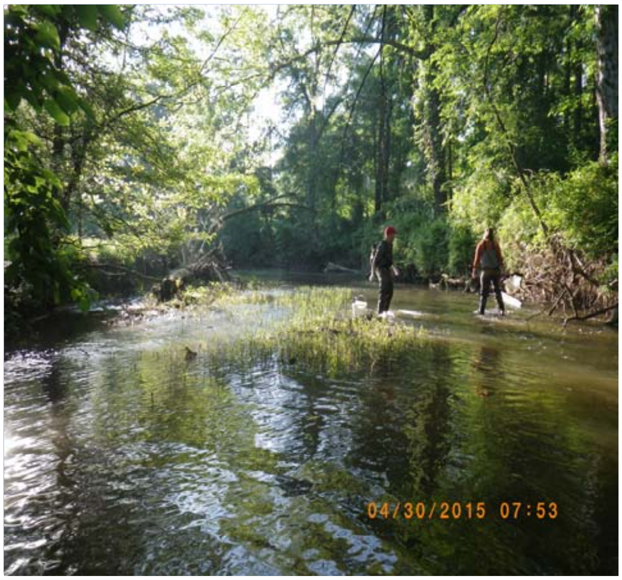
EXHIBIT B

REVISED SITE SPECIFIC STUDY

Poteau River Section 2.306 Site Specific Water Quality Study

Tyson Poultry, Inc.
Waldron Facility

Revision 3
December 2018
October 28, 2016



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Poteau River Section 2.306 Site Specific Water Quality Study

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Revised December 2018
October 28, 2016

EXECUTIVE SUMMARY

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Executive Summary

Study Objective

To collect appropriate water quality data sufficient to revise the in-stream water quality criteria (WQC) for chloride, sulfate and TDS in a segment(s) of the Poteau River and in the Unnamed Tributary that carries the effluent to the river in accordance with Arkansas Regulation 2.306.

Introduction and Background

A 3rd party rulemaking exercise was completed in mid-1990's that removed the domestic water supply use and established the current instream standards for minerals in the Unnamed Tributary (receiving discharges from Tyson Foods Waldron and the City of Waldron) to the Poteau River and the Poteau River downstream of the Unnamed Tributary and Highway 71 (Reach 031). Since then, phosphorus limits have been imposed on the facility requiring changes in treatment chemicals that have increased the discharge of minerals. In addition, increases in dissolved minerals from the Tyson Waldron Facility are the result of increased boiler blowdown from the production of increased volumes of hot water and increased use of cleaners needed to comply with USDA and FSIS rules regarding food safety; and increased quantities of marinades associated with Tyson Waldron's products. The facilities current circumstances led them to pursue a study to determine if the in-stream WQC for minerals (TDS, chloride and sulfate) could be further revised.

In March 2012 a Study was completed titled *Poteau River study - Section 2.306 Site Specific Water Quality Study* (GBM^c, 2012). This study contained all the required data to revise the in-stream water quality criteria for minerals in the Poteau River downstream of the effluent discharges from the Tyson Poultry facility in Waldron, Arkansas and the City of Waldron. The study was completed following methodology detailed in a Quality Assurance Project Plan (QAPP) (GBM^c, 2010) that was approved by the ADEQ in March 2011.

A key component of that study was a biological assessment designed to determine if the aquatic life use (fishery use) was being maintained downstream of the effluent discharges. The findings of the bioassessment indicated that the fishery use was being maintained in the Poteau River. However, the ADEQ determined that the data provided in the referenced report were insufficient for ADEQ to concur with the determination that the fisheries use is supported, and that additional data collection would be necessary to reach the study objective. An agreement was reached between Tyson Poultry and the ADEQ to complete supplemental study of the river over a 12-month period that would provide additional data sufficient for ADEQ to make a decision on use support. This study was designed with more of a watershed focus, to evaluate potential non-point source influences and allow assessment of use attainment in several reaches of the river above and below the City of Waldron and the effluent discharges.

Prior to initiating this new study, Tyson Poultry met with EPA Region 6 staff to discuss the Tyson Poultry Waldron Facility situation, the results of the 2012 study, and the course of action suggested by the ADEQ. EPA acknowledged that considerable effort had been exhausted by Tyson Poultry on this project and that they supported the plan for additional data collection. At that time EPA placed the facility under an Administrative Order that included completion of the study addendum as a required component. A timeline presenting all the tasks/actions completed by Tyson Poultry to achieve the study objectives is provided in Appendix A. The following sections of the Executive Summary provide information regarding the work completed to date in support of the project objective.

2012 Poteau River Study - Summary of Results and Conclusions

The 2012 Poteau River study consisted of a field study to evaluate water quality and aquatic life (bioassessment) in the river and the Unnamed Tributary, evaluation of permit required routine biomonitoring results (chronic toxicity testing), salinity toxicity modeling, effluent data characterization and general near-field watershed analysis (land-use, potential key non-point sources, etc. in the general vicinity of Waldron). This study is provided immediately following the Executive Summary at Page 1.

The field study consisted of collection of physical, biological, *in-situ*, and chemical data from stations located on the Poteau River and the Unnamed Tributary to the Poteau River and was completed between March 2011 and February 2012. Monitoring stations used in the study were the Poteau River, upstream of the Tyson Waldron Outfall 001 discharge (PR-1), the Poteau River downstream from the Tyson Waldron Outfall 001 and the City of Waldron discharge and the confluence with the Unnamed Tributary that receives the discharge (PR-2), further downstream in the Poteau River (PR-3), and in the Unnamed Tributary downstream from the Tyson Waldron Outfall 001 and the City of Waldron discharges (UT-2). As outlined in the QAPP for the project, the field study consisted primarily of habitat characterization, spring and fall macroinvertebrate collections, fall fish collection at stations PR-1, PR-2, and UT-2 (PR-3 added); and twelve monthly collections of water quality samples, and *in-situ* and flow measurements at stations PR-1, PR-2, and UT-2. A map is included as Figure EX-1 that depicts the location of these monitoring reaches.

