maline Creek: Leflore	OK220100-04-0020H	44024	13-Jul-09 <	30	45
Fourche Maline Creek: Leflore	OK220100-04-0020H	44381	17-Aug-09	20	80
Fourche Maline Creek: Leflore	OK220100-04-0020H	44635	21-Sep-09	30	40
Fourche Maline Creek: Leflore	OK220100-04-0020H	45290	17-May-10 <	40	480
George's Fork of Dirty Creek	OK120400-02-0110D	40413	03-Jun-08	240	100
George's Fork of Dirty Creek	OK120400-02-0110D	40580	23-Jun-08	220	20
George's Fork of Dirty Creek	OK120400-02-0110D	40833	08-Jul-08	60	80
George's Fork of Dirty Creek	OK120400-02-0110D	41145	12-Aug-08 >	2000 >	2000
George's Fork of Dirty Creek	OK120400-02-0110D	41519	23-Sep-08	70	150
George's Fork of Dirty Creek	OK120400-02-0110D	43736	02-Jun-09 <	190	60
George's Fork of Dirty Creek	OK120400-02-0110D	43975	07-Jul-09 <	10	70
George's Fork of Dirty Creek	OK120400-02-0110D	44349	11-Aug-09 <	20	160
George's Fork of Dirty Creek	OK120400-02-0110D	44580	14-Sep-09	80	140
George's Fork of Dirty Creek	OK120400-02-0110D	45278	05-May-10 <	20	10
Little Wewoka Creek	OK520500-02-0090D	40397	02-Jun-08	950	500
Little Wewoka Creek	OK520500-02-0090D	40818	07-Jul-08	10	60
Little Wewoka Creek	OK520500-02-0090D	41150	11-Aug-08 >	10000 >	10000
Little Wewoka Creek	OK520500-02-0090D	41477	15-Sep-08	1620	1860
Little Wewoka Creek	OK520500-02-0090D	43721	01-Jun-09 <	60 <	10
Little Wewoka Creek	OK520500-02-0090D	43980	06-Jul-09 <	120	130
Little Wewoka Creek	OK520500-02-0090D	44354	10-Aug-09 <	10	20
Little Wewoka Creek	OK520500-02-0090D	44585	14-Sep-09	540	480
Little Wewoka Creek	OK520500-02-0090D	45263	04-May-10 <	130	10
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	40410	03-Jun-08	60	60
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	40582	24-Jun-08	100	60
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	40830	08-Jul-08	30	90
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	41142	12-Aug-08	2300	4800
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	41516	23-Sep-08	70	60
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	43733	02-Jun-09 <	500	2600
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	43972	07-Jul-09 <	10	70
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	44346	11-Aug-09 <	1400	9600

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	44577	15-Sep-09	180	380
Mill Creek: Trib. to Eufaula	OK220600-01-0100P	45275	05-May-10 <	170	70
Peaceable Creek	OK220600-03-0050F	40439	09-Jun-08	180	60
Peaceable Creek	OK220600-03-0050F	40583	24-Jun-08	120	20
Peaceable Creek	OK220600-03-0050F	40861	14-Jul-08	80	30
Peaceable Creek	OK220600-03-0050F	41179	18-Aug-08	60	120
Peaceable Creek	OK220600-03-0050F	41483	15-Sep-08	180	220
Peaceable Creek	OK220600-03-0050F	43499	04-May-09	300	600
Peaceable Creek	OK220600-03-0050F	43768	08-Jun-09 <	790	110
Peaceable Creek	OK220600-03-0050F	44022	13-Jul-09 <	80	30
Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	420	80
Peaceable Creek	OK220600-03-0050F	44633	21-Sep-09	40	80
Peaceable Creek	OK220600-03-0050F	45288	17-May-10 <	140	460
Polecat Creek	OK120420-02-0050D	40403	02-Jun-08	4000	800
Polecat Creek	OK120420-02-0050D	40571	23-Jun-08	600	100
Polecat Creek	OK120420-02-0050D	40824	07-Jul-08	10 <	10
Polecat Creek	OK120420-02-0050D	41136	11-Aug-08	100	120
Polecat Creek	OK120420-02-0050D	41510	22-Sep-08	40	15
Polecat Creek	OK120420-02-0050D	43727	01-Jun-09 <	100	10
Polecat Creek	OK120420-02-0050D	43971	06-Jul-09 <	10	10
Polecat Creek	OK120420-02-0050D	44345	10-Aug-09 <	110	10
Polecat Creek	OK120420-02-0050D	44576	14-Sep-09	660	1000
Polecat Creek	OK120420-02-0050D	45274	04-May-10 <	10	10
Quapaw Creek	OK520700-04-0260C	40401	03-Jun-08	120	130
Quapaw Creek	OK520700-04-0260C	40822	08-Jul-08	30	60
Quapaw Creek	OK520700-04-0260C	41154	12-Aug-08	1600	1600
Quapaw Creek	OK520700-04-0260C	41481	16-Sep-08	60	40
Quapaw Creek	OK520700-04-0260C	43724	02-Jun-09 <	70	40
Quapaw Creek	OK520700-04-0260C	43983	07-Jul-09 <	30	120
Quapaw Creek	OK520700-04-0260C	44357	11-Aug-09 <	6300 >	10000
Quapaw Creek	OK520700-04-0260C	44588	15-Sep-09 <	20	120
Quapaw Creek	OK520700-04-0260C	45266	05-May-10 <	40	80
Sallisaw Creek: Lower	OK220200-03-0010C	40451	10-Jun-08	720	520
Sallisaw Creek: Lower	OK220200-03-0010C	40587	24-Jun-08	80 <	20
Sallisaw Creek: Lower	OK220200-03-0010C	40873	15-Jul-08	20	10
Sallisaw Creek: Lower	OK220200-03-0010C	41187	18-Aug-08	80	150
Sallisaw Creek: Lower	OK220200-03-0010C	41506	23-Sep-08	40	45
Sallisaw Creek: Lower	OK220200-03-0010C	43511	05-May-09	220	510
Sallisaw Creek: Lower	OK220200-03-0010C	43767	09-Jun-09 <	10	20
Sallisaw Creek: Lower	OK220200-03-0010C	44034	14-Jul-09 <	5	5
Sallisaw Creek: Lower	OK220200-03-0010C	44391	18-Aug-09 <	10 <	10
Sallisaw Creek: Lower	OK220200-03-0010C	44638	22-Sep-09 >	1000 >	1000
Sallisaw Creek: Lower	OK220200-03-0010C	45287	11-May-10	310	400
Sallisaw Creek: Upper	OK220200-03-0010G	40450	10-Jun-08	380	200
Sallisaw Creek: Upper	OK220200-03-0010G	40588	24-Jun-08	80	20
Sallisaw Creek: Upper	OK220200-03-0010G	40872	15-Jul-08	30	135
Sallisaw Creek: Upper	OK220200-03-0010G	41186	18-Aug-08	30	200
Sallisaw Creek: Upper	OK220200-03-0010G	41509	23-Sep-08	5	55
Sallisaw Creek: Upper	OK220200-03-0010G	43510	05-May-09	150	860

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	E.Coli	Enterococcus
Sallisaw Creek: Upper	OK220200-03-0010G	43766	09-Jun-09 <	20 <	10
Sallisaw Creek: Upper	OK220200-03-0010G	44033	14-Jul-09 <	15	165
Sallisaw Creek: Upper	OK220200-03-0010G	44390	18-Aug-09	20	80
Sallisaw Creek: Upper	OK220200-03-0010G	44639	22-Sep-09 >	1000 >	1000
Sallisaw Creek: Upper	OK220200-03-0010G	45286	11-May-10	4200	8050
Salt Creek	OK520700-03-0100B	40399	03-Jun-08	310	330
Salt Creek	OK520800-03-0010D	40446	09-Jun-08	8500	9000
Salt Creek	OK520700-03-0100B	40820	08-Jul-08	190	130
Salt Creek	OK520800-03-0010D	40868	14-Jul-08	50	20
Salt Creek	OK520700-03-0100B	41152	12-Aug-08	180	400
Salt Creek	OK520800-03-0010D	41190	19-Aug-08	13200 >	20000
Salt Creek	OK520700-03-0100B	41479	16-Sep-08	180	160
Salt Creek	OK520800-03-0010D	41504	22-Sep-08	15	250
Salt Creek	OK520800-03-0010D	43505	04-May-09	800	3300
Salt Creek	OK520700-03-0100B	43726	02-Jun-09 <	100 <	10
Salt Creek	OK520800-03-0010D	43761	08-Jun-09 <	70	210
Salt Creek	OK520700-03-0100B	43985	07-Jul-09 <	10	60
Salt Creek	OK520800-03-0010D	44028	13-Jul-09 <	115	20
Salt Creek	OK520700-03-0100B	44359	11-Aug-09 <	10	210
Salt Creek	OK520800-03-0010D	44385	17-Aug-09 <	20	20
Salt Creek	OK520700-03-0100B	44590	15-Sep-09	60	140
Salt Creek	OK520800-03-0010D	44641	21-Sep-09	20	90
Salt Creek	OK520700-03-0100B	45268	05-May-10 <	60	30
Salt Creek	OK520800-03-0010D	45281	10-May-10 <	120	65
San Bois Creek	OK220200-04-0010G	40443	10-Jun-08	1660	980
San Bois Creek	OK220200-04-0010G	40577	23-Jun-08	120	100
San Bois Creek	OK220200-04-0010G	40865	14-Jul-08	40	10
San Bois Creek	OK220200-04-0010G	41183	18-Aug-08 <	20	100
San Bois Creek	OK220200-04-0010G	43503	04-May-09	200	500
San Bois Creek	OK220200-04-0010G	43772	08-Jun-09 <	40	20
San Bois Creek	OK220200-04-0010G	44026	13-Jul-09 <	15 <	5
San Bois Creek	OK220200-04-0010G	44383	17-Aug-09 <	20 <	20
San Bois Creek	OK220200-04-0010G	44637	21-Sep-09	50	20
San Bois Creek	OK220200-04-0010G	45292	17-May-10 <	240	1100
Shady Grove Creek	OK120400-02-0240H	40407	02-Jun-08	1120	380
Shady Grove Creek	OK120400-02-0240H	40576	23-Jun-08	220	60
Shady Grove Creek	OK120400-02-0240H	40827	07-Jul-08	90 <	10
Shady Grove Creek	OK120400-02-0240H	41139	11-Aug-08	480	1960
Shady Grove Creek	OK120400-02-0240H	41513	22-Sep-08	10	15
Shady Grove Creek	OK120400-02-0240H	43730	01-Jun-09 <	20 <	10
Shady Grove Creek	OK120400-02-0240H	43966	06-Jul-09 <	80	80
Shady Grove Creek	OK120400-02-0240H	44340	10-Aug-09 <	40 <	10
Shady Grove Creek	OK120400-02-0240H	44572	14-Sep-09	220	220
Shady Grove Creek	OK120400-02-0240H	45270	01-May-10 <	10	20
Snake Creek	OK120410-01-0220G	40404	02-Jun-08	4800	1800
Snake Creek	OK120410-01-0220G	40572	23-Jun-08	100	40
Snake Creek	OK120410-01-0220G	40825	07-Jul-08	130 <	10
Snake Creek	OK120410-01-0220G	41137	11-Aug-08	800	1120
Snake Creek	OK120410-01-0220G	41511	22-Sep-08	220	100

**Appendix A.2. Raw bacteria data. Greater than or less than the detection limit is noted if applicable.**

SiteName	WBID	SAMPLEID	Date	<i>E.Coli</i>	<i>Enterococcus</i>
Snake Creek	OK120410-01-0220G	43728	01-Jun-09 <	170	10
Snake Creek	OK120410-01-0220G	43970	06-Jul-09 <	10	10
Snake Creek	OK120410-01-0220G	44344	10-Aug-09 <	10 <	10
Snake Creek	OK120410-01-0220G	44575	14-Sep-09	320	200
Snake Creek	OK120410-01-0220G	45273	04-May-10 <	40	10
South Fork of Dirty Creek	OK120400-02-0030F	40411	03-Jun-08	220	160
South Fork of Dirty Creek	OK120400-02-0030F	40578	23-Jun-08	80	260
South Fork of Dirty Creek	OK120400-02-0030F	40832	08-Jul-08	30	160
South Fork of Dirty Creek	OK120400-02-0030F	41143	12-Aug-08	1800	5100
South Fork of Dirty Creek	OK120400-02-0030F	41517	23-Sep-08	40	60
South Fork of Dirty Creek	OK120400-02-0030F	43734	02-Jun-09 <	30	40
South Fork of Dirty Creek	OK120400-02-0030F	43973	07-Jul-09 <	40	240
South Fork of Dirty Creek	OK120400-02-0030F	44347	11-Aug-09 <	60	400
South Fork of Dirty Creek	OK120400-02-0030F	44578	15-Sep-09	160	120
South Fork of Dirty Creek	OK120400-02-0030F	45276	05-May-10 <	140	40
Wewoka Creek	OK520500-02-0010M	40445	09-Jun-08	9900 >	10000
Wewoka Creek	OK520500-02-0010M	40867	14-Jul-08	150	170
Wewoka Creek	OK520500-02-0010M	41189	19-Aug-08	1700	7600
Wewoka Creek	OK520500-02-0010M	41503	16-Sep-08	160	70
Wewoka Creek	OK520500-02-0010M	43506	04-May-09	200	800
Wewoka Creek	OK520500-02-0010M	43762	08-Jun-09 <	30	30
Wewoka Creek	OK520500-02-0010M	44029	13-Jul-09 <	5	5
Wewoka Creek	OK520500-02-0010M	44386	17-Aug-09 <	20 <	20
Wewoka Creek	OK520500-02-0010M	44642	21-Sep-09	100	70
Wewoka Creek	OK520500-02-0010M	45264	04-May-10 <	100 <	10
Wewoka Creek: Downstream	OK520500-02-0010C	40396	02-Jun-08	70	40
Wewoka Creek: Downstream	OK520500-02-0010C	40817	07-Jul-08	10	10
Wewoka Creek: Downstream	OK520500-02-0010C	41149	11-Aug-08 >	10000 >	10000
Wewoka Creek: Downstream	OK520500-02-0010C	41476	15-Sep-08	1660	1700
Wewoka Creek: Downstream	OK520500-02-0010C	43720	01-Jun-09 <	300 <	10
Wewoka Creek: Downstream	OK520500-02-0010C	43979	06-Jul-09 <	350	90
Wewoka Creek: Downstream	OK520500-02-0010C	44353	10-Aug-09 <	10	10
Wewoka Creek: Downstream	OK520500-02-0010C	44584	14-Sep-09	1400	1200
Wewoka Creek: Downstream	OK520500-02-0010C	45262	04-May-10 <	20 <	10

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Alkalinity (CaCO3)	Alabama Creek	OK520500-01-0200D	21	0	89.76	8.51	38.98	25	58	78	116	169
Alkalinity (CaCO3)	Bad Creek	OK520500-01-0170L	21	0	62.81	3.69	16.91	36	54	57	76	110
Alkalinity (CaCO3)	Ballard Creek	OK121700-03-0370G	21	0	96.15	6.87	31.5	7	82	102	109	160
Alkalinity (CaCO3)	Battle Creek	OK121700-06-0040G	21	0	66.66	3.05	14	43	55.5	64	77.5	97
Alkalinity (CaCO3)	Bird Creek: Upstream	OK520800-01-0050M	22	0	162.1	11	51.6	55	134.5	168	201.5	247
Alkalinity (CaCO3)	Brazil Creek	OK220100-03-0010G	21	0	71.95	8.9	40.8	29	44	67	86	216
Alkalinity (CaCO3)	Brushy Creek	OK220600-03-0010J	21	0	55.52	3.94	18.04	30	43.5	50	69	90
Alkalinity (CaCO3)	Butler Creek	OK120400-02-0160D	19	0	93.7	10.2	44.3	38	56	89	112	204
Alkalinity (CaCO3)	Camp Creek	OK520700-03-0220G	22	0	218	14.5	68.1	91	172.3	222	278.3	322
Alkalinity (CaCO3)	Canadian Sandy Creek	OK520600-03-0010D	21	0	250.4	13.6	62.3	100	214.5	264	299	311
Alkalinity (CaCO3)	Cloud Creek	OK120410-01-0100T	21	0	99	12.4	56.8	30	52	89	124	264
Alkalinity (CaCO3)	Coody Creek	OK120400-01-0400F	20	1	97.65	8.91	39.84	40	66.5	94	123.25	188
Alkalinity (CaCO3)	Deep Fork of N. Canadian R.	OK520710-01-0010G	21	0	244.8	17.5	80.2	78	183	277	305.5	332
Alkalinity (CaCO3)	Dirty Creek	OK120400-02-0010F	19	0	75.74	4.84	21.11	36	58	81	93	121
Alkalinity (CaCO3)	Dry Creek	OK520700-04-0020F	21	0	231.8	14.8	67.9	120	164	256	292	330
Alkalinity (CaCO3)	Elk Creek	OK120400-02-0190D	21	0	69.43	7.04	32.25	14	41.5	63	101.5	118
Alkalinity (CaCO3)	Fourche Maline Creek	OK220100-04-0020H	21	0	53.48	4.62	21.19	29	37.5	47	65.5	109
Alkalinity (CaCO3)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	98.4	12.6	57.6	33	52	89	121.5	264
Alkalinity (CaCO3)	Little Wewoka Creek	OK520500-02-0090D	21	0	97.75	9.29	42.58	0.84	59	109	132	161
Alkalinity (CaCO3)	Mill Creek	OK220600-01-0100P	20	1	75.35	7	31.3	33	50	70.5	91.5	158
Alkalinity (CaCO3)	Peaceable Creek	OK220600-03-0050F	21	0	82.1	13.4	61.4	40	49	68	97	332
Alkalinity (CaCO3)	Polecat Creek	OK120420-02-0050D	21	0	109.95	7.11	32.58	55	78	125	135	161
Alkalinity (CaCO3)	Quapaw Creek	OK520700-04-0260C	21	0	265.3	22.6	103.4	3.14	221	282	352	367
Alkalinity (CaCO3)	Sallisaw Creek: Lower	OK220200-03-0010C	21	0	67.81	3.26	14.96	40	58.5	67	80.5	96
Alkalinity (CaCO3)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	76.48	4.08	18.71	50	60	72	89.5	125
Alkalinity (CaCO3)	Salt Creek (Creek Co.)	OK520700-03-0100B	21	1	190.3	10	45.9	102	151.5	188	216.5	311
Alkalinity (CaCO3)	Salt Creek (Seminole Co.)	OK520800-03-0010D	21	0	253.2	19.1	87.6	84	162.5	268	322.5	360
Alkalinity (CaCO3)	San Bois Creek	OK220200-04-0010G	20	0	100.2	19.6	87.7	1.04	46.8	62	131.8	323
Alkalinity (CaCO3)	Shady Grove Creek	OK120400-02-0240H	21	0	56.5	14.2	65.1	0.003	19.5	36	62.5	237
Alkalinity (CaCO3)	Snake Creek	OK120410-01-0220G	21	0	97.86	6.3	28.85	43	70.5	96	121.5	153
Alkalinity (CaCO3)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	128	12.7	58.2	36	78.5	115	188.5	213
Alkalinity (CaCO3)	Wewoka Creek	OK520500-02-0010M	21	0	122.86	8.66	39.68	65	92.5	128	142.5	217
Alkalinity (CaCO3)	Wewoka Creek: Downstrm	OK520500-02-0010C	21	0	118.19	8.45	38.74	55	82	128	151	189
Ammonia (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.03195	0.00461	0.02063	0.015	0.015	0.0235	0.045	0.084
Ammonia (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.0349	0.0075	0.03353	0.015	0.015	0.0165	0.0435	0.153