Results of the study and follow-up analysis recommended by the ADEQ during their review of the study report, provided the following key conclusions:

1. The fishery designated use for the Unnamed Tributary and the Poteau River are being maintained. However, those uses may not be at optimal levels because of specific non-point sources and un-permitted discharges documented during the study (see 2012 study report for details).
2. Habitat quality was sub-optimal in all Poteau River reaches (PR-1, PR-2 and PR-3) and marginal in the Unnamed Tributary (UT-2).
3. The macroinvertebrate community was in attainment of the fishery use at both the Poteau River stations during both the spring and the fall according to the ADEQ multimeric index (Figure EX-2). At UT-2 the macroinvertebrate scores indicated attainment in the fall but not in the spring. However, based on the aquatic life potential of the unnamed tributary and the lack of a suitable reference stream, the UT-2 was determined to be in attainment.
4. The fish collections for the Poteau River were typical of small Arkansas River Valley Ecoregion fisheries and indicated attainment of the fishery use according to the ADEQ Fish Community Similarity Index (Figure EX-3).
5. The Poteau River Station (PR-2) downstream of the confluence with of the Unnamed Tributary contained a higher quality fishery than the upstream station (PR-1).
6. The whole effluent toxicity testing results for the Tyson Waldron Facility reveal an excellent toxicity record and document that the levels of chloride, sulfate, and TDS discharged do not interfere with toxicity test organism health. As these organisms are selected to serve as surrogates for the natural aquatic environment these results are further evidence that the minerals are likely not having adverse effects instream.
7. Chloride, sulfate, and TDS measurements in the Poteau River upstream of the confluence with the Unnamed Tributary were occasionally atypical during storm events, suggesting non-point source influences upstream.
8. Non-point sources (during storm events) and un-permitted discharges were potentially significant issues within the reach of stream examined in 2012, as documented by ADEQ complaint investigations and noted during the study.

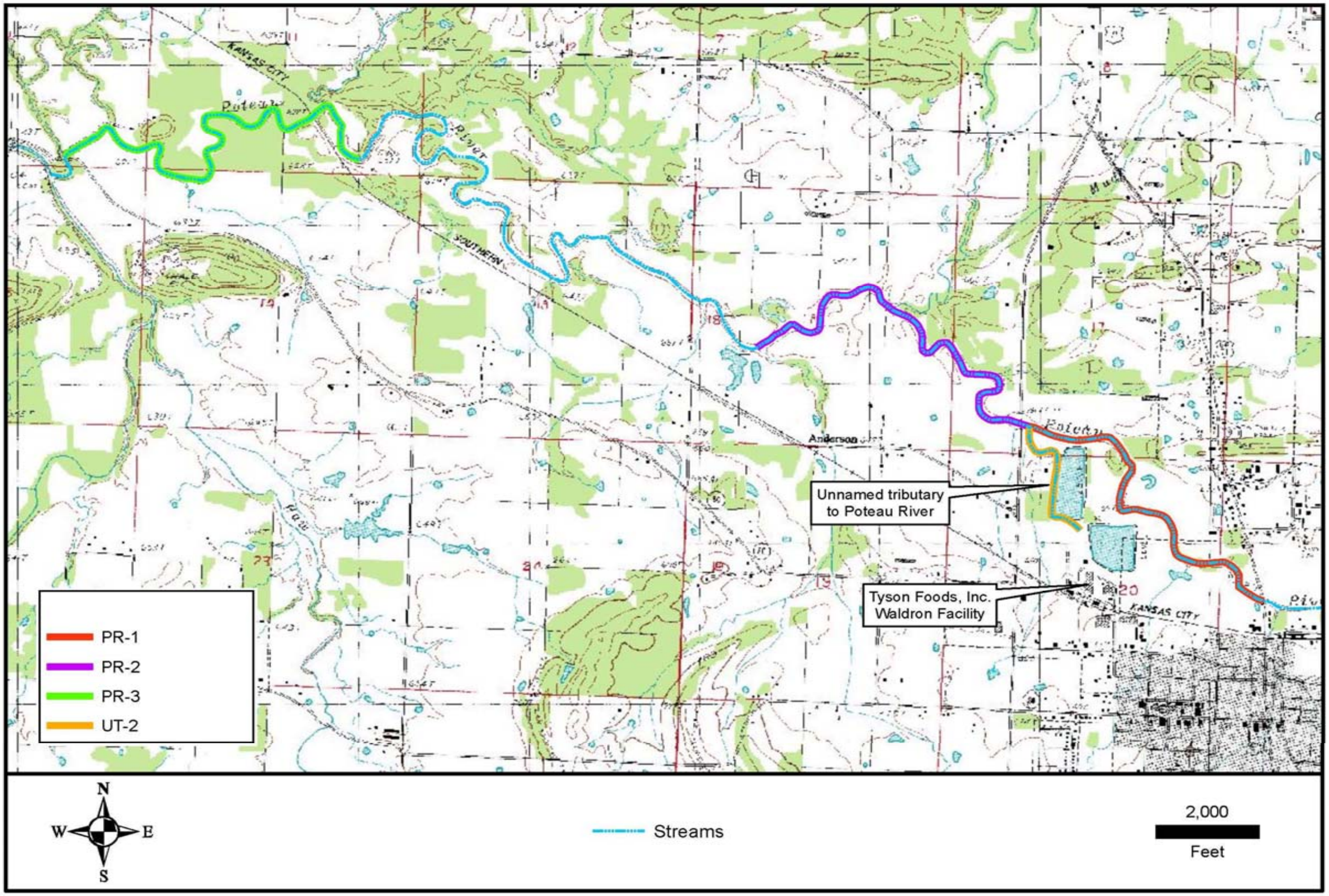

Figure EX-1. Study reaches utilized in the 2012 Study Report.