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Ammonia (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	0.02335	0.00309	0.0138	0.015	0.015	0.015	0.03225	0.063
Ammonia (mg/L)	Battle Creek	OK121700-06-0040G	20	1	0.024	0.00437	0.01953	0.015	0.015	0.015	0.026	0.088
Ammonia (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	1.442	0.756	3.38	0.015	0.0183	0.029	1.298	11.892
Ammonia (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.02545	0.00377	0.01688	0.015	0.015	0.016	0.0315	0.082
Ammonia (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.0336	0.00605	0.02708	0.015	0.015	0.024	0.0435	0.103
Ammonia (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.0785	0.0182	0.077	0.015	0.015	0.047	0.1333	0.239
Ammonia (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.048	0.0105	0.0469	0.015	0.015	0.0325	0.0513	0.176
Ammonia (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	0.0246	0.00534	0.02387	0.015	0.015	0.015	0.02325	0.118
Ammonia (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.067	0.0153	0.0686	0.015	0.015	0.0495	0.084	0.269
Ammonia (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.04815	0.00915	0.0409	0.015	0.01575	0.031	0.06625	0.183
Ammonia (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	0.0893	0.0244	0.1092	0.015	0.0218	0.0445	0.1135	0.428
Ammonia (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.0749	0.016	0.0696	0.015	0.02	0.052	0.106	0.255
Ammonia (mg/L)	Dry Creek	OK520700-04-0020F	20	1	0.03155	0.00514	0.02297	0.015	0.015	0.019	0.04475	0.083
Ammonia (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.0603	0.0112	0.05	0.015	0.016	0.0535	0.079	0.178
Ammonia (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.02625	0.00576	0.02578	0.015	0.015	0.015	0.0265	0.126
Ammonia (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.085	0.0239	0.1069	0.015	0.02	0.047	0.0955	0.446
Ammonia (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.02965	0.00387	0.0173	0.015	0.015	0.021	0.04175	0.068
Ammonia (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.03165	0.00646	0.02887	0.015	0.015	0.015	0.03775	0.13
Ammonia (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.0501	0.0121	0.054	0.015	0.015	0.034	0.0703	0.243
Ammonia (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.176	0.0941	0.4208	0.015	0.0163	0.0405	0.1763	1.903
Ammonia (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.02705	0.00503	0.02251	0.015	0.015	0.015	0.034	0.107
Ammonia (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.0208	0.00199	0.00891	0.015	0.015	0.015	0.0265	0.041
Ammonia (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.01895	0.00205	0.00918	0.015	0.015	0.015	0.016	0.049
Ammonia (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.04075	0.00638	0.02854	0.015	0.015	0.0345	0.06275	0.099
Ammonia (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	0.0289	0.00412	0.01844	0.015	0.015	0.0175	0.039	0.071
Ammonia (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.03489	0.00755	0.03289	0.015	0.015	0.021	0.042	0.143
Ammonia (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.1021	0.0151	0.0677	0.015	0.0523	0.096	0.1535	0.277
Ammonia (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.0243	0.00304	0.01359	0.015	0.015	0.018	0.028	0.054
Ammonia (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.0507	0.0151	0.0675	0.015	0.015	0.0175	0.0648	0.292
Ammonia (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	0.0893	0.0382	0.171	0.015	0.015	0.0395	0.079	0.781
Ammonia (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.0834	0.0221	0.0987	0.015	0.015	0.0485	0.1135	0.443
Base Flow (cfs)	Alabama Creek	OK520500-01-0200D	17	4	8.05	3.97	16.36	0	0.489	1.79	5.37	62.28
Base Flow (cfs)	Bad Creek	OK520500-01-0170L	20	1	7.25	3.5	15.66	0	0.314	1.56	6.19	64.86
Base Flow (cfs)	Ballard Creek	OK121700-03-0370G	20	1	40.53	9.69	43.36	0	10.88	22.2	65.82	170.87
Base Flow (cfs)	Battle Creek	OK121700-06-0040G	21	0	18.42	5.08	23.28	1.9	3.54	9.53	26.35	98.86

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Base Flow (cfs)	Bird Creek: Upstream	OK520800-01-0050M	18	4	2.53	1.35	5.74	-0.1	0	0	2.4	24.29
Base Flow (cfs)	Brazil Creek	OK220100-03-0010G	12	9	32.3	10.5	36.2	0.331	5.96	20.2	48.2	111.4
Base Flow (cfs)	Brushy Creek	OK220600-03-0010J	14	7	7.85	2.34	8.77	0	0	5.16	15.73	23.98
Base Flow (cfs)	Butler Creek	OK120400-02-0160D	14	5	5.32	4.22	15.8	0	0	0	2.94	59.62
Base Flow (cfs)	Camp Creek	OK520700-03-0220G	20	2	3.21	1.82	8.13	0	0.082	0.314	0.562	35.2
Base Flow (cfs)	Canadian Sandy Creek	OK520600-03-0010D	18	3	25.9	8.59	36.44	0.199	1.67	6.56	52.58	128.99
Base Flow (cfs)	Cloud Creek	OK120410-01-0100T	14	7	3.98	1.94	7.27	0	0	1.07	3.24	21.17
Base Flow (cfs)	Coody Creek	OK120400-01-0400F	16	5	11.88	2.75	11.01	0	3.14	7.17	22.06	30.69
Base Flow (cfs)	Deep Fork of N. Canadian R.	OK520710-01-0010G	18	3	35.83	8.61	36.54	11.83	17.99	21.16	26.16	115.44
Base Flow (cfs)	Dirty Creek	OK120400-02-0010F	14	5	0	0	0	0	0	0	0	0
Base Flow (cfs)	Dry Creek	OK520700-04-0020F	17	4	23.99	6.97	28.72	1.6	3.98	10.89	43.62	88.22
Base Flow (cfs)	Elk Creek	OK120400-02-0190D	17	4	7.98	2.29	9.46	0	0.253	2.37	15.34	31.46
Base Flow (cfs)	Fourche Maline Creek	OK220100-04-0020H	11	10	23.34	6.62	21.95	1.54	4.41	9.9	47.31	60.2
Base Flow (cfs)	George's Fork of Dirty Creek	OK120400-02-0110D	16	5	17.71	9.07	36.28	0	0.317	9.13	15.08	150.25
Base Flow (cfs)	Little Wewoka Creek	OK520500-02-0090D	20	1	15.57	6.92	30.96	0	1.26	3.18	10.65	128.38
Base Flow (cfs)	Mill Creek	OK220600-01-0100P	19	2	7.12	1.96	8.56	0.059	0.383	3.98	15.08	26.78
Base Flow (cfs)	Peaceable Creek	OK220600-03-0050F	14	7	6.52	1.97	7.37	0	0	5.29	11.45	22.53
Base Flow (cfs)	Polecat Creek	OK120420-02-0050D	11	10	28.61	5.05	16.76	9.34	13.73	26.44	39.39	59.97
Base Flow (cfs)	Quapaw Creek	OK520700-04-0260C	19	2	14.84	4.66	20.32	1.74	4.42	8.47	16.05	90.07
Base Flow (cfs)	Sallisaw Creek: Lower	OK220200-03-0010C	14	7	76.3	29.9	112	1.5	11.7	27.5	87.5	408.6
Base Flow (cfs)	Sallisaw Creek: Upper	OK220200-03-0010G	15	6	57.5	16	61.9	1.5	12.5	33	72.2	212.3
Base Flow (cfs)	Salt Creek (Creek Co.)	OK520700-03-0100B	21	1	9.8	4.64	21.25	0.469	1.33	3.49	6.76	98.98
Base Flow (cfs)	Salt Creek (Seminole Co.)	OK520800-03-0010D	17	4	20.2	6.47	26.67	0	2.94	9.59	29.39	95.13
Base Flow (cfs)	San Bois Creek	OK220200-04-0010G	11	9	18.28	4.64	15.39	1.99	4.26	14.98	29.22	49.07
Base Flow (cfs)	Shady Grove Creek	OK120400-02-0240H	19	2	3.86	1.02	4.46	0	0.491	1.88	6.47	16.76
Base Flow (cfs)	Snake Creek	OK120410-01-0220G	18	3	15.49	3.24	13.75	0	4.62	11.14	27.65	47.39
Base Flow (cfs)	South Fork of Dirty Creek	OK120400-02-0030F	16	5	4.87	1.83	7.31	0	0	0	10.35	20.3
Base Flow (cfs)	Wewoka Creek	OK520500-02-0010M	12	9	5.14	2.84	9.83	0	0	0	6.66	31.58
Base Flow (cfs)	Wewoka Creek: Downstrm	OK520500-02-0010C	17	4	40.7	11.3	46.7	0.832	11.4	29.8	61.9	196.8
Chloride (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	206.2	39.4	176	11.1	68.7	167.8	362.5	587.2
Chloride (mg/L)	Bad Creek	OK520500-01-0170L	20	1	209.3	25.7	114.9	40.1	106.2	219.4	316.9	365.8
Chloride (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	9.59	0.693	3.097	3.1	7.575	10	11.7	17.3
Chloride (mg/L)	Battle Creek	OK121700-06-0040G	20	1	11.19	2.21	9.89	2.5	5.2	8.85	13.85	49.4
Chloride (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	584	135	602	36.7	156	472	668	2315
Chloride (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	5.845	0.441	1.971	2.3	4.025	6.05	7.5	9.3

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Chloride (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	8.73	1.22	5.44	3.4	4.9	7	12.33	24.7
Chloride (mg/L)	Butler Creek	OK120400-02-0160D	18	1	20.27	6.38	27.07	3.1	4.65	10.75	18.48	102.4
Chloride (mg/L)	Camp Creek	OK520700-03-0220G	20	2	88.4	10.2	45.8	10.4	58.1	89.6	122.8	185.2
Chloride (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	34.31	5.9	26.38	4.7	14.3	24.05	55.53	91.7
Chloride (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	38.98	4.58	20.49	8.3	26.75	33.65	53.43	86.5
Chloride (mg/L)	Coody Creek	OK120400-01-0400F	20	1	26.92	2.95	13.21	6.9	14.53	26.8	36.1	51.2
Chloride (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	112.9	10.1	45.2	37.6	94.4	109.9	127.3	228.1
Chloride (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	18.27	2.5	10.89	5.2	12	14.2	23.3	48.1
Chloride (mg/L)	Dry Creek	OK520700-04-0020F	20	1	84.2	26	116.2	18.3	37.4	64.4	82.9	566.1
Chloride (mg/L)	Elk Creek	OK120400-02-0190D	20	1	25.1	5.49	24.54	5.3	9.68	14.45	31.68	87.3
Chloride (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	7.8	0.717	3.204	2.4	4.95	7.55	10.225	15.3
Chloride (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	15.35	3.15	14.09	3.8	7.58	11.55	16.65	68
Chloride (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	149.9	19.2	85.7	13.7	75.6	162.1	213.7	330.1
Chloride (mg/L)	Mill Creek	OK220600-01-0100P	20	1	10.785	0.811	3.625	3.5	8.875	10.65	14.125	16.7
Chloride (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	46.6	7.75	34.67	6.1	13.9	40.45	73.73	120.4
Chloride (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	98.62	9.61	42.96	17.9	66.93	95.5	140.88	162
Chloride (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	38.66	3.04	13.59	6.1	29.2	41.7	50.48	60
Chloride (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	3.675	0.265	1.184	2.3	2.825	3.2	4.85	6
Chloride (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	3.45	0.252	1.126	1.9	2.8	3.3	3.75	6.1
Chloride (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	121.4	14.4	64.6	26.7	81.9	117.7	139.8	351.6
Chloride (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	581.7	85.5	382.3	61.1	195.5	582.7	866.8	1317.8
Chloride (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	7.605	0.62	2.702	3	5.3	7.2	9.5	11.9
Chloride (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	9.916	0.732	3.273	4	8.03	9.65	12.35	17.7
Chloride (mg/L)	Snake Creek	OK120410-01-0220G	20	1	44.21	5.34	23.87	7.6	29.08	40.35	58.33	92.8
Chloride (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	7.91	0.648	2.899	3.5	5.35	7.4	10.85	13.4
Chloride (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	343.6	69.7	311.6	59.1	112.4	241.4	512.4	1247.1
Chloride (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	249.3	39.1	174.7	27.8	106.2	183.4	425.6	535.2
Conductivity (uS/cm)	Alabama Creek	OK520500-01-0200D	21	0	797	131	600	86.3	324	686	1172	2296
Conductivity (uS/cm)	Bad Creek	OK520500-01-0170L	21	0	816.5	84	384.7	200.7	468	877	1189.5	1359
Conductivity (uS/cm)	Ballard Creek	OK121700-03-0370G	21	0	264.19	8.2	37.56	166	250.15	274.2	294.1	304.3
Conductivity (uS/cm)	Battle Creek	OK121700-06-0040G	21	0	193.02	6.79	31.1	122.5	170.05	192.7	216.7	243.5
Conductivity (uS/cm)	Bird Creek: Upstream	OK520800-01-0050M	22	0	1856	298	1396	9.56	642	1758	2769	5370
Conductivity (uS/cm)	Brazil Creek	OK220100-03-0010G	21	0	185.1	14.3	65.6	80.5	137.8	179.9	249.2	290.9
Conductivity (uS/cm)	Brushy Creek	OK220600-03-0010J	21	0	137.99	8.74	40.03	78.2	101.95	141.2	171.75	211.6
Conductivity (uS/cm)	Butler Creek	OK120400-02-0160D	19	0	302	33.3	145	114.8	148.7	320.2	377.1	556

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Conductivity (uS/cm)	Camp Creek	OK520700-03-0220G	22	0	662.3	53.4	250.3	244.6	478.9	717	868.3	1032
Conductivity (uS/cm)	Canadian Sandy Creek	OK520600-03-0010D	21	0	542.6	36.1	165.4	166.4	432.2	602	656.5	790
Conductivity (uS/cm)	Cloud Creek	OK120410-01-0100T	20	1	426.5	61.6	275.4	104.7	241.2	338.6	648.3	1146
Conductivity (uS/cm)	Coody Creek	OK120400-01-0400F	21	0	375.7	24.9	114.2	178.4	279.3	389.3	466.8	559
Conductivity (uS/cm)	Deep Fork of N. Canadian R.	OK520710-01-0010G	21	0	751.3	53.5	245	228.5	556	853	951.5	1015
Conductivity (uS/cm)	Dirty Creek	OK120400-02-0010F	19	0	277.8	19.3	84.1	147.8	221.4	280.8	315	506
Conductivity (uS/cm)	Dry Creek	OK520700-04-0020F	21	0	639.6	66.5	304.9	282.1	442.4	632	747	1755
Conductivity (uS/cm)	Elk Creek	OK120400-02-0190D	20	1	474.1	44.4	198.4	6.32	375.4	468.5	658	768
Conductivity (uS/cm)	Fourche Maline Creek	OK220100-04-0020H	21	0	133.7	10	45.9	69.1	101.4	123.6	162.3	220.5
Conductivity (uS/cm)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	241.2	25.9	118.9	115	162.3	205.7	306.7	646
Conductivity (uS/cm)	Little Wewoka Creek	OK520500-02-0090D	21	0	643.6	72	329.9	80.5	318.3	628	910.5	1246
Conductivity (uS/cm)	Mill Creek	OK220600-01-0100P	20	1	194.7	16.9	75.4	81.3	123.1	197.5	243.2	336.1
Conductivity (uS/cm)	Peaceable Creek	OK220600-03-0050F	21	0	448.7	80.5	369	8.43	136.8	375.1	557.5	1374
Conductivity (uS/cm)	Polecat Creek	OK120420-02-0050D	20	1	540.4	41.6	186.2	125.6	406.2	511.5	678.3	830
Conductivity (uS/cm)	Quapaw Creek	OK520700-04-0260C	21	0	621.5	41.4	189.5	134.3	497.1	659	778	855
Conductivity (uS/cm)	Sallisaw Creek: Lower	OK220200-03-0010C	21	0	163.91	6.14	28.13	102.1	143.05	166.3	191.3	199.2
Conductivity (uS/cm)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	174.83	7.12	32.61	113.4	143.35	173.5	202.55	222.2
Conductivity (uS/cm)	Salt Creek (Creek Co.)	OK520700-03-0100B	21	1	679	37.6	172.2	310.1	527.5	738	800	1007
Conductivity (uS/cm)	Salt Creek (Seminole Co.)	OK520800-03-0010D	21	0	2651	482	2211	316	1484	2572	3273	11100
Conductivity (uS/cm)	San Bois Creek	OK220200-04-0010G	20	0	416.7	85.2	381	92.4	122.8	282.6	543.1	1273
Conductivity (uS/cm)	Shady Grove Creek	OK120400-02-0240H	20	1	1034	179	803	82	385	669	1763	2517
Conductivity (uS/cm)	Snake Creek	OK120410-01-0220G	20	1	353.8	27.7	123.7	121.4	284.5	325.1	469.1	603
Conductivity (uS/cm)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	518.2	77.2	353.9	139.9	281.4	462.1	630	1625
Conductivity (uS/cm)	Wewoka Creek	OK520500-02-0010M	21	0	1445	252	1153	293	612	997	2129	5099
Conductivity (uS/cm)	Wewoka Creek: Downstrm	OK520500-02-0010C	21	0	960	141	647	12	366	705	1638	2079
Dissolved Oxygen (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	7.958	0.713	3.19	1.94	5.515	7.465	9.648	14.4
Dissolved Oxygen (mg/L)	Bad Creek	OK520500-01-0170L	20	1	8.828	0.689	3.083	3.18	6.533	8.77	11.45	14.98
Dissolved Oxygen (mg/L)	Ballard Creek	OK121700-03-0370G	21	0	9.082	0.535	2.45	5.13	7.135	8.89	10.95	14.15
Dissolved Oxygen (mg/L)	Battle Creek	OK121700-06-0040G	21	0	9.555	0.42	1.923	5.96	8.295	9	11.095	13.3
Dissolved Oxygen (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	21	1	9.315	0.536	2.455	5.49	7.11	9.1	11.35	14.34
Dissolved Oxygen (mg/L)	Brazil Creek	OK220100-03-0010G	21	0	7.779	0.548	2.51	4	5.73	7.58	9.885	12.21
Dissolved Oxygen (mg/L)	Brushy Creek	OK220600-03-0010J	21	0	6.94	0.526	2.41	3.93	4.76	6.47	8.815	11.66
Dissolved Oxygen (mg/L)	Butler Creek	OK120400-02-0160D	19	0	6.209	0.694	3.023	1.47	3.81	5.78	8.43	13.92
Dissolved Oxygen (mg/L)	Camp Creek	OK520700-03-0220G	21	1	8.588	0.614	2.812	5.19	6.39	7.44	10.97	15.04
Dissolved Oxygen (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	8.39	0.576	2.577	4.52	6.523	8.07	10.465	12.8

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Dissolved Oxygen (mg/L)	Cloud Creek	OK120410-01-0100T	21	0	7.777	0.615	2.817	4.25	5.78	6.71	9.355	13.96
Dissolved Oxygen (mg/L)	Coody Creek	OK120400-01-0400F	21	0	7.253	0.604	2.768	4.2	5.1	6.15	10.055	13.31
Dissolved Oxygen (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	9.033	0.638	2.854	4.13	6.89	9.065	11.715	13.88
Dissolved Oxygen (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	5.544	0.567	2.471	1.12	4.02	5.13	6.61	10.4
Dissolved Oxygen (mg/L)	Dry Creek	OK520700-04-0020F	21	0	9.731	0.555	2.544	6.13	7.62	9.2	11.96	14.34
Dissolved Oxygen (mg/L)	Elk Creek	OK120400-02-0190D	21	0	7.797	0.622	2.848	3.36	5.525	7.57	9.89	12.84
Dissolved Oxygen (mg/L)	Fourche Maline Creek	OK220100-04-0020H	21	0	7.741	0.585	2.682	3.61	5.575	7.49	10.27	12.15
Dissolved Oxygen (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	6.117	0.657	3.009	0.97	3.7	5.65	7.87	12.65
Dissolved Oxygen (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	9.227	0.67	2.995	5.12	6.753	8.095	11.928	14.28
Dissolved Oxygen (mg/L)	Mill Creek	OK220600-01-0100P	20	1	7.984	0.628	2.806	2.79	6.225	6.965	10.223	13.59
Dissolved Oxygen (mg/L)	Peaceable Creek	OK220600-03-0050F	21	0	6.781	0.515	2.36	3.22	4.81	6.61	8.615	11.78
Dissolved Oxygen (mg/L)	Polecat Creek	OK120420-02-0050D	21	0	8.165	0.61	2.795	3.56	6.115	7.5	10.18	14.47
Dissolved Oxygen (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	9.802	0.568	2.54	5.91	8.258	8.845	11.708	15.17
Dissolved Oxygen (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	9.583	0.525	2.35	6.09	7.595	8.815	12.24	13.18
Dissolved Oxygen (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	9.416	0.559	2.563	4.91	7.59	9.36	11.775	14.1
Dissolved Oxygen (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	9.633	0.621	2.776	6.05	7.093	8.825	11.968	14.9
Dissolved Oxygen (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	21	0	9.509	0.483	2.214	5.8	7.79	9.1	11.82	12.78
Dissolved Oxygen (mg/L)	San Bois Creek	OK220200-04-0010G	20	0	7.754	0.529	2.364	5	5.715	6.725	10.188	11.99
Dissolved Oxygen (mg/L)	Shady Grove Creek	OK120400-02-0240H	21	0	7.285	0.658	3.016	1.63	5.345	6.77	9.405	13.06
Dissolved Oxygen (mg/L)	Snake Creek	OK120410-01-0220G	21	0	8.288	0.63	2.889	4.26	5.695	8.31	10.36	13.49
Dissolved Oxygen (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	6.949	0.627	2.872	2.95	4.6	6.28	9.31	13.13
Dissolved Oxygen (mg/L)	Wewoka Creek	OK520500-02-0010M	21	0	10.098	0.641	2.936	4.99	8.075	9.45	13.05	16.51
Dissolved Oxygen (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	9.402	0.701	3.133	5.14	6.45	9.095	12.14	15.44
DO (percent saturation)	Alabama Creek	OK520500-01-0200D	20	1	75.35	4.19	18.73	24.4	65.85	81.95	86.23	101.5
DO (percent saturation)	Bad Creek	OK520500-01-0170L	20	1	84.81	3.56	15.93	39.6	80	85	95.1	108
DO (percent saturation)	Ballard Creek	OK121700-03-0370G	21	0	88.11	3.16	14.49	61	80.95	88.1	96.85	123.6
DO (percent saturation)	Battle Creek	OK121700-06-0040G	21	0	91.77	2.45	11.24	67.4	87.4	90.5	99.45	117
DO (percent saturation)	Bird Creek: Upstream	OK520800-01-0050M	21	1	97.04	5.06	23.2	53	81.25	99.4	111.5	157.5
DO (percent saturation)	Brazil Creek	OK220100-03-0010G	21	0	77.29	3.06	14.01	48.5	65.55	81.3	88.55	98.5
DO (percent saturation)	Brushy Creek	OK220600-03-0010J	21	0	67.74	3.47	15.9	39.3	54.35	67.4	82.9	95.2
DO (percent saturation)	Butler Creek	OK120400-02-0160D	19	0	58.65	5.05	22.03	18.3	39.1	63.7	74.4	104.2
DO (percent saturation)	Camp Creek	OK520700-03-0220G	21	1	83.32	3.28	15.04	62.6	71.55	79.6	95.95	114
DO (percent saturation)	Canadian Sandy Creek	OK520600-03-0010D	20	1	81.67	3.47	15.54	58.1	68.23	82.3	96.2	112.1
DO (percent saturation)	Cloud Creek	OK120410-01-0100T	21	0	73.69	2.84	13.03	53.4	65.25	72.2	80.75	102.5
DO (percent saturation)	Coody Creek	OK120400-01-0400F	21	0	70.48	3.32	15.2	45	59.2	72.5	84.3	99.7

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
DO (percent saturation)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	90.41	5.95	26.59	50.4	75.08	88.3	104.4	152.1
DO (percent saturation)	Dirty Creek	OK120400-02-0010F	19	0	51.01	5.48	23.9	3.74	39.8	57.3	61.9	81.5
DO (percent saturation)	Dry Creek	OK520700-04-0020F	21	0	97.57	3.5	16.06	75.5	82.9	96	113.35	131.9
DO (percent saturation)	Elk Creek	OK120400-02-0190D	21	0	72.87	4.61	21.13	4.76	64.45	76.6	88.45	94.7
DO (percent saturation)	Fourche Maline Creek	OK220100-04-0020H	21	0	75.79	3.4	15.58	45.4	63.8	74.7	88.8	98.6
DO (percent saturation)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	58.61	4.63	21.22	11.6	41.7	57.6	75.7	92.8
DO (percent saturation)	Little Wewoka Creek	OK520500-02-0090D	20	1	89.99	3.68	16.45	62.8	74.18	92.55	100.98	125
DO (percent saturation)	Mill Creek	OK220600-01-0100P	20	1	75.58	3.38	15.12	34.2	70.7	76.6	87.23	94.3
DO (percent saturation)	Peaceable Creek	OK220600-03-0050F	21	0	67.02	3.58	16.4	40.7	55.1	67.3	80.15	99.1
DO (percent saturation)	Polecat Creek	OK120420-02-0050D	21	0	81.05	4.09	18.75	46.4	67.2	81.3	97.9	111.3
DO (percent saturation)	Quapaw Creek	OK520700-04-0260C	20	1	96.23	2.59	11.59	67.5	87.28	95.3	105.98	117.3
DO (percent saturation)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	97.14	2.3	10.28	76.9	89.5	99.9	106.3	111.5
DO (percent saturation)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	94.03	3.21	14.7	62.3	85.95	93	103.8	125.7
DO (percent saturation)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	95.57	3.26	14.57	68.7	80.68	99.9	107	115.5
DO (percent saturation)	Salt Creek (Seminole Co.)	OK520800-03-0010D	21	0	94.01	2.75	12.62	71.6	83.9	95.4	104.45	110.9
DO (percent saturation)	San Bois Creek	OK220200-04-0010G	20	0	77.86	2.81	12.56	54.6	68.18	80.15	88.3	97.8
DO (percent saturation)	Shady Grove Creek	OK120400-02-0240H	21	0	68.87	4.11	18.84	20.3	53.5	72.7	82.7	97.4
DO (percent saturation)	Snake Creek	OK120410-01-0220G	21	0	79.17	3	13.74	49.2	68.45	83.5	91.85	101.1
DO (percent saturation)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	66.04	3.73	17.1	33.7	53.5	67.2	80.9	92.2
DO (percent saturation)	Wewoka Creek	OK520500-02-0010M	21	0	101.65	4.94	22.63	65.9	82.15	102.3	116.15	160
DO (percent saturation)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	92.16	3.67	16.41	63.5	75.8	96.3	103.28	129.4
Hardness (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	166.7	23.1	103.5	23	87	142.5	236.8	417
Hardness (mg/L)	Bad Creek	OK520500-01-0170L	20	1	146.8	11.5	51.2	48	106.8	147	189.3	235
Hardness (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	119.78	5.69	25.43	62	111.25	121.5	133.5	163
Hardness (mg/L)	Battle Creek	OK121700-06-0040G	20	1	95.62	7.16	32.04	49.4	78.5	90.5	107	208
Hardness (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	21	1	348.9	37.1	169.9	61	214.7	348	475.5	691
Hardness (mg/L)	Brazil Creek	OK220100-03-0010G	21	0	81.74	5.4	24.77	44.5	59	84	97	141
Hardness (mg/L)	Brushy Creek	OK220600-03-0010J	21	0	86.73	5.96	27.31	47	60	88	107	146
Hardness (mg/L)	Butler Creek	OK120400-02-0160D	18	1	158.8	15.9	67.2	38	105.8	160	198	324
Hardness (mg/L)	Camp Creek	OK520700-03-0220G	21	1	261.8	21.4	98	25.3	199.5	256	353.5	415
Hardness (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	253.3	15.1	67.7	68.8	221.5	272.5	304.8	324
Hardness (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	219.7	35.6	159.2	51.1	102.3	168.5	327	591
Hardness (mg/L)	Coody Creek	OK120400-01-0400F	19	2	167.9	15.3	66.7	81	126	167	202	366
Hardness (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	274.3	21	93.8	99	186	306.5	359.8	385
Hardness (mg/L)	Dirty Creek	OK120400-02-0010F	18	1	139.3	13.2	56.1	62.5	110.8	115.5	157.3	297

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Hardness (mg/L)	Dry Creek	OK520700-04-0020F	20	1	262.8	17.3	77.5	109	189	268.8	332.8	383
Hardness (mg/L)	Elk Creek	OK120400-02-0190D	20	1	204.3	11.6	52	85	174.3	201.5	231.3	303
Hardness (mg/L)	Fourche Maline Creek	OK220100-04-0020H	21	0	82.83	6.42	29.4	36.4	63	75	103	155
Hardness (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	138.1	17.5	80.2	55	91.5	107	158.5	349
Hardness (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	156.9	15.3	68.3	30	115.8	161	205.4	267
Hardness (mg/L)	Mill Creek	OK220600-01-0100P	19	2	106.68	7.37	32.13	66	87	96	120	199
Hardness (mg/L)	Peaceable Creek	OK220600-03-0050F	21	0	146.7	16.9	77.4	66	88.5	124	183	371
Hardness (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	191.7	16.8	75	48.6	140.3	203.5	221.5	364
Hardness (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	267.9	22	98.6	19	232.8	303	337.3	370
Hardness (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	21	0	85.58	5.1	23.36	42	73	80	94.5	156
Hardness (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	89.75	4.17	19.1	55	73	91	103	127
Hardness (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	19	3	227.7	11.3	49.5	130	189.3	239	261	306
Hardness (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	458.6	43.9	196.5	80.6	266.3	520	623.8	696
Hardness (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	110.92	8.28	36.08	70	82	96.5	142	195
Hardness (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	375.9	47	210.2	24	207.8	350.5	549	897
Hardness (mg/L)	Snake Creek	OK120410-01-0220G	20	1	149.2	12.3	54.9	40.1	97.5	148.5	198.5	243
Hardness (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	221.7	24.7	113.3	90.4	124	182	297.5	472
Hardness (mg/L)	Wewoka Creek	OK520500-02-0010M	19	2	222.3	21.3	93	62.9	143	215	313	392
Hardness (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	205.4	22	98.6	46.4	135	181	266.3	406
Nitrate (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.1225	0.0476	0.213	0.02	0.02	0.04	0.13	0.94
Nitrate (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.24	0.148	0.663	0.02	0.02	0.045	0.138	3.01
Nitrate (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	2.177	0.194	0.869	0.22	1.56	2.365	2.73	3.46
Nitrate (mg/L)	Battle Creek	OK121700-06-0040G	20	1	2.6395	0.0994	0.4443	1.5	2.375	2.72	2.965	3.36
Nitrate (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	0.246	0.125	0.561	0.02	0.02	0.03	0.263	2.51
Nitrate (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.117	0.0137	0.0615	0.02	0.0725	0.12	0.175	0.21
Nitrate (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.066	0.0118	0.0527	0.02	0.02	0.055	0.09	0.18
Nitrate (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.0983	0.0265	0.1123	0.02	0.02	0.065	0.14	0.49
Nitrate (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.0465	0.00809	0.03617	0.02	0.02	0.02	0.07	0.15
Nitrate (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	0.272	0.189	0.847	0.02	0.02	0.085	0.125	3.86
Nitrate (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.2085	0.0759	0.3393	0.02	0.02	0.13	0.2525	1.56
Nitrate (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.153	0.0232	0.1037	0.02	0.035	0.14	0.2475	0.34
Nitrate (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	1.087	0.22	0.985	0.22	0.39	0.71	1.34	3.98
Nitrate (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.1684	0.0222	0.0969	0.02	0.11	0.17	0.24	0.39
Nitrate (mg/L)	Dry Creek	OK520700-04-0020F	20	1	0.0655	0.0163	0.0727	0.02	0.02	0.02	0.1	0.25
Nitrate (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.2965	0.0904	0.4041	0.02	0.0825	0.19	0.335	1.86

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Nitrate (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.085	0.0155	0.0694	0.02	0.02	0.07	0.1225	0.25
Nitrate (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.1135	0.0218	0.0975	0.02	0.02	0.085	0.1775	0.34
Nitrate (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.0575	0.013	0.0581	0.02	0.02	0.025	0.09	0.24
Nitrate (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.072	0.0118	0.0527	0.02	0.02	0.055	0.11	0.21
Nitrate (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.402	0.134	0.6	0.02	0.0825	0.16	0.378	2.24
Nitrate (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.387	0.154	0.69	0.02	0.045	0.17	0.43	3.15
Nitrate (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.1495	0.0367	0.1639	0.02	0.02	0.09	0.2	0.7
Nitrate (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.142	0.0184	0.0825	0.02	0.0775	0.15	0.215	0.3
Nitrate (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.2955	0.0343	0.1533	0.02	0.2225	0.3	0.3775	0.63
Nitrate (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.05	0.0121	0.0541	0.02	0.02	0.02	0.0725	0.21
Nitrate (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	0.0765	0.0295	0.1318	0.02	0.02	0.02	0.065	0.57
Nitrate (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.0974	0.0138	0.0602	0.02	0.04	0.09	0.14	0.22
Nitrate (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.2075	0.0336	0.1504	0.02	0.065	0.175	0.335	0.51
Nitrate (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.067	0.0137	0.0614	0.02	0.02	0.045	0.1075	0.23
Nitrate (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.091	0.0213	0.0951	0.02	0.02	0.05	0.13	0.36
Nitrate (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	0.543	0.202	0.901	0.02	0.085	0.195	0.378	3.21
Nitrate (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.1345	0.0343	0.1533	0.02	0.02	0.065	0.23	0.56
Nitrite (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Ballard Creek	OK121700-03-0370G	18	3	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Battle Creek	OK121700-06-0040G	19	2	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	0.035	0.015	0.0671	0.02	0.02	0.02	0.02	0.32
Nitrite (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.0225	0.0025	0.01118	0.02	0.02	0.02	0.02	0.07
Nitrite (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	19	2	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.0225	0.0025	0.01118	0.02	0.02	0.02	0.02	0.07
Nitrite (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.0275	0.0075	0.03354	0.02	0.02	0.02	0.02	0.17
Nitrite (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	0.0585	0.0208	0.0931	0.02	0.02	0.02	0.02	0.36
Nitrite (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.02579	0.00414	0.01805	0.02	0.02	0.02	0.02	0.09
Nitrite (mg/L)	Dry Creek	OK520700-04-0020F	19	2	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.0235	0.0035	0.01565	0.02	0.02	0.02	0.02	0.09
Nitrite (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.021	0.001	0.00447	0.02	0.02	0.02	0.02	0.04