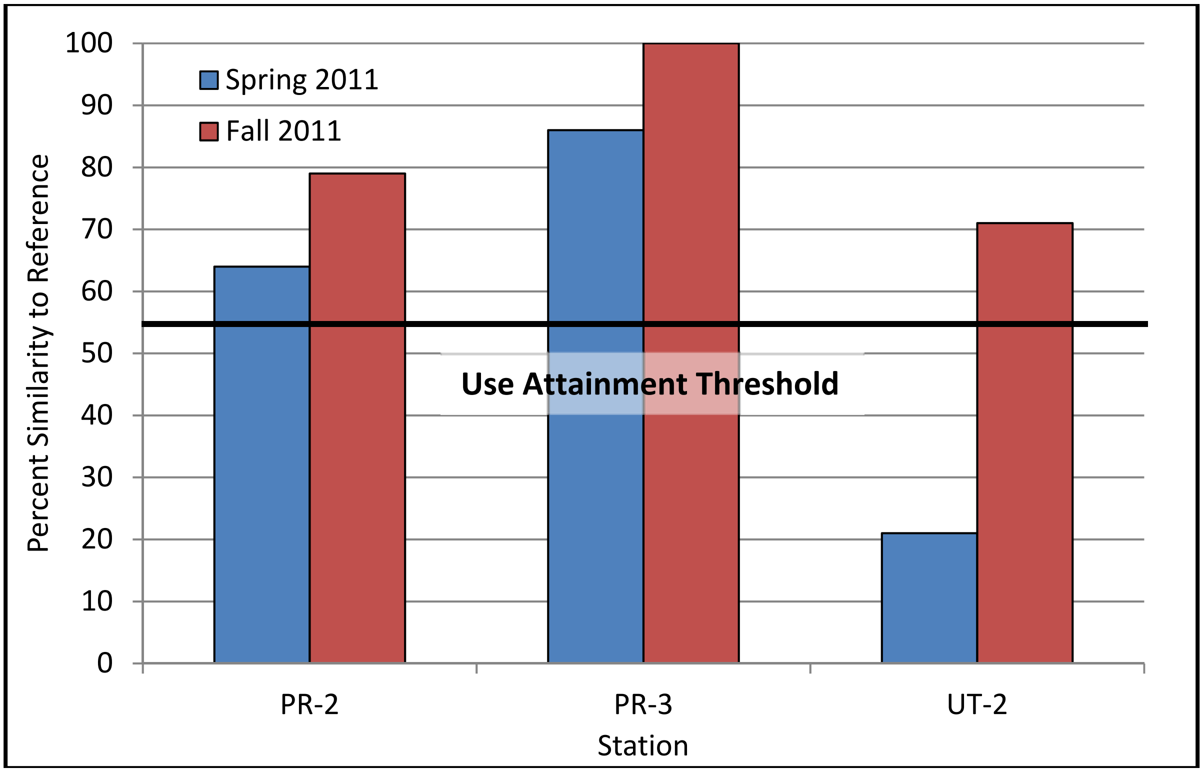

Figure EX-2. Scores for Poteau River macroinvertebrate collections according to the ADEQ Multimeric Scoring System (provided by ADEQ in their comments on the 2012 study).

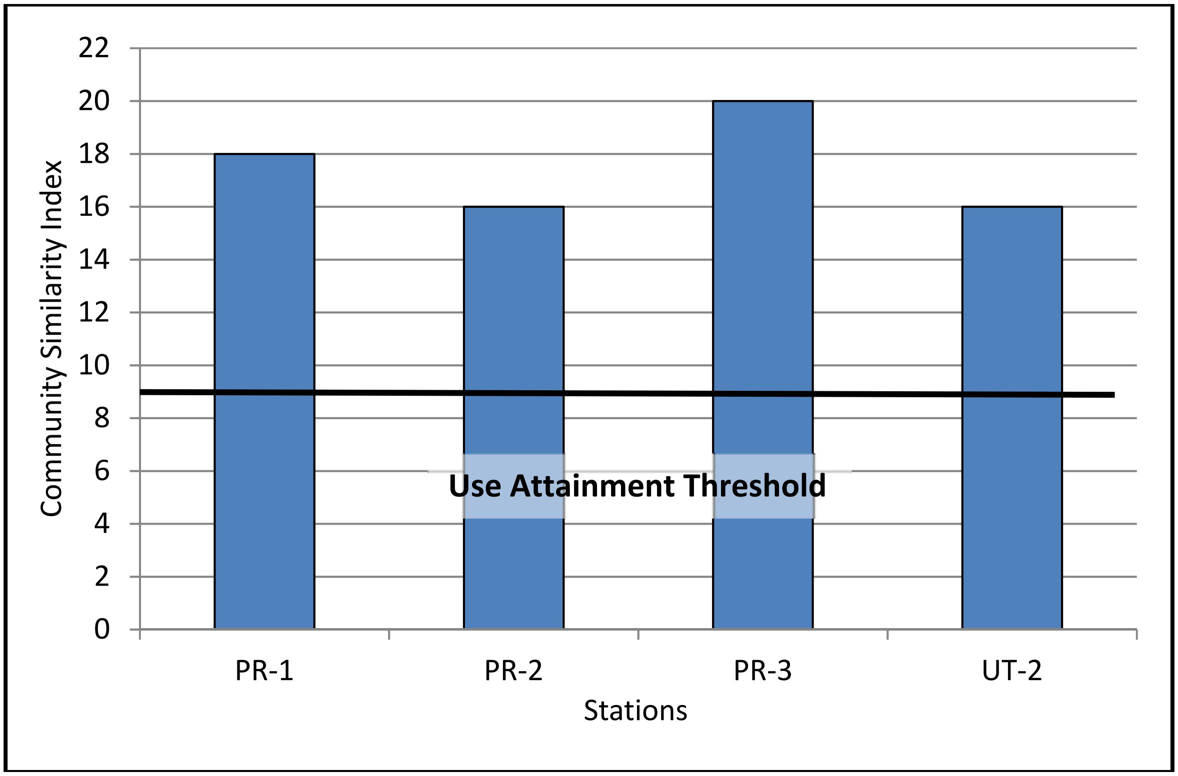

Figure EX-3. Scores of Poteau River fish community according to the ADEQ Fish Community Similarity Index.

The conclusions from the 2012 study provided above state that the UT-2 macroinvertebrates passed the similarity index (indicating support) 50% of the time. It should be noted that the unnamed tributary was compared to PR-1 as it was the only option identified. No suitable reference condition was available for UT-2, as it is small, begins at the Tyson outfall and is entirely man-made/altered and in very poor condition due to historical dumping. Considering it passes the macroinvertebrate condition index 50 percent of the time, when compared to the Poteau River, is evidence that it is attaining all aquatic life uses it is capable of attaining.

2016 Study Addendum - Summary Results and Conclusions

The main purposes of the study addendum are:

1. Assess fishery (aquatic life) use attainment in the Poteau River, and
2. Determine if non-point sources are having an impact in the river, and if so, are they the cause of any impairment to the fishery designated use in the river.

The approach (methodology) to macroinvertebrate collection, macroinvertebrate sorting and identification, habitat analysis and water quality monitoring followed that of the original ADEQ approved Quality Assurance Project Plan (QAPP) (GBM[c], March 2, 2011) with the intent to "…replicate, to the extent possible…" the 2012 study methodology. However, additional data were collected at the request of the ADEQ including, Wolman Pebble counts at each station and the addition of three upstream reference/background stations on the river and addition of one local reference stream station on Jones Creek. No additional data was collected from UT-2 as it does not have a suitable reference. The unnamed tributary is man-made (and/or man altered) from the Tyson outfall all the way to the Poteau River. Additional data was unlikely to result in any new definitive conclusions. Due to this complexity of UT-2, the focus of the study addendum was on the Poteau River. The study Addendum Report is provided immediately following the 2012 Study Report beginning at Page ADD-1.

The following monitoring stations were utilized (Figure EX-4).

1. PR-1 Poteau River upstream site, original reference site from 2011/2012 study.
2. PR-2 Poteau River first downstream site, from 2011/2012 study (at AR0055).
3. PR-3 Poteau River second downstream site, from 2011/2012 study.
4. PR-0.5 Poteau River upstream of Hwy 71B bridge crossing (new site).
5. JC-1 Jones Creek approximately ¼ mile upstream of confluence with Poteau River. Serves as an additional reference site in the Poteau River watershed (new site).

6. PR-0E Poteau River East Fork upstream of the transmission line crossing just north of Waldron (new site).
7. PR-0W Poteau River West Fork, upstream of Hwy 80 crossing (new site).

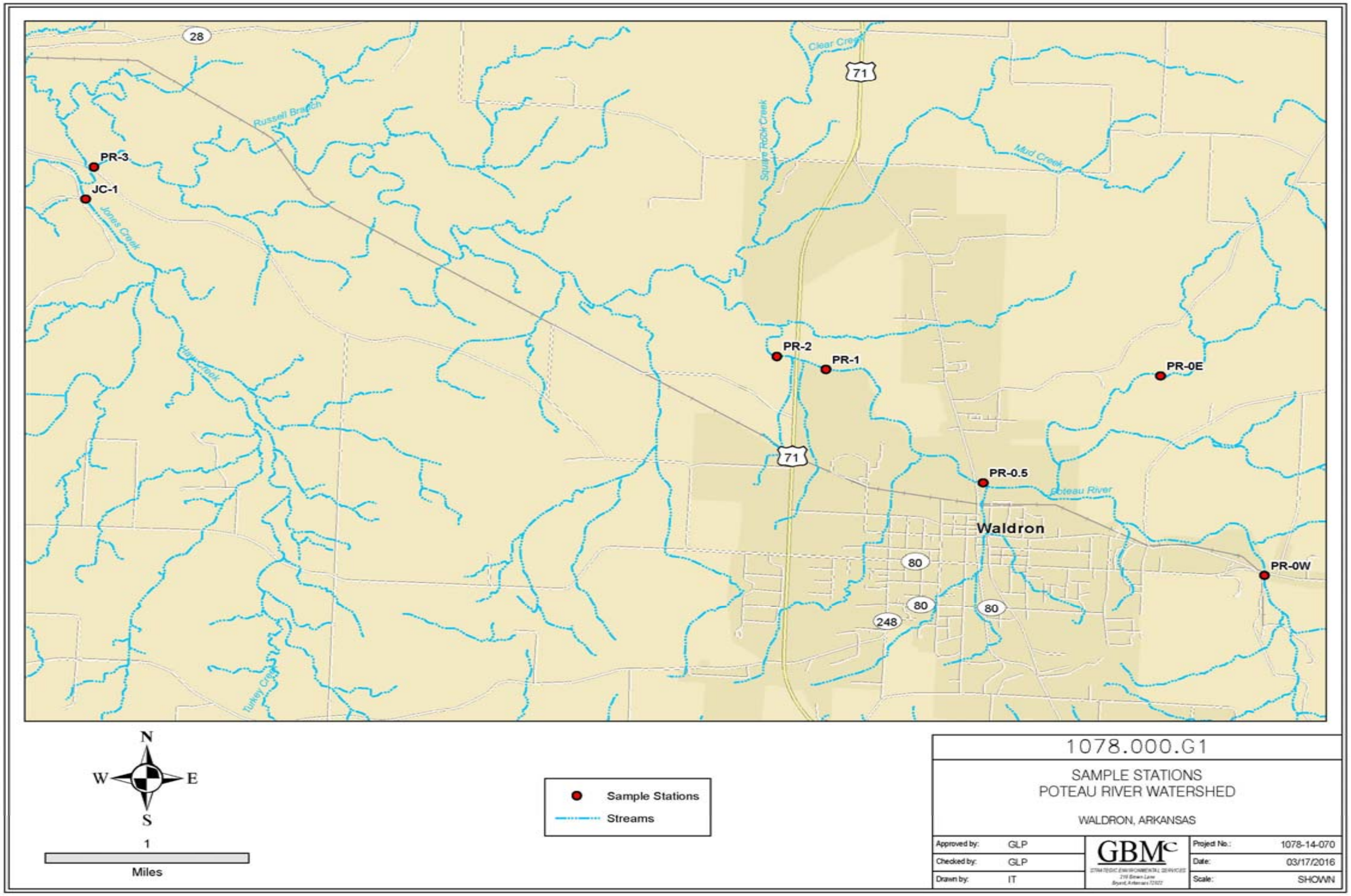

Figure EX-4. Monitoring Stations for 2015 Study Addendum.

Stations PR-0E, PR-0W, PR-0.5 and PR-1 are in the Poteau River upstream of the point source dischargers (Tyson Poultry, Inc. and the City of Waldron) and are utilized in this study as reference/background conditions were warranted (i.e. bioassessment comparisons). Stations PR-0E and PR-0W were also generally upstream of developed land use influences (residential, commercial and industrial land uses) from the City of Waldron and are more rural in nature. Station JC-1 is an independent regional reference station in the Poteau River watershed and was also used as a reference/background condition where warranted. JC-1 is mostly affected by rural land uses.

Ambient water quality sampling and *in-situ* measurements were completed each month from January 2015 through December 2015. An additional high flow storm water sample was collected in April 2015. Macroinvertebrate collections were completed in the spring and fall seasons. Semi-quantitative habitat analysis, including the pebble counts (100 pebble observations per sample reach following Wolman, (1954) were also completed during the spring and fall assessments. Fish collections were not repeated during this study. Flow was measured according to the velocity-area method at each station during each ambient sample event. Flow was also measured during the high flow events where safety and access allowed. Water samples from each station were analyzed for the parameters listed in Table EX-1. Parameters measured in the field (mostly *in-situ*) included pH, temperature, dissolved oxygen, specific conductance, and turbidity.

Table EX-1. Water quality sample parameters.