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Nitrite (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.0245	0.0045	0.02012	0.02	0.02	0.02	0.02	0.11
Nitrite (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.0455	0.0119	0.0534	0.02	0.02	0.02	0.02	0.2
Nitrite (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.025	0.00373	0.0167	0.02	0.02	0.02	0.02	0.09
Nitrite (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	19	2	0.0358	0.0158	0.0688	0.02	0.02	0.02	0.02	0.32
Nitrite (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.02211	0.00211	0.00918	0.02	0.02	0.02	0.02	0.06
Nitrite (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.02	0	0	0.02	0.02	0.02	0.02	0.02
Nitrite (mg/L)	Wewoka Creek	OK520500-02-0010M	19	2	0.0389	0.0132	0.0576	0.02	0.02	0.02	0.02	0.23
Nitrite (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.029	0.009	0.04025	0.02	0.02	0.02	0.02	0.2
pH	Alabama Creek	OK520500-01-0200D	17	4	7.1412	0.0549	0.2265	6.5	7	7.2	7.3	7.4
pH	Bad Creek	OK520500-01-0170L	17	4	7.3529	0.0556	0.2294	6.9	7.15	7.4	7.6	7.7
pH	Ballard Creek	OK121700-03-0370G	19	2	7.5	0.0949	0.4137	6.6	7.3	7.5	7.6	8.7
pH	Battle Creek	OK121700-06-0040G	19	2	7.305	0.104	0.455	6.7	7	7.2	7.6	8.7
pH	Bird Creek: Upstream	OK520800-01-0050M	18	4	7.7278	0.062	0.263	7	7.5	7.8	7.9	8
pH	Brazil Creek	OK220100-03-0010G	21	0	7.0952	0.055	0.2519	6.3	7	7.1	7.15	7.5
pH	Brushy Creek	OK220600-03-0010J	21	0	7.019	0.0792	0.3628	6.3	6.8	7	7.3	7.7
pH	Butler Creek	OK120400-02-0160D	19	0	6.9684	0.0709	0.3092	6.4	6.7	7.1	7.2	7.4
pH	Camp Creek	OK520700-03-0220G	20	2	7.705	0.0609	0.2724	6.9	7.5	7.7	7.975	8
pH	Canadian Sandy Creek	OK520600-03-0010D	19	2	7.8684	0.0508	0.2212	7.3	7.8	7.9	8	8.2
pH	Cloud Creek	OK120410-01-0100T	20	1	7.1	0.0811	0.3627	6.6	6.825	7	7.4	7.9
pH	Coody Creek	OK120400-01-0400F	21	0	7.3381	0.0537	0.2459	6.9	7.15	7.3	7.55	7.8
pH	Deep Fork of N. Canadian R.	OK520710-01-0010G	19	2	8.1632	0.0766	0.3337	7.4	7.9	8.2	8.3	8.7
pH	Dirty Creek	OK120400-02-0010F	19	0	7.1526	0.0762	0.3323	6.8	6.9	7.2	7.4	7.9
pH	Dry Creek	OK520700-04-0020F	20	1	8.06	0.105	0.471	6.6	7.9	8.1	8.3	8.8
pH	Elk Creek	OK120400-02-0190D	21	0	7.0952	0.0719	0.3294	6.5	6.85	7.1	7.35	7.8
pH	Fourche Maline Creek	OK220100-04-0020H	21	0	6.9857	0.0522	0.2393	6.5	6.85	7	7.2	7.4
pH	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	7.276	0.179	0.818	6.7	6.9	7.1	7.4	10.6
pH	Little Wewoka Creek	OK520500-02-0090D	18	3	7.4778	0.0563	0.239	6.9	7.4	7.5	7.625	7.8
pH	Mill Creek	OK220600-01-0100P	20	1	7.185	0.0812	0.3631	6.6	6.925	7.1	7.475	8

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
pH	Peaceable Creek	OK220600-03-0050F	21	0	7.1571	0.0739	0.3385	6.5	6.95	7.2	7.3	7.9
pH	Polecat Creek	OK120420-02-0050D	21	0	7.5857	0.0779	0.3568	6.9	7.3	7.5	7.85	8.4
pH	Quapaw Creek	OK520700-04-0260C	19	2	8.2158	0.0668	0.2911	7.5	8.1	8.2	8.4	8.9
pH	Sallisaw Creek: Lower	OK220200-03-0010C	19	2	7.4526	0.069	0.3007	6.8	7.2	7.5	7.7	7.9
pH	Sallisaw Creek: Upper	OK220200-03-0010G	19	2	7.453	0.113	0.493	6.4	7.1	7.4	7.8	8.2
pH	Salt Creek (Creek Co.)	OK520700-03-0100B	19	3	7.7368	0.0663	0.2891	7.3	7.5	7.8	7.9	8.4
pH	Salt Creek (Seminole Co.)	OK520800-03-0010D	19	2	8.1	0.053	0.2309	7.6	7.9	8.2	8.3	8.4
pH	San Bois Creek	OK220200-04-0010G	20	0	7.36	0.101	0.451	6.5	7.025	7.25	7.8	8.2
pH	Shady Grove Creek	OK120400-02-0240H	21	0	6.19	0.166	0.76	3.7	5.95	6.3	6.6	7.2
pH	Snake Creek	OK120410-01-0220G	21	0	7.4286	0.0526	0.2411	7	7.2	7.5	7.6	7.8
pH	South Fork of Dirty Creek	OK120400-02-0030F	21	0	7.3667	0.084	0.3851	6.8	7	7.2	7.7	8.1
pH	Wewoka Creek	OK520500-02-0010M	19	2	8.0421	0.0727	0.3168	7.2	7.9	8.1	8.3	8.4
pH	Wewoka Creek: Downstrm	OK520500-02-0010C	18	3	7.756	0.117	0.498	6.7	7.475	7.7	8.1	8.5
Sulfate (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	22.42	2.02	9.01	5.3	15.68	22.35	27.68	40.1
Sulfate (mg/L)	Bad Creek	OK520500-01-0170L	20	1	22.54	1.55	6.93	9	16.43	23.25	28.65	33.7
Sulfate (mg/L)	Ballard Creek	OK121700-03-0370G	19	2	9.153	0.491	2.139	5.3	7.3	9.9	11.1	12.1
Sulfate (mg/L)	Battle Creek	OK121700-06-0040G	20	1	6.94	1.76	7.87	3.1	4.6	5.6	6.1	40.1
Sulfate (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	31.52	2.32	10.39	8.6	26.58	34.4	38.75	44.1
Sulfate (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	25.77	2.07	9.24	10.2	20.28	24.15	31.33	42.7
Sulfate (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	21.25	4.01	17.95	7.2	10.98	14.2	27.8	85.6
Sulfate (mg/L)	Butler Creek	OK120400-02-0160D	18	1	51.13	7.78	33.02	14.3	24.88	48	70.2	133.4
Sulfate (mg/L)	Camp Creek	OK520700-03-0220G	20	2	12.005	0.989	4.423	4	9.875	11.95	14.2	20.6
Sulfate (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	18.97	1.3	5.81	6.8	14.6	19.2	24.48	27.1
Sulfate (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	144.9	35.3	157.7	8.6	29.5	70	302.7	431.5
Sulfate (mg/L)	Coody Creek	OK120400-01-0400F	20	1	50.75	5.14	22.97	20.9	29.1	47.65	68.5	100.4
Sulfate (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	39.52	3.13	13.98	11.9	26.98	41.8	46.55	69.7
Sulfate (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	50.47	4.87	21.25	27.3	36.4	45.5	56.4	103.6
Sulfate (mg/L)	Dry Creek	OK520700-04-0020F	20	1	15.88	0.976	4.364	5.8	12.525	16.3	19.425	22.2
Sulfate (mg/L)	Elk Creek	OK120400-02-0190D	20	1	183.1	15.1	67.6	48.7	151.8	173.1	216.8	348.1
Sulfate (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	15.73	1.42	6.36	6.8	11.28	14.35	17.15	32.6
Sulfate (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	41.98	8.67	38.79	9.2	21.05	29.35	56.33	185.4
Sulfate (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	15.11	1.29	5.76	2.8	10.88	16.65	19.63	22.6
Sulfate (mg/L)	Mill Creek	OK220600-01-0100P	20	1	16.98	1.71	7.63	6.8	10.55	17	20.15	40.4
Sulfate (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	136.8	43.6	194.8	12	16.3	64	187.2	828.8
Sulfate (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	25.48	1.64	7.33	11.2	20.63	24.25	30.25	39

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Sulfate (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	27.66	2.32	10.38	3.5	21.35	27.85	33.05	50.8
Sulfate (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	6.87	0.454	2.028	3.3	5.25	6.6	8.675	10.5
Sulfate (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	6.56	0.399	1.785	4.4	5.125	6.1	7.825	11.2
Sulfate (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	20.52	1.19	5.31	11.1	16.73	21.55	24.3	31.2
Sulfate (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	34.17	3.83	17.13	3.6	19.48	38.3	45.18	69.3
Sulfate (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	70.8	17.5	76.2	10.6	17.8	44.9	88.8	304.4
Sulfate (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	646	115	513	61.1	230	488	1084	1723
Sulfate (mg/L)	Snake Creek	OK120410-01-0220G	20	1	30.99	3.18	14.22	7	20.28	29.75	42.48	69.3
Sulfate (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	155.3	30.7	137.2	29.3	66.4	109.7	190.7	606.4
Sulfate (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	25.29	2.96	13.23	10.3	13.13	22.15	35.53	55.3
Sulfate (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	20.16	1.97	8.79	4.9	13.38	20.55	25	36.1
Temperature (°C)	Alabama Creek	OK520500-01-0200D	21	0	15.99	1.95	8.93	1	6.85	18.9	24.15	27.2
Temperature (°C)	Bad Creek	OK520500-01-0170L	21	0	16.4	1.97	9.02	1.9	7.3	20.3	24.2	28.4
Temperature (°C)	Ballard Creek	OK121700-03-0370G	21	0	15.42	1.44	6.58	4.2	9.35	14.9	21.15	25.8
Temperature (°C)	Battle Creek	OK121700-06-0040G	21	0	14.252	0.962	4.407	6.3	10.5	14.2	17.95	21.4
Temperature (°C)	Bird Creek: Upstream	OK520800-01-0050M	22	0	18.76	1.86	8.74	1.4	10.4	20.2	26.85	30.5
Temperature (°C)	Brazil Creek	OK220100-03-0010G	21	0	17.85	2.01	9.21	4.7	7.6	17.3	26.2	31.6
Temperature (°C)	Brushy Creek	OK220600-03-0010J	21	0	16.89	1.85	8.5	4.7	7.35	16.9	24.15	28.9
Temperature (°C)	Butler Creek	OK120400-02-0160D	19	0	16.01	1.92	8.37	3.2	8.5	17.5	23.7	28.3
Temperature (°C)	Camp Creek	OK520700-03-0220G	21	1	15.87	1.69	7.74	2.6	9.3	16.6	23.6	25.5
Temperature (°C)	Canadian Sandy Creek	OK520600-03-0010D	21	0	16.13	1.76	8.06	3.9	8.7	15.7	23.05	28.5
Temperature (°C)	Cloud Creek	OK120410-01-0100T	21	0	15.63	2.08	9.54	0.7	6.6	16.4	24.1	28.6
Temperature (°C)	Coody Creek	OK120400-01-0400F	21	0	16.45	1.95	8.94	0.8	8.7	19.1	24.4	28.5
Temperature (°C)	Deep Fork of N. Canadian R.	OK520710-01-0010G	21	0	16.94	2.05	9.39	2.1	6.95	18.6	25.2	29.1
Temperature (°C)	Dirty Creek	OK120400-02-0010F	19	0	17.66	1.88	8.17	4.6	9.2	20.8	24.2	28.8
Temperature (°C)	Dry Creek	OK520700-04-0020F	21	0	16.98	1.98	9.07	3.4	9.5	15.3	23.75	33.3
Temperature (°C)	Elk Creek	OK120400-02-0190D	21	0	16.19	2.08	9.53	0.04	7.55	18.2	24.15	28.6
Temperature (°C)	Fourche Maline Creek	OK220100-04-0020H	21	0	16.84	1.87	8.57	4.7	7.35	16.2	24.3	29.2
Temperature (°C)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	16.48	1.85	8.47	0.6	8.65	19.8	24.15	27.2
Temperature (°C)	Little Wewoka Creek	OK520500-02-0090D	21	0	16.85	1.95	8.94	0.9	8.1	20.5	24.8	28
Temperature (°C)	Mill Creek	OK220600-01-0100P	20	1	15.6	1.99	8.89	0.6	7.75	17.8	22.93	27.3
Temperature (°C)	Peaceable Creek	OK220600-03-0050F	21	0	17.03	1.91	8.77	4.3	7.35	16.9	25.6	29.1
Temperature (°C)	Polecat Creek	OK120420-02-0050D	21	0	17.24	2.09	9.58	0.6	7.85	21.6	24.6	31.5
Temperature (°C)	Quapaw Creek	OK520700-04-0260C	21	0	16.4	2.01	9.23	0.3	8	18.5	24.1	28.2
Temperature (°C)	Sallisaw Creek: Lower	OK220200-03-0010C	21	0	17.58	1.87	8.55	5.9	9.3	16.1	25.4	32.8

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Temperature (°C)	Sallisaw Creek: Upper	OK220200-03-0010G	21	0	17	1.62	7.4	4.5	10.45	15.7	24	28.5
Temperature (°C)	Salt Creek (Creek Co.)	OK520700-03-0100B	21	1	16.73	1.8	8.23	0.4	9.8	17.9	24.5	28.4
Temperature (°C)	Salt Creek (Seminole Co.)	OK520800-03-0010D	21	0	16.31	1.88	8.62	3.6	9.45	15.2	24.25	31
Temperature (°C)	San Bois Creek	OK220200-04-0010G	20	0	17.69	2.07	9.26	5.1	7.63	16.5	25.88	31
Temperature (°C)	Shady Grove Creek	OK120400-02-0240H	21	0	15.37	1.94	8.9	0.2	6.65	17.5	23.5	26.4
Temperature (°C)	Snake Creek	OK120410-01-0220G	21	0	16.15	2.1	9.61	0.4	6.35	20.5	24.35	28.6
Temperature (°C)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	15.44	1.95	8.71	0.05	7.5	18.35	22.78	27.6
Temperature (°C)	Wewoka Creek	OK520500-02-0010M	20	1	16.8	1.98	8.84	4.8	9.3	15.7	25.05	31.5
Temperature (°C)	Wewoka Creek: Downstrm	OK520500-02-0010C	21	0	17.17	2.02	9.25	0.5	7.95	20.7	25.9	29.5
Total Dissolved Solids	Alabama Creek	OK520500-01-0200D	20	1	466.8	69.8	312.2	132	208.5	373.5	721.3	1210
Total Dissolved Solids	Bad Creek	OK520500-01-0170L	20	1	469.5	40.4	180.6	194	283	516.5	634.3	700
Total Dissolved Solids	Ballard Creek	OK121700-03-0370G	19	2	151.68	5.09	22.19	107	137	151	168	189
Total Dissolved Solids	Battle Creek	OK121700-06-0040G	20	1	114	4.59	20.52	69	98.25	116.5	130.25	149
Total Dissolved Solids	Bird Creek: Upstream	OK520800-01-0050M	20	2	1047	175	781	162	474	918	1318	3293
Total Dissolved Solids	Brazil Creek	OK220100-03-0010G	20	1	125.5	5.66	25.3	88	110.25	122.5	136.75	203
Total Dissolved Solids	Brushy Creek	OK220600-03-0010J	20	1	101.4	4.11	18.39	75	87.25	95	113	147
Total Dissolved Solids	Butler Creek	OK120400-02-0160D	18	1	197.1	16.8	71.1	96	136.3	197.5	250.3	333
Total Dissolved Solids	Camp Creek	OK520700-03-0220G	20	2	373.1	27.9	124.6	139	294.3	393.5	482.5	523
Total Dissolved Solids	Canadian Sandy Creek	OK520600-03-0010D	20	1	336.6	16.1	71.8	197	290.3	348	391.8	440
Total Dissolved Solids	Cloud Creek	OK120410-01-0100T	20	1	364.1	62.2	278.3	81	182.5	259.5	574.5	981
Total Dissolved Solids	Coody Creek	OK120400-01-0400F	20	1	235.9	13	58.2	145	188	234	267.8	333
Total Dissolved Solids	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	435.5	26.8	119.9	193	312.5	502.5	519.5	538
Total Dissolved Solids	Dirty Creek	OK120400-02-0010F	19	0	183.89	8.61	37.54	131	143	184	200	288
Total Dissolved Solids	Dry Creek	OK520700-04-0020F	20	1	384	34.5	154.4	205	269.3	396	421.8	948
Total Dissolved Solids	Elk Creek	OK120400-02-0190D	20	1	324.8	20.4	91	152	266	310	401	497
Total Dissolved Solids	Fourche Maline Creek	OK220100-04-0020H	20	1	93.35	3.92	17.54	65	82.5	92	105.75	126
Total Dissolved Solids	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	161.4	13	58.3	101	121.3	145.5	187.8	363
Total Dissolved Solids	Little Wewoka Creek	OK520500-02-0090D	20	1	379.6	29.8	133.4	186	248.8	384.5	494.8	682
Total Dissolved Solids	Mill Creek	OK220600-01-0100P	20	1	146.25	7.24	32.38	111	121.5	141.5	155.5	246
Total Dissolved Solids	Peaceable Creek	OK220600-03-0050F	20	1	323.3	48.4	216.3	71	156.8	260	470.3	869
Total Dissolved Solids	Polecat Creek	OK120420-02-0050D	20	1	320.1	18.6	83.2	137	258.5	311.5	404.8	440
Total Dissolved Solids	Quapaw Creek	OK520700-04-0260C	20	1	360	21.6	96.8	105	295.5	385.5	440.5	492
Total Dissolved Solids	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	93.2	2.92	13.07	68	86	92.5	106.25	116
Total Dissolved Solids	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	101.8	3.45	15.44	75	91	101.5	116	128
Total Dissolved Solids	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	407.8	24.2	108.1	207	332.5	427.5	465.5	709