Parameter	Number samples/Station
TDS	13
Chloride	13
Sulfate	13
Ammonia	13
Nitrate-Nitrite	13
Total Phosphorus	13
TSS	13
Total copper	13
Total zinc	13
Total cadmium	13
TOC	13

Results of the 2016 study addendum provide the following key conclusions:

- Concentrations of various constituents of concern, such as phosphorus and metals were as high or nearly as high above the point source (PS) discharges as they were below the discharges under baseflow conditions.
- Storm flow concentrations and loads of various key constituents, including phosphorus and metals were higher at stations above the PS discharges than they were below.
- TDS levels, during baseflow were highest downstream of the PS discharge, but during high flow events, TDS is similar at all stations.
- The water quality data indicates significant NPS influence (during storm events) in the river for many pollutants.
- Habitat was sub-optimal at all stations, but sufficient to maintain biological integrity.
- Macroinvertebrate community composition was similar at all stations monitored in the Spring 2015
- Macroinvertebrate community composition showed some minor differences in the Fall 2015, however, differences represented in stations downstream of the discharge generally depict an improved community.
- Macroinvertebrates at each station downstream of the Tyson Discharge (PR-2 and PR-3) were compared to the three stations that generally had the best community metrics (PR-0.5, PR-1 and JC-1). All comparisons were greater than 54% similarity, indicating the downstream stations are supporting a diverse macroinvertebrate community that is similar to the reference site (Figure 5 and 6).
- Macroinvertebrates at each station downstream of the Tyson Discharge (PR-2 and PR-3) were supporting the Aquatic Life (Fishery) use according to the ADEQ Assessment Criteria.
- Based on the “Supporting” Fishery Use determination it is evident that elevated concentrations of dissolved minerals downstream of the PS discharges were not adversely affecting the macroinvertebrate community.

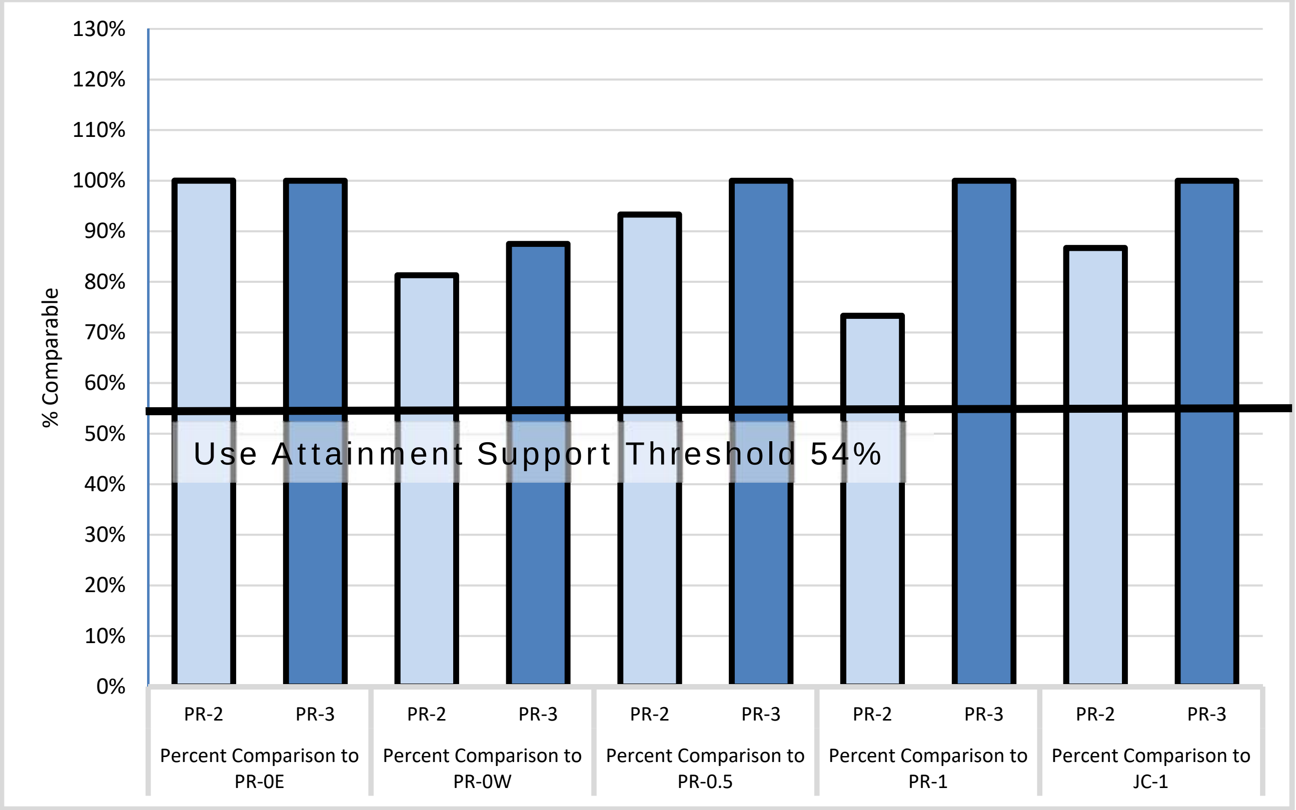

Figure EX-5. Spring 2015 macroinvertebrate Use Support status based on Biological Condition Criteria, PR-2 is shown in light blue and PR-3 is in dark blue.