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Total Dissolved Solids	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	1240	137	612	369	562	1231	1783	2132
Total Dissolved Solids	San Bois Creek	OK220200-04-0010G	19	1	246.9	41.1	179.2	85	124	172	287	688
Total Dissolved Solids	Shady Grove Creek	OK120400-02-0240H	20	1	973	170	760	176	364	704	1736	2334
Total Dissolved Solids	Snake Creek	OK120410-01-0220G	20	1	247.2	28.2	126.1	114	177.8	221.5	269	735
Total Dissolved Solids	South Fork of Dirty Creek	OK120400-02-0030F	20	1	350.5	55.9	250.2	128	192.5	269.5	441	1161
Total Dissolved Solids	Wewoka Creek	OK520500-02-0010M	20	1	677	105	470	207	339	524	909	1781
Total Dissolved Solids	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	564.8	66.7	298.4	111	329	464	853	1059
Total Kjeldahl N (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.3895	0.0535	0.2392	0.11	0.1825	0.34	0.47	0.9
Total Kjeldahl N (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.5015	0.075	0.3355	0.11	0.18	0.495	0.7525	1.15
Total Kjeldahl N (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	0.245	0.064	0.2864	0.11	0.11	0.11	0.28	1.22
Total Kjeldahl N (mg/L)	Battle Creek	OK121700-06-0040G	20	1	0.125	0.00896	0.04007	0.11	0.11	0.11	0.11	0.27
Total Kjeldahl N (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	2.242	0.953	4.263	0.11	0.283	0.6	2.37	14.94
Total Kjeldahl N (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.313	0.0619	0.2769	0.11	0.11	0.22	0.3875	1.06
Total Kjeldahl N (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.358	0.0579	0.2589	0.11	0.1175	0.325	0.495	0.95
Total Kjeldahl N (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.589	0.105	0.447	0.11	0.178	0.495	0.845	1.82
Total Kjeldahl N (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.3145	0.0466	0.2086	0.11	0.11	0.275	0.4225	0.77
Total Kjeldahl N (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	0.513	0.196	0.876	0.11	0.11	0.315	0.465	4.09
Total Kjeldahl N (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.5355	0.0891	0.3984	0.11	0.2475	0.45	0.6375	1.5
Total Kjeldahl N (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.3685	0.0456	0.2039	0.11	0.1125	0.405	0.53	0.77
Total Kjeldahl N (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	0.648	0.227	1.015	0.11	0.115	0.415	0.683	4.72
Total Kjeldahl N (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.5289	0.0723	0.3152	0.11	0.25	0.52	0.82	1.1
Total Kjeldahl N (mg/L)	Dry Creek	OK520700-04-0020F	20	1	0.495	0.0948	0.4239	0.11	0.1725	0.3	0.915	1.37
Total Kjeldahl N (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.512	0.0825	0.3689	0.11	0.245	0.475	0.6825	1.69
Total Kjeldahl N (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.306	0.0485	0.2167	0.11	0.1175	0.27	0.3675	1.03
Total Kjeldahl N (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.5365	0.0671	0.3001	0.1	0.325	0.51	0.7625	1.09
Total Kjeldahl N (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.4415	0.0723	0.3236	0.11	0.1325	0.37	0.66	1.34
Total Kjeldahl N (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.465	0.0552	0.247	0.11	0.24	0.465	0.6475	0.84
Total Kjeldahl N (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.569	0.0705	0.3152	0.11	0.2875	0.61	0.8175	1.15
Total Kjeldahl N (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.737	0.104	0.466	0.12	0.345	0.765	0.97	2
Total Kjeldahl N (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.337	0.0902	0.4032	0.11	0.11	0.23	0.415	1.93
Total Kjeldahl N (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.1735	0.0308	0.1376	0.11	0.11	0.11	0.1475	0.58
Total Kjeldahl N (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.1945	0.029	0.1297	0.11	0.11	0.11	0.315	0.54
Total Kjeldahl N (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.439	0.0584	0.261	0.11	0.2325	0.38	0.62	1.04
Total Kjeldahl N (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	0.586	0.119	0.532	0.11	0.263	0.34	0.815	2.08
Total Kjeldahl N (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.3463	0.0672	0.2929	0.11	0.11	0.25	0.5	1.08

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Total Kjeldahl N (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.3135	0.0584	0.2613	0.11	0.11	0.23	0.4575	0.98
Total Kjeldahl N (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.34	0.0359	0.1604	0.11	0.205	0.335	0.49	0.58
Total Kjeldahl N (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.3325	0.0577	0.2582	0.11	0.1225	0.26	0.4525	1.11
Total Kjeldahl N (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	0.858	0.175	0.782	0.11	0.443	0.635	0.94	3.6
Total Kjeldahl N (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.803	0.102	0.457	0.11	0.503	0.61	1.243	1.65
Total Ortho Phosphorus (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.0174	0.00512	0.02289	0.005	0.005	0.01	0.019	0.107
Total Ortho Phosphorus (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.0179	0.00604	0.02701	0.005	0.005	0.007	0.01675	0.121
Total Ortho Phosphorus (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	0.1125	0.036	0.1609	0.009	0.0503	0.073	0.0905	0.749
Total Ortho Phosphorus (mg/L)	Battle Creek	OK121700-06-0040G	20	1	0.04505	0.00642	0.02872	0.005	0.03125	0.04	0.0475	0.146
Total Ortho Phosphorus (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	0.441	0.173	0.775	0.005	0.00625	0.0665	0.594	2.642
Total Ortho Phosphorus (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.02175	0.00515	0.02303	0.005	0.01025	0.016	0.02325	0.112
Total Ortho Phosphorus (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.02105	0.00473	0.02116	0.005	0.008	0.012	0.0305	0.096
Total Ortho Phosphorus (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.0466	0.0209	0.0887	0.005	0.0148	0.021	0.0358	0.394
Total Ortho Phosphorus (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.0081	0.000946	0.004229	0.005	0.005	0.006	0.0115	0.019
Total Ortho Phosphorus (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	0.0623	0.0206	0.0919	0.005	0.0245	0.032	0.0715	0.437
Total Ortho Phosphorus (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.0329	0.00589	0.02634	0.005	0.0095	0.031	0.04925	0.099
Total Ortho Phosphorus (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.0411	0.00762	0.03408	0.009	0.02225	0.032	0.04775	0.156
Total Ortho Phosphorus (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	0.327	0.0344	0.1538	0.022	0.1918	0.3345	0.438	0.672
Total Ortho Phosphorus (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.04758	0.00846	0.03685	0.007	0.019	0.043	0.062	0.141
Total Ortho Phosphorus (mg/L)	Dry Creek	OK520700-04-0020F	20	1	0.0424	0.0136	0.061	0.005	0.0085	0.0195	0.056	0.272
Total Ortho Phosphorus (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.0626	0.019	0.0852	0.013	0.0205	0.038	0.0675	0.392
Total Ortho Phosphorus (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.0206	0.00296	0.01322	0.005	0.013	0.015	0.03075	0.049
Total Ortho Phosphorus (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.03495	0.00656	0.02936	0.006	0.01225	0.0285	0.0435	0.125
Total Ortho Phosphorus (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.02175	0.00677	0.03028	0.005	0.0065	0.0115	0.02925	0.141
Total Ortho Phosphorus (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.0219	0.00422	0.01885	0.005	0.00875	0.015	0.0325	0.072
Total Ortho Phosphorus (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.1432	0.0231	0.1034	0.024	0.056	0.113	0.2418	0.383
Total Ortho Phosphorus (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.05745	0.00932	0.04168	0.005	0.035	0.0485	0.06875	0.196
Total Ortho Phosphorus (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.0392	0.0205	0.0918	0.005	0.007	0.016	0.023	0.42
Total Ortho Phosphorus (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.01275	0.00317	0.01419	0.005	0.005	0.008	0.01675	0.067
Total Ortho Phosphorus (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.0156	0.00341	0.01527	0.005	0.006	0.011	0.015	0.069
Total Ortho Phosphorus (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.0185	0.00299	0.01337	0.005	0.01025	0.0135	0.02175	0.06
Total Ortho Phosphorus (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	0.0429	0.0161	0.0721	0.005	0.00525	0.0175	0.0433	0.278
Total Ortho Phosphorus (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.02805	0.00441	0.01922	0.007	0.01	0.025	0.045	0.065
Total Ortho Phosphorus (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.01595	0.00536	0.02398	0.005	0.005	0.005	0.0125	0.102
Total Ortho Phosphorus (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.02845	0.00561	0.02509	0.005	0.01275	0.0195	0.0335	0.09

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Total Ortho Phosphorus (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.02525	0.00512	0.0229	0.005	0.00925	0.016	0.036	0.091
Total Ortho Phosphorus (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	0.242	0.124	0.554	0.005	0.038	0.06	0.15	2.504
Total Ortho Phosphorus (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.0679	0.0203	0.0907	0.005	0.0155	0.04	0.0675	0.361
Total Phosphorus (mg/L)	Alabama Creek	OK520500-01-0200D	20	1	0.0573	0.0162	0.0726	0.007	0.017	0.035	0.0705	0.342
Total Phosphorus (mg/L)	Bad Creek	OK520500-01-0170L	20	1	0.0648	0.0199	0.0891	0.008	0.0253	0.0385	0.0688	0.422
Total Phosphorus (mg/L)	Ballard Creek	OK121700-03-0370G	20	1	0.1439	0.038	0.1699	0.024	0.0553	0.0905	0.1453	0.74
Total Phosphorus (mg/L)	Battle Creek	OK121700-06-0040G	20	1	0.0787	0.0112	0.0501	0.027	0.0423	0.0575	0.1088	0.192
Total Phosphorus (mg/L)	Bird Creek: Upstream	OK520800-01-0050M	20	2	0.559	0.206	0.92	0.005	0.0313	0.1	0.8	3.139
Total Phosphorus (mg/L)	Brazil Creek	OK220100-03-0010G	20	1	0.0874	0.0152	0.0682	0.015	0.0493	0.0715	0.1155	0.315
Total Phosphorus (mg/L)	Brushy Creek	OK220600-03-0010J	20	1	0.0893	0.0147	0.0656	0.025	0.0375	0.0775	0.118	0.275
Total Phosphorus (mg/L)	Butler Creek	OK120400-02-0160D	18	1	0.1185	0.0306	0.1297	0.018	0.0488	0.0905	0.1228	0.559
Total Phosphorus (mg/L)	Camp Creek	OK520700-03-0220G	20	2	0.0452	0.0192	0.0859	0.005	0.018	0.0235	0.0363	0.406
Total Phosphorus (mg/L)	Canadian Sandy Creek	OK520600-03-0010D	20	1	0.1363	0.0513	0.2296	0.034	0.0428	0.079	0.1355	1.088
Total Phosphorus (mg/L)	Cloud Creek	OK120410-01-0100T	20	1	0.0959	0.0193	0.0865	0.012	0.0378	0.081	0.1205	0.386
Total Phosphorus (mg/L)	Coody Creek	OK120400-01-0400F	20	1	0.1042	0.0232	0.1038	0.021	0.0498	0.068	0.1148	0.492
Total Phosphorus (mg/L)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	0.406	0.0708	0.3167	0.122	0.198	0.365	0.4668	1.598
Total Phosphorus (mg/L)	Dirty Creek	OK120400-02-0010F	19	0	0.1191	0.017	0.0742	0.035	0.08	0.094	0.152	0.346
Total Phosphorus (mg/L)	Dry Creek	OK520700-04-0020F	20	1	0.0986	0.0244	0.1091	0.008	0.024	0.046	0.1403	0.389
Total Phosphorus (mg/L)	Elk Creek	OK120400-02-0190D	20	1	0.1086	0.0209	0.0936	0.029	0.0413	0.0875	0.1328	0.433
Total Phosphorus (mg/L)	Fourche Maline Creek	OK220100-04-0020H	20	1	0.0785	0.0103	0.0461	0.03	0.0483	0.068	0.1015	0.214
Total Phosphorus (mg/L)	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	0.0927	0.0144	0.0646	0.012	0.0513	0.0805	0.1038	0.263
Total Phosphorus (mg/L)	Little Wewoka Creek	OK520500-02-0090D	20	1	0.0882	0.0394	0.1761	0.016	0.0303	0.039	0.0705	0.824
Total Phosphorus (mg/L)	Mill Creek	OK220600-01-0100P	20	1	0.0725	0.0109	0.0487	0.026	0.0375	0.0525	0.0903	0.195
Total Phosphorus (mg/L)	Peaceable Creek	OK220600-03-0050F	20	1	0.362	0.156	0.699	0.059	0.117	0.16	0.294	3.278
Total Phosphorus (mg/L)	Polecat Creek	OK120420-02-0050D	20	1	0.1276	0.0145	0.0647	0.005	0.0878	0.13	0.1578	0.26
Total Phosphorus (mg/L)	Quapaw Creek	OK520700-04-0260C	20	1	0.0782	0.0377	0.1686	0.005	0.0263	0.0305	0.0495	0.776
Total Phosphorus (mg/L)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	0.0482	0.0108	0.0483	0.005	0.02	0.0295	0.056	0.188
Total Phosphorus (mg/L)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	0.0462	0.0103	0.046	0.005	0.0165	0.033	0.061	0.206
Total Phosphorus (mg/L)	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	0.04465	0.00591	0.02644	0.018	0.02525	0.037	0.05975	0.101
Total Phosphorus (mg/L)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	0.12	0.0427	0.1907	0.006	0.0173	0.043	0.132	0.671
Total Phosphorus (mg/L)	San Bois Creek	OK220200-04-0010G	19	1	0.09	0.0116	0.0505	0.011	0.06	0.082	0.121	0.191
Total Phosphorus (mg/L)	Shady Grove Creek	OK120400-02-0240H	20	1	0.0358	0.00839	0.0375	0.005	0.013	0.0235	0.04275	0.147
Total Phosphorus (mg/L)	Snake Creek	OK120410-01-0220G	20	1	0.0728	0.0129	0.0578	0.014	0.0275	0.0545	0.0965	0.223
Total Phosphorus (mg/L)	South Fork of Dirty Creek	OK120400-02-0030F	20	1	0.0661	0.0118	0.0526	0.005	0.03	0.0525	0.1058	0.195
Total Phosphorus (mg/L)	Wewoka Creek	OK520500-02-0010M	20	1	0.397	0.16	0.715	0.026	0.0855	0.142	0.434	3.106