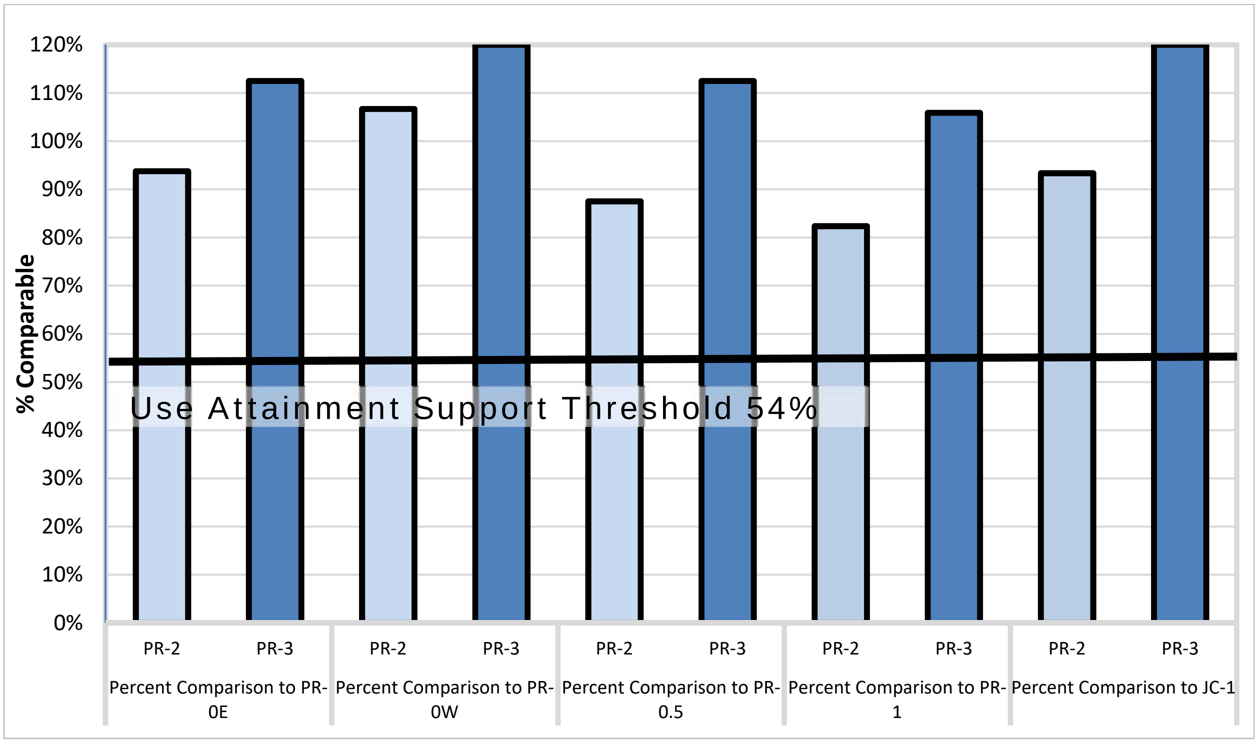

Figure EX-6. Fall 2015 macroinvertebrate Use Support status based on Biological Condition Criteria, PR-2 is shown in light blue and PR-3 is in dark blue.

Our recommendations, based on the finding of this supplementary study are that the Fisheries Use be designated as “Supporting” and that the revision of the minerals WQC proceed.

Proposed Changes to WQC in Poteau River and the Unnamed Tributary

The new proposed WQC for minerals is presented in Table EX-2. These new criteria are based on the current ADEQ procedure to establish instream site specific minerals criteria and supersede any previous criteria calculated for this project.

Table EX-2. Proposed new WQC for minerals in the Poteau River.

Stream	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
Poteau River (PR-2)	185	200	786
Unnamed Tributary (UT-2)	180	200	870

The “Instream Criteria” that are presented in Table EX-2 were developed from water quality sampling for those parameters in the Poteau River and the Unnamed Tributary downstream of the two point source discharges (Tyson Waldron and the City of Waldron). Data used in developing the criteria are provided in Appendix B. The proposed WQC for the Poteau River are the 95th percentile of the in-stream data collected during these two studies (2012 and 2015/16) and by ADEQ over the five year study period, as part of their ambient monitoring program. The instream criteria for the Unnamed Tributary are the 95th percentile of the monthly data collected during the 2012 study.

These new WQC are appropriate based on the results of the bioassessments. The macroinvertebrate community in the river was evaluated in 2012 and again in 2015 during the same timeframe that these samples were collected. Results from the studies indicate that the macroinvertebrate community below the point source discharges is similar to that of the local control streams and is in attainment of the aquatic life use (Fishery Use). Therefore, since the biota in the river is in attainment of the Fishery Use, under the existing and historical minerals levels, the water quality criteria can be safely adjusted to the level observed in the river over the past several years with assurance that the Fishery use will continue to be maintained. The 95th percentile was used to establish this new WQC for each mineral as specified by ADEQ.

We recommend that the new instream criteria in the Poteau River extend from the confluence of the Unnamed Tributary (the receiving stream) downstream to the Highway 59 Bridge crossing (Walker Mountain Road) that is just downstream of the confluence of Shadley Creek and Cedar Creek, in Arkansas. This location is approximately 5 miles upstream of the Oklahoma state line.

As noted above, the requested WQC for sulfate, chloride and TDS are consistent with the historical discharge concentrations that the river has experienced for the past several years and have not triggered any Beneficial Use Monitoring Program (BUMP) assessment thresholds in Oklahoma to date (700 mg/L for TDS and 250 mg/L for chloride and sulfate). In addition, based on a cursory review of water quality data for chloride, sulfate and TDS at both the USGS Cauthron, Arkansas station (USGS No. 07247000) and at the Oklahoma Water Resources Board BUMP station (No. 220100020010-001AT) near Heavener, Oklahoma, it appears that the data from 2008 to current is well below the thresholds noted above. Specifically, out of the 28 data points from the Cauthron site, there were no values reported in exceedance of the current standard. Further, we recommend that the proposed criteria in the unnamed tributary begin at the Tyson outfall and extend to the Poteau River thence extending downstream in the river to the Highway 59 bridge.

The remainder of the report is organized as follows:

- The initial Reg. Section 2.306 Site Specific Water Quality Study is presented immediately following the Executive Summary, beginning at Page 1 and continuing through Page 60. It provides results and information as existed during the period of time in which the study was conducted (March 2011-February 2012).
- The Addendum Study immediately follows the initial Reg. Section 2.306 Site Specific Water Quality Study beginning at Page ADD-1 through ADD-21. It provides results and information as existed during the period of time in which the study was conducted.
- Appendices referenced are found following the Addendum.

1.0 Introduction

1.1 Background

A 3rd party rulemaking exercise was completed in mid 1990's that removed the domestic water supply use and established the current instream standards for minerals in an Unnamed Tributary (receiving discharges from Tyson Foods Waldron and the City of Waldron) to the Poteau River and the Poteau River downstream from the Highway 71 (Reach 031). Since then, phosphorus limits have been imposed on the facility requiring changes in treatment chemicals that have increased the discharge of minerals. In addition, increases in dissolved minerals from the Tyson Waldron Facility are the result of increased boiler blowdown from the production of increased volumes of hot water and increased use of cleaners needed to comply with Federal Drug Administration rules regarding food safety; and increased quantities of marinades associated with Tyson Waldron's products.

The Quality Assurance Project Plan (QAPP) that outlines the tasks necessary to amend the dissolved minerals criteria downstream from the Tyson Waldron Facility (based on the facility's current discharge level of minerals) was submitted to ADEQ on December 30, 2010; comments were received and the QAPP was finalized and resubmitted on March 9, 2011.

Tyson Waldron discharges pursuant to NPDES AR0038482. The current (interim) permit limits for TDS, chloride, and sulfate are monitor and report only. The Tyson Waldron discharge will likely exceed the final permit limits the majority of the time. The final permit limits are scheduled to become effective on approximately October 1, 2013 (3-years after the effective date of the permit), unless they are modified through the 3rd party rulemaking provision of the Arkansas Water Quality Standards (Regulation No. 2).