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Total Phosphorus (mg/L)	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	0.1709	0.0512	0.2289	0.041	0.0568	0.098	0.1893	1.066
Total Suspended Solids	Alabama Creek	OK520500-01-0200D	20	1	43.9	29.3	130.9	10	10	10	11.8	596
Total Suspended Solids	Bad Creek	OK520500-01-0170L	20	1	35.5	24.1	107.6	10	10	10	10	492
Total Suspended Solids	Ballard Creek	OK121700-03-0370G	19	2	13.37	2.69	11.74	10	10	10	10	60
Total Suspended Solids	Battle Creek	OK121700-06-0040G	20	1	10	0	0	10	10	10	10	10
Total Suspended Solids	Bird Creek: Upstream	OK520800-01-0050M	20	2	81.6	69.4	310.4	10	10	10	10	1400
Total Suspended Solids	Brazil Creek	OK220100-03-0010G	20	1	16.85	2.57	11.49	10	10	10	10	19.75
Total Suspended Solids	Brushy Creek	OK220600-03-0010J	20	1	20.6	6.15	27.51	10	10	10	12.5	103
Total Suspended Solids	Butler Creek	OK120400-02-0160D	18	1	25.9	10.4	44	10	10	10	23	196
Total Suspended Solids	Camp Creek	OK520700-03-0220G	20	2	11.4	1.06	4.73	10	10	10	10	30
Total Suspended Solids	Canadian Sandy Creek	OK520600-03-0010D	20	1	112.7	88.9	397.4	10	10	10	20	1795
Total Suspended Solids	Cloud Creek	OK120410-01-0100T	20	1	39.4	20.3	90.9	10	10	10	21.8	406
Total Suspended Solids	Coody Creek	OK120400-01-0400F	20	1	14.4	2.54	11.35	10	10	10	10	60
Total Suspended Solids	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	158.4	96.6	432.2	10	10	10	48	1691
Total Suspended Solids	Dirty Creek	OK120400-02-0010F	19	0	30.1	11.1	48.3	10	10	12	25	215
Total Suspended Solids	Dry Creek	OK520700-04-0020F	20	1	68.2	36.5	163.1	10	10	10	56.3	734
Total Suspended Solids	Elk Creek	OK120400-02-0190D	20	1	14.35	2.2	9.85	10	10	10	13.75	49
Total Suspended Solids	Fourche Maline Creek	OK220100-04-0020H	20	1	18.4	3.04	13.6	10	10	10	25.25	54
Total Suspended Solids	George's Fork of Dirty Creek	OK120400-02-0110D	20	1	13.9	1.72	7.71	10	10	10	16.25	36
Total Suspended Solids	Little Wewoka Creek	OK520500-02-0090D	20	1	121	104	464	10	10	10	25.8	2092
Total Suspended Solids	Mill Creek	OK220600-01-0100P	20	1	35	14.9	66.7	10	10	10	35.3	300
Total Suspended Solids	Peaceable Creek	OK220600-03-0050F	20	1	13.75	2.05	9.16	10	10	10	11.5	48
Total Suspended Solids	Polecat Creek	OK120420-02-0050D	20	1	70.1	43.4	194	10	10	20.5	31.8	887
Total Suspended Solids	Quapaw Creek	OK520700-04-0260C	20	1	100.9	83.9	375.1	10	10	10	10	1692
Total Suspended Solids	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	14.55	4.45	19.88	10	10	10	10	99
Total Suspended Solids	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	12.4	2.02	9.03	10	10	10	10	50
Total Suspended Solids	Salt Creek (Creek Co.)	OK520700-03-0100B	20	2	11.4	0.966	4.321	10	10	10	10	25
Total Suspended Solids	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	207	115	513	10	10	10	25.5	1857
Total Suspended Solids	San Bois Creek	OK220200-04-0010G	19	1	20.84	6.16	26.85	10	10	10	24	126
Total Suspended Solids	Shady Grove Creek	OK120400-02-0240H	20	1	11.25	0.836	3.74	10	10	10	10	26
Total Suspended Solids	Snake Creek	OK120410-01-0220G	20	1	26.05	8.86	39.64	10	10	10	18.25	166
Total Suspended Solids	South Fork of Dirty Creek	OK120400-02-0030F	20	1	13.1	2.03	9.09	10	10	10	10	46
Total Suspended Solids	Wewoka Creek	OK520500-02-0010M	20	1	267	240	1072	10	10.3	20	41.5	4820
Total Suspended Solids	Wewoka Creek: Downstrm	OK520500-02-0010C	20	1	215	161	718	10	10.5	34	74	3253
Turbidity (NTU)	Alabama Creek	OK520500-01-0200D	21	0	42.1	17.4	79.9	3.76	10.2	17.7	35	362

**Appendix A.3. Descriptive statistics by site for water quality parameters.**

Variable	Site Name	WBID	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Turbidity (NTU)	Bad Creek	OK520500-01-0170L	21	0	42.1	19.6	89.7	1.78	8.65	17	30.8	421
Turbidity (NTU)	Ballard Creek	OK121700-03-0370G	20	1	8.2	3.78	16.91	0.63	1.65	2.72	5.2	72.2
Turbidity (NTU)	Battle Creek	OK121700-06-0040G	20	1	2.359	0.831	3.714	0.4	0.578	0.885	2.41	16
Turbidity (NTU)	Bird Creek: Upstream	OK520800-01-0050M	22	0	61.8	44.9	210.5	4.05	5.89	7.99	21.5	1000
Turbidity (NTU)	Brazil Creek	OK220100-03-0010G	18	3	46.22	6.75	28.62	8.17	24.5	34	76.05	106
Turbidity (NTU)	Brushy Creek	OK220600-03-0010J	19	2	41.91	9.14	39.83	5.17	11.9	40.7	65.3	161
Turbidity (NTU)	Butler Creek	OK120400-02-0160D	19	0	51.7	16.6	72.5	5.02	13.4	25.7	51.3	304
Turbidity (NTU)	Camp Creek	OK520700-03-0220G	22	0	9.84	1.24	5.81	3.58	5.64	8.1	11.38	24.7
Turbidity (NTU)	Canadian Sandy Creek	OK520600-03-0010D	20	1	72.9	49.6	221.6	1.27	2.76	7.24	34.3	1000
Turbidity (NTU)	Cloud Creek	OK120410-01-0100T	21	0	50.8	17.2	78.8	2.69	6.05	29.5	47.1	336.1
Turbidity (NTU)	Coody Creek	OK120400-01-0400F	21	0	27.8	5.47	25.07	6.83	11.8	18.6	31.15	106
Turbidity (NTU)	Deep Fork of N. Canadian R.	OK520710-01-0010G	20	1	53.8	35.1	157	3.25	4.87	8.26	25.6	713
Turbidity (NTU)	Dirty Creek	OK120400-02-0010F	19	0	39.52	8.23	35.88	11.6	20.3	24.4	39.8	136
Turbidity (NTU)	Dry Creek	OK520700-04-0020F	20	1	86.6	38.4	171.7	3.8	8.8	15.2	114.8	769
Turbidity (NTU)	Elk Creek	OK120400-02-0190D	20	1	16.87	3.88	17.36	5.05	8.04	11.4	18.45	73.4
Turbidity (NTU)	Fourche Maline Creek	OK220100-04-0020H	19	2	49.26	6.88	30	3.17	25	43.5	64.1	134
Turbidity (NTU)	George's Fork of Dirty Creek	OK120400-02-0110D	21	0	29.57	6.89	31.58	5.84	13.45	19.1	32.7	147
Turbidity (NTU)	Little Wewoka Creek	OK520500-02-0090D	21	0	77.1	46.7	213.9	2.98	7.51	25.7	49.6	1000
Turbidity (NTU)	Mill Creek	OK220600-01-0100P	21	0	58.2	22.9	104.8	2.79	16.7	27.9	50.9	490
Turbidity (NTU)	Peaceable Creek	OK220600-03-0050F	21	0	37.77	6.21	28.46	5.17	11.6	26.2	61.75	98.6
Turbidity (NTU)	Polecat Creek	OK120420-02-0050D	21	0	64.9	24	109.9	9.34	23.8	33.4	49.1	518
Turbidity (NTU)	Quapaw Creek	OK520700-04-0260C	21	0	69.6	47.2	216.5	3.3	6.6	10.8	16.9	1000
Turbidity (NTU)	Sallisaw Creek: Lower	OK220200-03-0010C	20	1	12.36	3.97	17.76	2.89	4.96	6.54	14.85	83.5
Turbidity (NTU)	Sallisaw Creek: Upper	OK220200-03-0010G	20	1	13.12	6.09	27.22	1.21	2.16	4.32	10.63	123
Turbidity (NTU)	Salt Creek (Creek Co.)	OK520700-03-0100B	22	0	11.67	2.1	9.84	2.89	6.39	8.51	13.08	48.6
Turbidity (NTU)	Salt Creek (Seminole Co.)	OK520800-03-0010D	20	1	147.2	70	312.9	1.59	3.32	11.1	71	1000
Turbidity (NTU)	San Bois Creek	OK220200-04-0010G	17	3	54.61	8.97	36.99	6.69	23.55	41.9	87.85	125
Turbidity (NTU)	Shady Grove Creek	OK120400-02-0240H	20	1	15.85	3.71	16.59	2.48	4.46	9.01	20.33	58
Turbidity (NTU)	Snake Creek	OK120410-01-0220G	20	1	35.99	8.61	38.5	9.02	13.08	22.85	37.6	169
Turbidity (NTU)	South Fork of Dirty Creek	OK120400-02-0030F	21	0	21.68	5.79	26.52	2.76	5.94	11.8	22.55	110
Turbidity (NTU)	Wewoka Creek	OK520500-02-0010M	20	1	94.1	49	219	8.49	11.5	28.1	68.6	1000
Turbidity (NTU)	Wewoka Creek: Downstrm	OK520500-02-0010C	21	0	102.6	46.7	213.9	3.46	11.1	35.3	96.2	1000

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	108	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	49	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	38	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X				X	
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	17	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	15	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	14	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	12	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X				
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	11	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	8	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	7	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X		X		
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	7	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	4	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X	X		
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	4	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm	X					X
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	4	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	3	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	3	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, green x bluegill sunfish	tol						
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	2	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	2	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	2	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	2	Catostomidae	Carpoides carpio	River carpsucker	tol		X				
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	2	Percidae	Percina caprodes	Logperch	interm	X					
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	1	Centrarchidae	Pomoxis annularis	White crappie	tol			X			
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	1	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Alabama Creek	OK520500-01-0200D	40691	30-Jun-08	1	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	69	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	66	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	42	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	28	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	15	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	12	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	9	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	9	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	7	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	5	Percidae	Percina caprodes	Logperch	interm	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	4	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	4	Catostomidae	Carpoides carpio	River carpsucker	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	4	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	4	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	3	Catostomidae	Ictiobus cyprinellus	Largemouth buffalo	tol	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	3	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	2	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	2	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, sunfish			X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, green x bluegill sunfish	tol						
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
Bad Creek	OK520500-01-0170L	40692	01-Jul-08	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X			
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	190	Cyprinidae	Notropis boops	Bigeye shiner	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	179	Cyprinidae	Luxilus cardinalis	Cardinal shiner	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	91	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	43	Cottidae	Cottus carolinae	Banded sculpin	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	39	Percidae	Etheostoma spectabile	Orangethroat darter	interm	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	28	Ictaluridae	Noturus exilis	Slender madtom	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	22	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	22	Percidae	Etheostoma punctulatum	Stippled darter	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	21	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	16	Cyprinidae	Notropis nubilus	Ozark minnow	intol			X	X		
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	11	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	4	Catostomidae	Hypentelium nigricans	Northern hog sucker	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	3	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X	X		
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	2	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	2	Centrarchidae	Micropterus dolomieu	Smallmouth bass	intol			X	X		
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	2	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	2	Percidae	Etheostoma blennioides	Greenside darter	intol	X					X
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	1	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	1	Centrarchidae	Ambloplites ariommus	Shadow bass	intol	X			X	X	
Ballard Creek	OK121700-03-0370G	40702	24-Jul-08	1	Cyprinidae	Semotilus atromaculatus	Creek chub	interm			X	X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	209	Cyprinidae	Phoxinus erythrogaster	Southern redbelly dace	intol			X	X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	47	Percidae	Etheostoma spectabile	Orangethroat darter	interm	X					
Battle Creek	OK121700-06-0040G	40687	28-May-08	47	Cyprinidae	Luxilus cardinalis	Cardinal shiner	intol	X					X
Battle Creek	OK121700-06-0040G	40687	28-May-08	21	Cottidae	Cottus carolinae	Banded sculpin	intol	X					X
Battle Creek	OK121700-06-0040G	40687	28-May-08	20	Cyprinidae	Semotilus atromaculatus	Creek chub	interm			X	X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	17	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	15	Ictaluridae	Noturus exilis	Slender madtom	intol	X					X
Battle Creek	OK121700-06-0040G	40687	28-May-08	13	Centrarchidae	Ambloplites ariommus	Shadow bass	intol	X			X	X	
Battle Creek	OK121700-06-0040G	40687	28-May-08	6	Percidae	Etheostoma flabellare	Fantail darter	intol	X					X
Battle Creek	OK121700-06-0040G	40687	28-May-08	5	Cyprinidae	Notropis nubilus	Ozark minnow	intol			X	X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	4	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Battle Creek	OK121700-06-0040G	40687	28-May-08	3	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Battle Creek	OK121700-06-0040G	40687	28-May-08	1	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Battle Creek	OK121700-06-0040G	40687	28-May-08	1	Percidae	Etheostoma punctulatum	Stippled darter	intol	X					X

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	466	Cyprinidae	Cyprinella lutrensis	Red shiner	tol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	149	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X	X				
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	84	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	43	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	31	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	30	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	13	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	11	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	9	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	8	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	6	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	6	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	2	Cyprinidae	Notemigonus crysoleucas	Golden shiner	tol		X				
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	2	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	2	Centrarchidae	Pomoxis annularis	White crappie	tol			X			
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol			X			
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X	X		
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Fundulidae	Fundulus notatus	Blackstripe topminnow	interm	X					
Bird Creek: Downstream	OK520800-01-0050G	40694	09-Jul-08	1	Percichthyidae	Morone chrysops	White bass	tol			X			
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	45	Cyprinidae	Cyprinella lutrensis	Red shiner	tol			X			
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	44	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	36	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	20	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	10	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	5	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	3	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	2	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	1	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, green x redear sunfish	tol						
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	1	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol			X			
Bird Creek: Upstream	OK520800-01-0050M	43617	01-Jul-09	1	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	133	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	35	Cyprinidae	Notropis boops	Bigeye shiner	intol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	17	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	17	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	17	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	15	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	14	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	13	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	13	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	10	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	7	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol		X				
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	7	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	6	Cyprinidae	Cyprinella whipplei	Steelcolor shiner	intol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	6	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	5	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	3	Catostomidae	Moxostoma	Redhorse sucker	intol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	3	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	3	Percidae	Percina sciera	Dusky darter	interm	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	2	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Cyprinidae	Notemigonus crysoleucas	Golden shiner	tol		X				
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Ictaluridae	Noturus exilis	Slender madtom	intol	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X			
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Percidae	Etheostoma spectabile	Orangethroat darter	interm	X					X
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
Brazil Creek	OK220100-03-0010G	43621	21-Jul-09	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	155	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	66	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	29	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	28	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	13	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X				
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	9	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	7	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	6	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	5	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	5	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	4	Percidae	Percina caprodes	Logperch	interm	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	3	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	3	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, sunfish							
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	3	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	2	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	2	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	2	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	2	Lepisosteidae	Lepisosteus osseus	Longnose gar	tol			X			
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	2	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Catostomidae	Carpoides carpio	River carpsucker	tol		X				
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Clupeidae	Dorosoma petenense	Threadfin shad	interm		X				
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Catostomidae	Minytrema melanops	Spotted sucker	intol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Cyprinidae	Cyprinella whipplei	Steelcolor shiner	intol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Catostomidae	Moxostoma erythrurum	Golden redhorse	interm	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X		X		
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol		X				
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Brushy Creek	OK220600-03-0010J	43618	08-Jul-09	1	Percidae	Percina sciera	Dusky darter	interm	X					X
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	59	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	27	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	26	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	24	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	5	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	5	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X				
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	4	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	3	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	1	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	1	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Camp Creek	OK520700-03-0220D	40689	26-Jun-08	1	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	284	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	34	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	32	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	28	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	23	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	21	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	14	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	10	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	9	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	3	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	2	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X	X		
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	2	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	1	Percidae	Percina caprodes	Logperch	interm	X					
Canadian Sandy Creek	OK520600-03-0010D	40697	11-Jul-08	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	90	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	58	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	53	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	52	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	47	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	39	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	18	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	17	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	12	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	8	Cyprinidae	Machrybopsis storeriana	Silver chub	tol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	6	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectiv	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	3	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X				
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	3	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X		X		
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	3	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X			X	
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	3	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X				X	
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	3	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	2	Catostomidae	Moxostoma erythrurum	Golden redhorse	interm	X					X
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	2	Catostomidae	Minytrema melanops	Spotted sucker	intol	X					X
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	2	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	2	Centrarchidae	Pomoxis annularis	White crappie	tol			X			
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Percidae	Percina caprodes	Logperch	interm	X					
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Percichthyidae	Morone chrysops	White bass	tol			X			
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Cloud Creek	OK120410-01-0100T	40708	08-Sep-08	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	51	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	37	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	34	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	20	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	13	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	12	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	10	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	8	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	6	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	4	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	2	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	1	Catostomidae	Carpioles carpio	River carpsucker	tol		X				
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	1	Cyprinidae	Carassius auratus	Goldfish	tol		X				
Coody Creek	OK120400-01-0400F	40701	23-Jul-08	1	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, green x bluegill sunfish	tol						
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	275	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	16	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	15	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	12	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	7	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	6	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	4	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	4	Catostomidae	Unidentified Catostomidae spp.	Unidentified Cat. spp. (smallmouth buff. or riv. carpsucker)							
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	3	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X			
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	1	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	1	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Deep Fork of North Canadian R.	OK520710-01-0010G	40700	21-Jul-08	1	Cyprinidae	Pimephales promelas	Fathead minnow	tol		X				
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	273	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	13	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	10	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	8	Lepisosteidae	Lepisosteus osseus	Longnose gar	tol		X				
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	6	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	5	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	3	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	3	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X			
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	3	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	2	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	2	Lepisosteidae	Lepisosteus platostomus	Shortnose gar	tol			X			
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	1	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	1	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	1	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Dry Creek	OK520700-04-0020F	40690	27-Jun-08	1	Percidae	Percina phoxocephala	Slenderhead darter	intol	X					X
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	132	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	67	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	42	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	27	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	21	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	19	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X				
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	18	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	14	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm	X			X		
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	12	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	9	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	7	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	7	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	5	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	5	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	4	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	3	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	2	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X			X		
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	1	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	1	Catostomidae	Minytrema melanops	Spotted sucker	intol	X					X
Elk Creek	OK120400-02-0190D	40706	29-Jul-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	83	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	74	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	46	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	17	Cyprinidae	Cyprinella whipplei	Steelcolor shiner	intol	X					X
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	16	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	15	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	11	Percidae	Percina caprodes	Logperch	interm	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	9	Catostomidae	Moxostoma erythrurum	Golden redhorse	interm	X					X