Tyson Waldron is located in the Poteau River watershed within Segment 3I of the Arkansas River Basin, USGS HUC 11110105-031, in Scott County Arkansas. The Facility is classified as a poultry slaughtering and processing industry and is currently authorized to discharge treated process wastewater and boiler blowdown through NPDES Outfall 001 (NPDES No. AR0038482) to an Unnamed Tributary of the Poteau River. Tyson Waldron and the City of Waldron Wastewater Treatment Plant (WWTP) are the two currently active NPDES permitted facilities within the HUC 11110105-031 reach. In addition, this reach is listed as Category 4a Waters: Impaired Waterbodies with Completed TMDLs for total phosphorus, total copper, and total zinc and as Category 5 Waters: Arkansas Water Quality Limited Waterbodies (Streams) 2010 303(d) list for non-attainment of total dissolved solids.

During the most recent NPDES permit renewal, interim monitor requirements and final permit limits (effective September 1, 2013) for Outfall 001 were established for chlorides (150 mg/L), sulfates (70 mg/L), and total dissolved solids (660 mg/L) as monthly average limitations.

The Tyson Foods Facility in Waldron is the largest employer in Scott County, where it is located. The facility has an annual payroll of approximately $36 million. The facility is extremely important to the City of Waldron, Scott County, and the west central region of Arkansas.

1.2 Study Focus and Objective

The focus of the study completed and described in this report is the discharge from the Tyson Waldron treated process wastewater outfall (Outfall 001), the Unnamed Tributary, and the Poteau River upstream and downstream from the confluence with the Unnamed Tributary.

The primary report objectives are to:

Propose site-specific water quality criteria for chloride, sulfate, and TDS that:

- reflect the current discharge concentrations of the Tyson Waldron Facility, and
- support the designated fishery use in the Unnamed Tributary and the Poteau River downstream of the discharge.

2.0 Significant Findings

1. The designated uses for the Unnamed Tributary and the Poteau River are being maintained. However, those uses may not be at optimal levels because of specific non-point sources and un-permitted discharges documented during the study.
2. The whole effluent toxicity testing results for the Tyson Waldron Facility reveal an excellent toxicity record and document that the levels of chloride, sulfate, and TDS discharged do not interfere with test organism health, and since these organisms serve as surrogates to the freshwater environment, they support the case that mineral levels are having no negative influence on attainment of designated uses.
3. Habitat quality of the Poteau River for the reaches examined is sub-optimal and the habitat quality of the Unnamed Tributary is marginal.
4. Chloride, sulfate, and TDS measurements in the Poteau River upstream of the confluence with the Unnamed Tributary were occasionally atypical during storm events, suggesting non-point source influences upstream.

5. Other water quality measurements were typical for small Arkansas River Valley Ecoregion streams, although temperatures during August were very warm, reflecting the excessively hot ambient conditions of the period.
6. The macroinvertebrate community was in attainment of the fishery use at both the Poteau River stations during both the spring and the fall according to the ADEQ multimeric index.
7. Biotic Index scores at all stations suggested that the benthic communities may have been influenced by organic enrichment above and below the point source discharges.
8. The fish collections for the Poteau River were typical of small Arkansas River Valley Ecoregion fisheries and the Unnamed Tributary reflected a seasonal fishery.
9. The Poteau River Station (PR-2) downstream of the confluence with of the Unnamed Tributary contained a higher quality fishery than the upstream station (PR-1).
10. Non-point sources and un-permitted discharges are potentially significant issues within the reach of stream examined, as documented by ADEQ complaint investigations and noted during the study.

3.0 Background

3.1 Introduction

The current permit for the Tyson Waldron Facility (NPDES AR0038482) was effective October 1, 2010 and expires September 30, 2015. The facility is classified under the Standard Industrial Classification (SIC) as 2015, Poultry Slaughtering and Processing. According to the Statement of Basis for the effective permit the facility design flow is 1.25 mgd. The facility discharges treated process wastewater and boiler blowdown. The treatment system for the facility consists of primary and secondary pretreatment screening, dissolved air floatation unit, first stage pretreatment, anaerobic lagoon, extended aeration activated sludge, final clarification, UV disinfection, and post aeration. Aluminum Sulfate is added for phosphorus removal. The Tyson Waldron Facility is classified as a Minor industrial. There are no active Consent Administrative Orders or Notice of Violations for the facility. The schedule of compliance for the facility provides an option to complete a water quality study to address new or revised permit limitations.

The Arkansas Water Quality Standards - Regulation No. 2 allows modification of water quality standards under various conditions. Specifically, Section 2.306 of the WQS allows the removal of a designated use other than a fishable or swimmable use, and for establishment of less stringent water quality criteria without affecting fishable or swimmable uses. This project report documents the information required to amend Regulation 2 through 3rd party rulemaking.

3.2 Designated Uses – Water Quality Criteria

The designated uses for the Unnamed Tributary and the Poteau River are those listed in the WQS for Arkansas River Valley streams with watersheds less than 10 mi^2, and greater than 10 mi^2, respectively. The designated uses, Use Variations, and Variations for the Unnamed Tributary and the Poteau River are listed below. They are as follows:

Unnamed Tributary to Poteau River

Secondary Contact Recreation
Industrial and Agricultural Water Supply
Seasonal Arkansas River Valley fishery
No Domestic Water Supply Use
Criteria for Unnamed Tributary to the Poteau River at Waldron – chlorides 150 mg/L, sulfate 70 mg/L, and TDS 660 mg/L

Poteau River (from HWY 71 to Stateline)

Primary Contact Recreation
Industrial and Agricultural Water Supply
Perennial Arkansas River Valley fishery
No Domestic Water Supply Use – Highway 71 to stateline
Criteria for the Poteau River at Waldron Highway 71 to stateline – chlorides 120 mg/L, sulfate 60 mg/L, and TDS 500 mg/L

3.3 Permit Limitations

The effective permit for the facility (October 1, 2010 – September 30, 2015) contains both interim and final permit limits for Outfall 001 as shown in Tables 3.1 and 3.2.

Table 3.1. Interim Effluent Limitations for Outfall 001, Tyson Foods Waldron (NPDES AR 0038482).