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	8	Cyprinidae	Cyprinella lutrensis	Red shiner	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	8	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	7	Cyprinidae	Notropis atherinoides	Emerald shiner	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	6	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	5	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X		X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	5	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	5	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	5	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol		X		X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	4	Clupeidae	Dorosoma petenense	Threadfin shad	interm		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	3	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	3	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	3	Percidae	Percina sciera	Dusky darter	interm	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	3	Catostomiidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	2	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	2	Percidae	Etheostoma whipplei	Redfin darter	intol	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	2	Ictaluridae	Noturus miurus	Brindled madtom	intol	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	2	Catostomiidae	Minytrema melanops	Spotted sucker	intol	X			X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	2	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X		X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X		X		
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	1	Centrarchidae	Pomoxis annularis	White crappie	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	1	Centrarchidae	Pomoxis nigromaculatus	Black crappie	tol		X				
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	1	Percidae	Etheostoma histrio	Harlequin darter	intol	X					
Fourche Maline Creek	OK220100-04-0020H	44092	20-Jul-09	1	Cyprinidae	Notropis boops	Bigeye shiner	intol	X			X		
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	16	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	12	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	12	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	11	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	4	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X				
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	1	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	1	Centrarchidae	Pomoxis nigromaculatus	Black crappie	tol		X				
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	1	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
George's Fork of Dirty Creek	OK120400-02-0110D	44322	04-Aug-09	1	Percidae	Etheostoma whipplei	Redfin darter	intol	X			X		
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	242	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	95	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	62	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	45	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	41	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectiv	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic	Spawner
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	35	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X					
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	24	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X	X			
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	20	Cyprinidae	Campostoma anomalum	Central stoneroller	interm				X		X	
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	8	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X						
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	8	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X			X	
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	3	Percidae	Etheostoma whipplei	Redfin darter	intol	X						X
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	2	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X					X
Little Wewoka Creek	OK520500-02-0090D	40698	17-Jul-08	1	Centrarchidae	Pomoxis annularis	White crappie	tol			X				
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	126	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	47	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X						X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	42	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X			X	X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	21	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X						X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	21	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	14	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X			X	
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	13	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X					X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	13	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X					
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	12	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	8	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol							X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	6	Centrarchidae	Pomoxis annularis	White crappie	tol							X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	6	Percidae	Etheostoma whipplei	Redfin darter	intol	X						X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	5	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	3	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol							X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	2	Centrarchidae	Pomoxis nigromaculatus	Black crappie	tol							X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	2	Centrarchidae	Micropterus salmoides	Largemouth bass	tol							X
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	1	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	1	Percidae	Percina caprodes	Logperch	interm	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	1	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X						
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	1	Centrarchidae	Unidentified Lepomis hybrid	Hybrid, green x bluegill sunfish	tol							
Mill Creek	OK220600-01-0100P	40704	28-Jul-08	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X	X			
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	51	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X						
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	30	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X						
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	24	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X						X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	15	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X						
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	11	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X						
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	8	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X			X	X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	6	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X					X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	4	Percidae	Etheostoma whipplei	Redfin darter	intol	X						X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	3	Percidae	Percina sciera	Dusky darter	interm	X						X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	2	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X			X	X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	2	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X				X
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	2	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X						
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	1	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X						

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	1	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X		X		
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	1	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Peaceable Creek	OK220600-03-0050F	43616	30-Jun-09	1	Lepisosteidae	Lepisosteus osseus	Longnose gar	tol		X				
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	173	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	39	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	31	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	14	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X	X			
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	10	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	10	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	8	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	7	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	6	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	6	Catostomidae	Carpioles carpio	River carpsucker	tol		X				
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	5	Percidae	Percina phoxocephala	Slenderhead darter	intol	X					X
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	5	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	2	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	2	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	2	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	2	Cyprinidae	Machrybopsis storeriana	Silver chub	tol	X					
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	1	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	1	Lepisosteidae	Lepisosteus osseus	Longnose gar	tol			X			
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	1	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X		X		X
Polecat Creek	OK120420-02-0050D	40709	10-Sep-08	1	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	557	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	150	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X	X		
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	66	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	50	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	25	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	22	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X			X		
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	10	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	9	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	7	Cyprinidae	Cyprinus carpio	Common carp	tol		X				
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	4	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	3	Catostomidae	Carpioles carpio	River carpsucker	tol		X				
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	2	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	2	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	1	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	1	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
Quapaw Creek	OK520700-04-0260C	40688	05-Jun-08	1	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	104	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	79	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X	X		
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	53	Cyprinidae	Luxilus cardinalis	Cardinal shiner	intol	X					X

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	39	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	29	Cyprinidae	Notropis boops	Bigeye shiner	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	28	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	20	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	16	Percidae	Etheostoma blennioides	Greenside darter	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	12	Ictaluridae	Noturus exilis	Slender madtom	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	11	Catostomidae	Moxostoma erythrurum	Golden redhorse	interm	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	10	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X				
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	10	Catostomidae	Hypentelium nigricans	Northern hog sucker	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	9	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	9	Cyprinidae	Cyprinella whipplei	Steelcolor shiner	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	8	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	8	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X			X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	7	Percidae	Etheostoma zonale	Banded darter	intol	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	4	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	4	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X			X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	3	Centrarchidae	Ambloplites ariommus	Shadow bass	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	2	Catostomidae	Moxostoma duquesnei	Black redhorse	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	2	Centrarchidae	Pomoxis annularis	White crappie	tol			X			
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	2	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	2	Catostomidae	Carpoides carpio	River carpsucker	tol		X				
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Cyprinidae	Semotilus atromaculatus	Creek chub	interm			X			X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Centrarchidae	Micropterus dolomieu	Smallmouth bass	intol		X				X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Cyprinidae	Notropis nubilus	Ozark minnow	intol			X			X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Catostomidae	Moxostoma	Redhorse sucker	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Percidae	Percina caprodes	Logperch	interm	X					
Sallisaw Creek: Lower	OK220200-03-0010C	43619	10-Jul-09	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	205	Cyprinidae	Luxilus cardinalis	Cardinal shiner	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	96	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X			X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	60	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	42	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	25	Ictaluridae	Noturus exilis	Slender madtom	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	19	Catostomidae	Hypentelium nigricans	Northern hog sucker	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	17	Cyprinidae	Notropis nubilus	Ozark minnow	intol			X			X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	15	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	11	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	10	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	7	Cyprinidae	Notropis boops	Bigeye shiner	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	6	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	6	Percidae	Etheostoma blennioides	Greenside darter	intol	X					X

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivor	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	5	Catostomidae	Moxostoma duquesnei	Black redhorse	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	4	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	4	Percidae	Etheostoma spectabile	Orangethroat darter	interm	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	3	Cyprinidae	Nocomis asper	Redspot chub	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	3	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	3	Catostomidae	Moxostoma erythrurum	Golden redhorse	interm	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Centrarchidae	Micropterus dolomieu	Smallmouth bass	intol			X			X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Percidae	Etheostoma flabellare	Fantail darter	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Percidae	Etheostoma punctulatum	Stippled darter	intol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	2	Percidae	Percina caprodes	Logperch	interm	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	1	Centrarchidae	Ambloplites ariommus	Shadow bass	intol	X				X	X
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	1	Fundulidae	Fundulus notatus	Blackstripe topminnow	interm	X					
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Sallisaw Creek: Upper	OK220200-03-0010G	43615	26-Jun-09	1	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	85	Cyprinidae	Cyprinella lutrensis	Red shiner	tol			X			
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	31	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	29	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	26	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	9	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	9	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X			X
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	6	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	1	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	1	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	1	Percidae	Percina phoxocephala	Slenderhead darter	intol	X					X
Salt Creek (Creek Co.)	OK520700-03-0100B	40693	02-Jul-08	1	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	242	Cyprinidae	Cyprinella lutrensis	Red shiner	tol			X			
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	45	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X			X
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	26	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	10	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	8	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	6	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	4	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	2	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	2	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	2	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	1	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
Salt Creek (Seminole Co.)	OK520800-03-0010D	40696	11-Jul-08	1	Cyprinidae	Notropis stramineus	Sand shiner	interm	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	54	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectiv	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	38	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	20	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X		X	X	
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	14	Cyprinidae	Cyprinella whipplei	Steelcolor shiner	intol	X					X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	12	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	10	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X		X		
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	8	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X				
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	6	Cyprinidae	Campostoma anomalum	Central stoneroller	interm		X		X	X	
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	5	Percidae	Percina sciera	Dusky darter	interm	X					X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	5	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol			X			
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	3	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	2	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	2	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X				
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	2	Cyprinidae	Notropis amblops	Bigeye chub	intol	X					X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	2	Cyprinidae	Lythrurus umbratilis	Redfin shiner	interm	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	2	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X				X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X			X		
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Ictaluridae	Noturus nocturnus	Freckled madtom	intol	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Centrarchidae	Lepomis microlophus	Redear sunfish	interm	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Catostomidae	Ictiobus bubalus	Smallmouth buffalo	tol	X					
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Lepisosteidae	Lepisosteus osseus	Longnose gar	tol			X			
San Bois Creek	OK220200-04-0010G	43620	15-Jul-09	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	31	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	16	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	13	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	11	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	6	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	4	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	4	Cyprinidae	Campostoma anomalum	Central stoneroller	interm			X			X
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	4	Cyprinidae	Notemigonus crysoleucas	Golden shiner	tol		X				
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	3	Centrarchidae	Micropterus punctulatus	Spotted bass	interm			X			X
Shady Grove Creek	OK120400-02-0240H	40703	25-Jul-08	1	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	70	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X				
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	21	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	11	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	5	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	4	Percidae	Etheostoma whipplei	Redfin darter	intol	X					X
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	3	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	3	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	2	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectiv	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic	Spawner
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	2	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol	X						
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	2	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol	X						
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	2	Ictaluridae	Ictalurus punctatus	Channel catfish	tol		X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	1	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X						
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X	
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	1	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X						
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol		X					
Snake Creek	OK120410-01-0220G	40707	30-Jul-08	1	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X					X
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	69	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	48	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	45	Atherinidae	Labidesthes sicculus	Brook silverside	interm	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	44	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X	
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	12	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X					
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	11	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	9	Cyprinidae	Pimephales notatus	Bluntnose minnow	interm		X					X
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	9	Cyprinidae	Campostoma anomalum	Central stoneroller	interm				X		X	
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	3	Centrarchidae	Lepomis gulosus	Warmouth sunfish	tol		X					
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	2	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X					X
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	2	Fundulidae	Fundulus olivaceus	Blackspotted topminnow	interm	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Centrarchidae	Pomoxis nigromaculatus	Black crappie	tol		X					
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Percidae	Etheostoma gracile	Slough darter	intol	X						
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol		X					
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Ictaluridae	Ameiurus natalis	Yellow bullhead	tol	X					X	
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Catostomidae	Moxostoma	Redhorse sucker	intol	X						X
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Catostomidae	Minytrema melanops	Spotted sucker	intol	X						X
South Fork of Dirty Creek	OK120400-02-0030F	43622	23-Jul-09	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol						X	
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	206	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X					
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	23	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol		X					
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	8	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X						
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	6	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X						
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	2	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X						
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	2	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X	
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	2	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X					X
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	2	Catostomidae	Carpoides carpio	River carpsucker	tol		X					
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	1	Centrarchidae	Lepomis humilis	Orangespotted sunfish	tol	X						
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	1	Catostomidae	Unidentified Catostomidae spp.	(carpsucker)								
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol		X					
Wewoka Creek	OK520500-02-0010M	40699	17-Jul-08	1	Centrarchidae	Micropterus salmoides	Largemouth bass	tol		X					
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	224	Cyprinidae	Cyprinella lutrensis	Red shiner	tol		X					
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	104	Ictaluridae	Ictalurus punctatus	Channel catfish	tol			X			X	
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	46	Cyprinidae	Phenacobius mirabilis	Suckermouth minnow	intol	X						
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	30	Cyprinidae	Pimephales vigilax	Bullhead minnow	tol	X						

**Appendix B. Fish collection data.**

Site Name	WBID	SAMPLEID	Date	Number	Family	Species	VernName	Combined tolerance	Insectivore	Omnivore	Piscivore	Herbivore	Generalist	Lithophilic Spawner
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	14	Centrarchidae	Lepomis megalotis	Longear sunfish	tol	X					
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	5	Centrarchidae	Lepomis macrochirus	Bluegill sunfish	tol	X					
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	3	Centrarchidae	Lepomis cyanellus	Green sunfish	tol	X					X
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	2	Clupeidae	Dorosoma cepedianum	Gizzard shad	tol		X				
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	2	Centrarchidae	Micropterus salmoides	Largemouth bass	tol			X			
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	2	Centrarchidae	Micropterus punctulatus	Spotted bass	interm		X				X
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	2	Poeciliidae	Gambusia affinis	Mosquitofish	tol	X					
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	1	Ictaluridae	Pylodictis olivaris	Flathead catfish	tol			X			
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	1	Sciaenidae	Aplodinotus grunniens	Freshwater drum	tol	X					X
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	1	Lepisosteidae	Lepisosteus oculatus	Spotted gar	tol			X			
Wewoka Creek: Downstream	OK520500-02-0010C	40695	10-Jul-08	1	Catostomidae	Unidentified Catostomidae spp.	Unidentified Cat. spp. (smallmouth buff. or riv. carpsucker)							

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	45	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	34	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	15	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	6	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	3	ARTHROPODA	Acari	Arcarina	Hygrobatidae	Atractides
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	3	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Forcipomyia
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Tropisternus
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	NEMATODA				
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnophila
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Odonata	Libellulidae	
riffle	Alabama Creek	OK520500-01-0200D	41696	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ephydriidae	Hydrellia
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	35	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	13	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	13	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	10	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	6	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	4	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	2	MOLLUSCA	Pelecypoda	Venerida	Corbiculidae	Corbicula
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Chrysops
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	1	MOLLUSCA	Gastropoda	Basommatophora	Physidae	Physella
riffle	Alabama Creek	OK520500-01-0200D	43263	20-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	35	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	32	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	30	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	9	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	4	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Tipulidae	
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Lumbricidae	
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Bad Creek	OK520500-01-0170L	41695	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	19	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	18	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	15	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	15	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	14	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	10	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	9	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	7	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
riffle	Bad Creek	OK520500-01-0170L	43262	20-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	63	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	48	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	45	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	41	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	27	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	23	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	19	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	19	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	17	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	15	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08					Heptageniidae	Leucrocuta

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	14	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	12	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	12	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	11	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	8	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	5	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	3	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	3	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ANNELIDA	Oligochaeta	Haplotauxida	Glossoscolecidae	Sparganophilus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Branchiobdellida			
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Polycentropodidae	Polycentropus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Acari	Arcarina	Hygrobatidae	Atractides
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Acari	Arcarina		
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Lumbricidae	
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Neoperla
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Neoperla
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	NEMATODA				
riffle	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Lanthus
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	86	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	14	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	7	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	7	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	5	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	4	ARTHROPODA	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	3	ARTHROPODA	Insecta	Plecoptera	Perlodidae	Isoperla
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	2	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Perlinella
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Lumbricidae	
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Ballard Creek	OK121700-03-0370G	43338	22-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	43	ARTHROPODA	Insecta	Ephemeroptera	Ephemeridae	Ephemera
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	29	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	27	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	24	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	23	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	20	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	20	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	17	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	13	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	12	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	12	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	9	ANNELIDA	Oligochaeta	Haplotauxida	Glossoscolecidae	Sparganophilus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	9	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	7	ARTHROPODA	Insecta	Ephemeroptera	Ephemeridae	Ephemera
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	7	ANNELIDA	Oligochaeta	Haplotauxida	Glossoscolecidae	Sparganophilus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	7	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	5	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	5	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	5	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	4	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	ARTHROPODA	Insecta	Plecoptera	Perlidae	Agnetina=Phasgan
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	ARTHROPODA	Insecta	Plecoptera	Perlidae	Neoperla
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Polycentropodidae	Polycentropus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Acari	Arcarina	Arrenuridae	Arrenurus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	2	ARTHROPODA	Insecta	Plecoptera	Perlidae	Neoperla
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Helicopsychidae	Helicopsyche
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Crustacea	Isopoda	Asellidae	Lirceus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	PLATYHELMINTHES	Turbellaria	Tricladida	Planariidae	Dugesia
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Crustacea	Isopoda	Asellidae	Lirceus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Acari	Arcarina	Sperchoniidae	Sperchon
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Acaris	Arcarina	Torrenticolidae	Torrenticola
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Helicopsychidae	Helicopsyche
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	81	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	53	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	21	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	Gammarus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	18	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	17	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	16	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	13	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	12	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	9	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	9	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	7	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	7	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Polycentropodidae	Polycentropus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	5	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	5	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	4	ARTHROPODA	Insecta	Plecoptera	Leuctridae	Leuctra
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	4	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpanna
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	4	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	3	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	2	ARTHROPODA	Acaris	Arcarina	Hygrobatidae	Atractides
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	2	ARTHROPODA	Insecta	Plecoptera	Leuctridae	Leuctra
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Polycentropodidae	Polycentropus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Branchiobdellida			
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Optioservus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Ectopria
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Battle Creek	OK121700-06-0040G	41699	27-Aug-08	1	PLATYHELMINTHES	Turbellaria	Tricladida	Planariidae	Dugesia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	69	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	48	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	24	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	17	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	14	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	11	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	Gammarus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	11	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	9	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	8	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	7	ARTHROPODA	Insecta	Coleoptera	Elmidae	Optioservus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	6	ARTHROPODA	Insecta	Diptera	Tipulidae	Tipula
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	6	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	Gammarus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	5	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	5	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	4	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	4	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	ARTHROPODA	Crustacea	Isopoda	Perlidae	Agnetina=Phasgan
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Asellidae	Lirceus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Ephemerellidae	Ephemerella

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Perlidae	Isoperla
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	PLATYHELMINTHES	Turbellaria	Tricladida	Planariidae	Dugesia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Optioservus
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Antocha
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Empididae	Chelifera
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Acari	Arcarina	Lebertiidae	Lebertia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Isoperla
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Perlestia
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Battle Creek	OK121700-06-0040G	43337	22-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	73	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	32	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	11	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	7	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	7	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	5	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	5	ARTHROPODA	Insecta	Plecoptera	Leuctridae	Leuctra
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Insecta	Odonata	Gomphidae	Lanthus
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Insecta	Coleoptera	Elmidae	Optioservus
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	3	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Polycentropodidae	Polycentropus
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	ARTHROPODA	Branchiobdellida			
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Slavina
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	ARTHROPODA	Acari	Arcarina	Torrenticolidae	Torrenticola
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	PLATYHELMINTHES	Turbellaria	Tricladida	Planariidae	Dugesia

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Battle Creek	OK121700-06-0040G	44421	24-Aug-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Perlestia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	45	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	26	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	22	ARTHROPODA	Insecta	Hemiptera	Corixidae	Trichocorixa
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	8	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	6	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnophila
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Forcipomyia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ARTHROPODA	Crustacea	Ostracoda		
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ARTHROPODA	Insecta	Diptera	Stratiomyidae	Stratiomys
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Stilobezzia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Pristina
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Tropisternus
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Enochrus
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Hemiptera	Veliidae	Microvelia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Nigronia
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	MOLLUSCA	Gastropoda	Basommatophora	Physidae	Physella
riffle	Bird Creek	OK520800-01-0050G	41684	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Haliplidiae	Peltodytes
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	42	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	18	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	8	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	6	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	5	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlodidae	Hydroperla
riffle	Brazil Creek	OK220100-03-0010G	43334	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpanna
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	42	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	16	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	14	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	11	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	11	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	8	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	6	ANNELIDA	Oligochaeta	Haplotaidea	Naididae	Nais
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	3	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Brazil Creek	OK220100-03-0010G	44382	17-Aug-09	1	ANNELIDA	Oligochaeta	Haplotaidea	Naididae	Pristina
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	61	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	13	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	8	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	4	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	3	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	Gammarus
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	3	ARTHROPODA	Insecta	Coleoptera	Elmidae	Optioservus
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	2	ARTHROPODA	Insecta	Plecoptera	Perlodidae	Isoperla
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Helicopsychidae	Helicopsyche
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Ephemerellidae	Ephemerella
riffle	Brushy Creek	OK220600-03-0010J	44380	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Tipula
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	21	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	20	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	20	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	13	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	9	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	7	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	4	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	3	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	32	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	20	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	18	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	11	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	7	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	5	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	5	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	4	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	3	ANNELIDA	Oligochaeta	Haplotauxida	Lumbricidae	
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Pristina
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Libellulidae	Erythemis
riffle	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	23	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	20	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	18	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	16	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	13	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Pristina
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	11	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	7	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	7	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	5	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Enochrus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	3	ARTHROPODA	Acari	Arcarina	Lebertiidae	Lebertia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	3	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Microcylloepus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Paraleptophlebia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Odonata	Macromiinae	Macromia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Oecetis
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Acari	Arcarina	Torrenticolidae	Torrenticola
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Forcipomyia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnophila
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Canadian Sandy Creek	OK520600-03-0010D	44423	25-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Helicopsychidae	Helicopsyche
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	19	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	17	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	13	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	10	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	7	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	7	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	2	ANNELIDA	Oligochaeta	Haplotauxida	Lumbricidae	
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	1	ARTHROPODA	Crustacea	Isopoda	Asellidae	Lirceus
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Cloud Creek	OK120410-01-0100T	43326	20-Jan-09	1	ARTHROPODA	Crustacea	Isopoda	Asellidae	Asellus
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	64	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	17	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	2	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Paracymus
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Coody Creek	OK120400-01-0400F	42491	05-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	34	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	29	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	18	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	3	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Coody Creek	OK120400-01-0400F	43330	20-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	33	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	32	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	25	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	9	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	3	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	2	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Ceraclea
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Coody Creek	OK120400-01-0400F	44417	24-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	45	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	25	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	23	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	8	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	7	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	4	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	41704	09-Sep-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	64	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	18	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	8	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	1	MOLLUSCA	Gastropoda	Basommatophora	Physidae	Physella
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	43271	23-Jan-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	59	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	39	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	8	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	7	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	2	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Deep Fork of N. Canadian R.	OK520710-01-0010G	44427	26-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Slavina
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	9	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	5	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	3	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Oecetis
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	3	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Procloeon
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	2	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Sphaerium
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Dolichopodidae	Hydrophorus
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ANNELIDA	Hirudinea	Rhynchobellida	Glossiphoniidae	Placobdella
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ARTHROPODA	Insecta	Odonata	Libellulidae	
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Elk Creek	OK120400-02-0190D	42489	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	2	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	2	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Stilobezzia
riffle	Elk Creek	OK120400-02-0190D	44413	24-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	35	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	22	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	17	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	9	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	4	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Perlidae	Isoperla
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Taeniopterygidae	Oemopteryx
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Fourche Maline Creek	OK220100-04-0020H	43333	21-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	28	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	4	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Labiobaetus
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Sphaerium
riffle	Fourche Maline Creek	OK220100-04-0020H	44381	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	47	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	29	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	12	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	3	ARTHROPODA	Insecta	Coleoptera	Scirtidae	Scirtes
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Tipulidae	Tipula
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	2	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Dolichopodidae	Hydrophorus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	42490	05-Aug-08	1	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Sphaerium
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	18	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	15	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	9	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	4	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	3	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	43344	05-Mar-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	9	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	9	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	9	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	6	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	2	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrochidae	Hydrochus
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	1	ARTHROPODA	Insecta	Odonata	Aeshnidae	Nasiaeschna
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	George's Fork of Dirty Creek	OK120400-02-0110D	44416	24-Aug-09	1	ARTHROPODA	Insecta	Lepidoptera	Pyralidae	
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	47	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	45	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	5	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	5	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	3	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Paracloeodes
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Odonata	Macromiinae	Macromia
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Crustacea	Ostracoda		
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Scirtidae	Scirtes
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Little Wewoka Creek	OK520500-02-0090D	41683	06-Aug-08	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	38	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	24	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	16	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	16	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	9	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	8	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ANNELIDA	Oligochaeta	Haplotaxida	Naididae	Nais
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Hydroperla
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Acari	Arcarina	Torrenticolidae	Torrenticola
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	42	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	21	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	17	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	12	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	4	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	ARTHROPODA	Crustacea	Isopoda	Asellidae	Lirceus
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	72	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	21	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	4	ARTHROPODA	Insecta	Trichoptera	Limnephilidae	Pycnopsyche
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	4	ANNELIDA	Oligochaeta	Haplotaxida	Naididae	Nais
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	4	ANNELIDA	Oligochaeta	Haplotaxida	Naididae	Slavina
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	2	ARTHROPODA	Insecta	Coleoptera	Scirtidae	Scirtes
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	1	ARTHROPODA	Insecta	Diptera	Dolichopodidae	Hydrophorus
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnophila
riffle	Mill Creek	OK220600-01-0100P	43339	23-Jan-09	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	48	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	20	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	4	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	1	ANNELIDA	Hirudinea	Rhynchobellida	Glossiphoniidae	Helobdella
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Nigronia
riffle	Mill Creek	OK220600-01-0100P	44420	27-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chaoboridae	Chaoborus
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	44	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	32	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	25	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	17	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	7	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	6	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	6	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	5	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	5	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	4	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	3	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Branchiura
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	2	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	1	ANNELIDA	Oligochaeta	Haplotaxida	Naididae	Nais
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Helicopsychidae	Helicopsyche
riffle	Peaceable Creek	OK220600-03-0050F	44379	17-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	45	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	29	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	22	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	20	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	17	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Smicridea
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	5	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Heptagenia
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Enochrus
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Polecat Creek	OK120420-02-0050D	42485	05-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Nectopsyche
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	50	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	28	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	18	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	16	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	7	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Dero
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	4	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Chaetogaster
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Polecat Creek	OK120420-02-0050D	43324	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	67	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	42	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	4	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	2	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Sphaerium
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Chaetogaster

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Polecat Creek	OK120420-02-0050D	44060	14-Jul-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	38	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	19	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	13	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	8	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	7	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	5	ARTHROPODA	Insecta	Plecoptera	Perlidae	Agnetina=Phasgan
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	5	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	3	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Branchiura
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	2	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acentrella
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ARTHROPODA	Insecta	Lepidoptera	Pyralidae	Petrophila
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	41702	27-Aug-08	1	ANNELIDA	Oligochaeta	Haplotaxida	Tubificidae	Limnodrilus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	70	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	38	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	23	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	2	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Agnetina=Phasgan

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	PLATYHELMINTHES	Turbellaria	Tricladida	Planariidae	Dugesia
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Sphaerium
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	52	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	49	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	13	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	8	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	5	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Brachycercus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Odonata	Calopterygidae	Hetaerina
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Microcylloepus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Neochoroterpes
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	20	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	14	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	14	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	11	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	7	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	5	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	4	ARTHROPODA	Crustacea	Amphipoda	Gammaridae	Gammarus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	4	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Ephemeridae	Ephemera
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Crustacea	Isopoda	Asellidae	Lirceus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis-Elimia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	41701	27-Aug-08	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	67	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	12	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	6	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	3	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Microcylloepus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Perlidae	Isoperla
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Stylogomphus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Ectoria
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Acroneuria
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	35	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	26	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	22	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	14	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	11	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	11	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	11	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	3	ARTHROPODA	Insecta	Plecoptera	Perlidae	Agnetina=Phasgan
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	3	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	3	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Ceraclea
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Microcylloepus
riffle	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Plecoptera	Perlidae	Neoperla
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	38	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	27	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	13	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	12	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	10	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	7	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	5	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Labiobaetis
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	3	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	3	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Paracloeodes
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	35	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	28	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	27	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	19	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	13	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	11	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	3	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Chaetogaster
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ANNELIDA	Oligochaeta	Haplotaidea	Naididae	Nais
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	San Bois Creek	OK220200-04-0010G	43343	23-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	82	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	5	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	MOLLUSCA	Pelecypoda	Unionoida	Unionidae	
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	ARTHROPODA	Insecta	Odonata	Macromiinae	Macromia
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	San Bois Creek	OK220200-04-0010G	44383	17-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Hexatoma
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	66	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	56	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	16	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	7	ANNELIDA	Oligochaeta	Haplotaidea	Tubificidae	Branchiura
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	4	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Oecetis
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Heterelmis
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Scirtidae	Scirtes
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
riffle	Snake Creek	OK120410-01-0220G	42486	05-Aug-08	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	70	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	8	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	3	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	3	ARTHROPODA	Insecta	Plecoptera	Capniidae	Allocapnia
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Slavina
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Snake Creek	OK120410-01-0220G	43325	20-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	60	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	41	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	20	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	10	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	5	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	4	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	4	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Atrichopogon
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	2	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	1	ARTHROPODA	Insecta	Lepidoptera	Pyralidae	
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Procloeon
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
riffle	Snake Creek	OK120410-01-0220G	44059	14-Jul-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	21	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	12	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	11	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	3	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	2	ANNELIDA	Hirudinea	Pharyngobdellida	Erpobdellidae	Mooreobdella

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Odonata	Aeshnidae	Nasiaeschna
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsytiidae	Hydroptila
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	MOLLUSCA	Pelecypoda	Veneroida	Sphaeriidae	Pisidium
riffle	South Fork of Dirty Creek	OK120400-02-0030F	44415	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	34	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	32	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	22	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	8	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	5	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	36	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	29	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	5	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	43264	20-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	37	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Branchiura
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	25	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	17	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	16	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	16	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	12	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	4	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Pristina
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	4	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	3	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	2	ANNELIDA	Oligochaeta	Haplotauxida	Tubificidae	Limnodrilus
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Forcipomyia
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Gomphus
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
riffle	Wewoka Creek: Downstrm	OK520500-02-0010C	44433	27-Aug-09	1	MOLLUSCA	Pelecypoda	Venerida	Sphaeriidae	Sphaerium
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Gyrinidae	Dineutus
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	3	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	8	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	59	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	6	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	5	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Odonata	Calopterygidae	Hetaerina
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Nectopsyche
veg	Mill Creek	OK220600-01-0100P	42493	21-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	30	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	10	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	6	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	44	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	16	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
veg	Sallisaw Creek: Lower	OK220200-03-0010C	43336	21-Jan-09	4	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Microcylloepus
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	10	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	13	ARTHROPODA	Insecta	Coleoptera	Staphylinidae	
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	1	ARTHROPODA	Insecta	Hemiptera	Veliidae	Rhagovelia
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	2	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
veg	Sallisaw Creek: Lower	OK220200-03-0010C	44418	25-Aug-09	2	ARTHROPODA	Insecta	Odonata	Calopterygidae	Hetaerina
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Limnephilidae	Pycnopsyche
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	87	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Ephemerellidae	Eurylophella
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ARTHROPODA	Acari	Arcarina		
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
veg	Sallisaw Creek: Upper	OK220200-03-0010G	43335	21-Jan-09	2	ARTHROPODA	Insecta	Plecoptera	Taeniopterygidae	Strophopteryx
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Enallagma
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	8	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	3	ARTHROPODA	Insecta	Coleoptera	Psephenidae	Psephenus
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	4	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	10	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Procloeon
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Centroptilum
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	4	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	60	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
veg	Sallisaw Creek: Upper	OK220200-03-0010G	44419	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Cambarus
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Leptophlebiidae	Leptophlebia
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenonema
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	10	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Procloeon
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	4	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Atrichopogon
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	27	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Ballard Creek	OK121700-03-0370G	41700	27-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
woody	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Crustacea	Decapoda	Cambaridae	Orconectes
woody	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	3	MOLLUSCA	Gastropoda	Neotaenioglossa	Pleuroceridae	Goniobasis=Elimia
woody	Ballard Creek	OK121700-03-0370G	44422	24-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Bird Creek	OK520800-01-0050G	43266	20-Jan-09	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Diptera	Tabanidae	Tabanus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	8	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	5	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Gyrinidae	Dineutus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Gomphus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Leptoceridae	Oecetis
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	2	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
woody	Canadian Sandy Creek	OK520600-03-0010D	41697	25-Aug-08	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	4	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	6	MOLLUSCA	Gastropoda	Basommatophora	Physidae	Physella
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Tipula
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnephilus
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Slavina
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	39	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Gyrinidae	Dineutus
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	15	ARTHROPODA	Crustacea	Amphipoda	Talitridae	Hyalella
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Canadian Sandy Creek	OK520600-03-0010D	43270	22-Jan-09	6	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	54	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	13	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	18	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallcone
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
woody	Dry Creek	OK520700-04-0020F	41692	22-Aug-08	3	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	4	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	28	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	20	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Heterelmis
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Dolichopodidae	Hydrophorus
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Dry Creek	OK520700-04-0020F	43267	22-Jan-09	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Dry Creek	OK520700-04-0020F	44426	25-Aug-09	16	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	20	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	7	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	1	ARTHROPODA	Insecta	Plecoptera	Perlodidae	Hydroperla
woody	Little Wewoka Creek	OK520500-02-0090D	43265	20-Jan-09	12	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	47	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Progomphus
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Odonata	Macromiinae	Macromia
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	10	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	3	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Paracloeodes
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	7	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	31	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Quapaw Creek	OK520700-04-0260C	41693	22-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	28	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	33	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Dryopidae	Helichus
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	5	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	1	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	2	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	17	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
woody	Quapaw Creek	OK520700-04-0260C	43272	23-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	3	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	2	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	16	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	3	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Dubiraphia
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Quapaw Creek	OK520700-04-0260C	44428	26-Aug-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	2	ARTHROPODA	Insecta	Diptera	Empididae	Hemerodromia
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	36	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Gyrinidae	Dineutus
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Caenis
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	15	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	8	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	6	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Tricorythidae	Tricorythodes
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	41690	22-Aug-08	25	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	31	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	1	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Stenacron
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	28	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	12	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	2	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Dasyhelea
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	3	ANNELIDA	Oligochaeta	Haplotauxida	Naididae	Nais
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	21	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Bezzia
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	43274	23-Jan-09	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Acerpenna
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	25	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	1	ARTHROPODA	Insecta	Megaloptera	Corydalidae	Corydalus
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	9	MOLLUSCA	Pelecypoda	Veneroida	Corbiculidae	Corbicula
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	1	ARTHROPODA	Insecta	Coleoptera	Elmidae	Stenelmis
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	1	ARTHROPODA	Insecta	Diptera	Tipulidae	Limnophila
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	1	ARTHROPODA	Insecta	Diptera	Ceratopogonidae	Probezzia
woody	Salt Creek (Creek Co.)	OK520700-03-0100B	44430	26-Aug-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	13	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	54	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	6	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Diptera	Simuliidae	Simulium
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Trichoptera	Philopotamidae	Chimarra
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	1	ARTHROPODA	Insecta	Ephemeroptera	Caenidae	Cercobrachys
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	4	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	7	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Fallceon
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Enochrus
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Ephemeroptera	Heptageniidae	Leucrocuta
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	4	ARTHROPODA	Insecta	Ephemeroptera	Isonychiidae	Isonychia
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	41703	09-Sep-08	2	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Berosus
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Diptera	Chironomidae	Pseudochironomini
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	14	ARTHROPODA	Insecta	Diptera	Chironomidae	Orthocladiinae
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	42	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	50	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	11	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Coenagrionidae	Argia
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Hydroptilidae	Hydroptila
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Odonata	Gomphidae	Erpetogomphus

**Appendix C. Macroinvertebrate collection data.**

Sample type	Sitename	WBID	Sample ID	Date	Number	BugPhylum	BugClass	BugOrder	BugFamily	BugGenus
woody	Salt Creek (Seminole Co.)	OK520800-03-0010D	43269	22-Jan-09	1	ARTHROPODA	Insecta	Trichoptera	Limnephilidae	
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	2	ARTHROPODA	Insecta	Ephemeroptera	Baetidae	Baetis
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	9	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Potamyia
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	39	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Cheumatopsyche
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	43	ARTHROPODA	Insecta	Trichoptera	Hydropsychidae	Hydropsyche
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	4	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanypodinae
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	1	ARTHROPODA	Insecta	Coleoptera	Hydrophilidae	Enochrus
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	1	ARTHROPODA	Acari	Arcarina	Eremaeidae	Hydrozetes
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	21	ARTHROPODA	Insecta	Diptera	Chironomidae	Chironomini
woody	Wewoka Creek: Downstrm	OK520500-02-0010C	41682	06-Aug-08	9	ARTHROPODA	Insecta	Diptera	Chironomidae	Tanytarsini