Effluent Characteristics	**Discharge Limitations**				**Monitoring Requirements**	
	Mass (lbs/day, unless otherwise specified)		Concentration (mg/L), unless otherwise		Frequency	Sample Type
	Monthly Avg.	Daily Max	Monthly Avg.	Daily Max		
Flow	N/A	N/A	Report, MGD	Report, MGD	once/day	totalizing meter
Carbonaceous Biochemical Oxygen Demand (CBOD5)	156.4	234.6	15	22.5	once/month	6-hr composite
Biochemical Oxygen Demand (BODS)	166.8	271.1	16	26	once/year	6-hr composite
Total Suspended Solids (TSS)	156.4	234.6	15	22.5	once/month	6-hr composite
Ammonia Nitrogen (NH3-N)						
(April-October)	41.7	58.4	4	5.6	once/month	6-hr composite
(November-March)	41.7	83.4	4	8	once/month	6-hr composite
Dissolved Oxygen	N/A	N/A	5.0 (Inst. Min.)		once/week	grab
Fecal Coliform Bacteria (FCB)			(colonies/100 ml)			
	N/A	N/A	400 (Inst. Max.)		once/month	grab
Oil and Grease (0 & G)	83.4	145.9	8	14	once/month	grab
Copper, Total Recoverable	Report	Report	Report µg/L	Report µg/L	once/month	grab
Zinc, Total Recoverable	Report	Report	Report µg/L	Report µg/L	once/month	grab
Total Phosphorus	20.9	41.7	2	4	twice/month	grab
Total Nitrogen	1,073.8	1,532.5	103	147	once/month	grab
Chlorides	Report	Report	Report	Report	once/month	grab
Sulfates	Report	Report	Report	Report	once/month	grab
Total Dissolved Solids	Report	Report	Report	Report	once/month	grab
pH	N/A	N/A	Minimum 6.0 s.u.	Maximum 9.0 s.u.	once/week	grab
Chronic WET Testing	N/A	N/A	Report		once/quarter	24-hr composite

Table 3.2. Final Effluent Limitations for Outfall 001, Tyson Foods Waldron (NPDES AR 0038482).

Effluent Characteristics	**Discharge Limitations**				**Monitoring Requirements**	
	Mass (lbs/day, unless otherwise specified)		Concentration (mg/L), unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Daily Max	Monthly Avg.	Daily Max		
Flow	N/A	N/A	Report, MGD	Report, MGD	once/day	totalizing meter
Carbonaceous Biochemical Oxygen Demand (CBOD5)	156.4	234.6	15	22.5	once/month	6-hr composite
Biochemical Oxygen Demand (BOD5)	166.8	271.1	16	26	once/year	6-hr composite
Total Suspended Solids (TSS)	156.4	234.6	15	22.5	once/month	6-hr composite
Ammonia Nitrogen (NH3-N)						
(April-October)	41.7	58.4	4	5.6	once/month	6-hr composite
(November-March)	41.7	83.4	4	8	once/month	6-hr composite
Dissolved Oxygen	N/A	N/A	5.0 (Inst. Min.)		once/week	grab
Fecal Coliform Bacteria (FCB)			(colonies/100 ml)			
	N/A	N/A	400 (Inst. Max.)		once/week	grab
Oil and Grease (0 & G)	83.4	145.9	8	14	once/month	grab
Copper, Total Recoverable	0.096	0.2	9.2 µg/L	18.5 µg/L	once/month	grab
Zinc, Total Recoverable	0.891	1.8	85.5 µg/L	171.6 µg/L	once/month	grab
Total Phosphorus	15.64	41.7	1.5	4	twice/month	grab
Total Nitrogen	1,073.8	1,532.5	103	147	once/month	grab
Chlorides	1,564	2,346	150	225	once/month	grab
Sulfates	730	1,095	70	105	once/month	grab
Total Dissolved Solids	6,881	10,321	660	990	once/month	grab
pH	N/A	N/A	Minimum 6.0 s.u.	Maximum 9.0 s.u.	once/week	grab
Chronic WET Testing	N/A	N/A	Report		once/quarter	24-hr composit

4.0 Outfall 001 Characterization

Appendix C contains discharge monitoring results (DMR) for the Tyson Waldron Facility. Appendix D contains analytical reports and data that were collected from Outfall 001 for this study (March 2011-February 2012).

4.1 Chloride, Sulfate, TDS, and Discharge

During the study period March 2011- February 2012 monthly samples of Outfall 001 were obtained and analyzed for several parameters including chloride, sulfate, and TDS. Both the DMR data and the data collected as part of the study (for chloride, sulfate, and TDS) are provided in Table 4.1.

Discharged flow rates from DMR's for one year preceding and during the study period are shown in Table 4.2.

Table 4.1. Chloride, Sulfate, and TDS analyzed for Outfall 001 Tyson Foods Waldron for DMR purposes and during the study period. Values are for a single sample each month.

Date/Statistic	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
10/31/2010	153	170	756
11/30/2010	177.5	170	852
12/31/2010	44.5	90	628
1/31/2011	62.5	80	632
2/28/2011	72.5	200	696
3/4/2011	200	140	940
3/31/2011	95	12	736
4/19/2011	180	230	820
4/30/2011	214.5	280	960
5/26/2011	210	200	860
5/31/2011	167.5	200	724
6/16/2011	220	320	950
6/30/2011	222.5	300	848
7/6/2011	210	120	1200
7/31/2011	202.5	170	1140
8/2/2011	210	250	920
8/31/2011	204	240	804
9/7/2011	230	250	1000
9/30/2011	210	240	884
10/19/2011	210	150	690
10/31/2011	212.5	2.9	948

Date/Statistic	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
11/14/2011	220	200	880
11/30/2011	193.5	240	892
12/8/2011	200	110	770
12/31/2011	152.5	210	840
1/24/2012	240	230	780
1/31/2012	177.5	210	792
2/21/2012	200	210	810
2/29/2012	143	150	676
Minimum	44.5	2.9	628.0
Maximum	240.0	320.0	1200.0
Average	180.5	185.3	842.3
N	29	29	29

Table 4.2. Discharge flow rates from DMR's for Outfall 001 Tyson Foods Waldron preceding and during the study period.

Date	Monthly Average Flow (mgd)	Daily Maximum Flow (mgd)
3/31/2010	0.79	1.29
4/30/2010	0.87	1.18
5/31/2010	0.91	1.54
6/30/2010	0.86	1.18
7/31/2010	0.92	1.42
8/31/2010	0.92	1.39
9/30/2010	0.97	1.23
10/31/2010	0.83	1.03
11/30/2010	0.90	1.24
12/31/2010	0.82	1.11
1/31/2011	0.81	1.04
2/28/2011	0.88	1.12
3/31/2011	0.85	1.08
4/30/2011	0.87	1.07
5/31/2011	0.89	1.12
6/30/2011	0.75	1.44
7/31/2011	0.94	1.23
8/31/2011	0.87	1.07
9/30/2011	0.83	1.10
10/31/2011	0.83	1.04
11/30/2011	0.73	1.26
12/31/2011	0.80	1.10
1/31/2012	0.73	1.08
2/29/2012	0.87	1.05
Highest Monthly Average Flow	0.97	-----
Highest Daily Maximum Flow	-----	1.54

4.2 Salinity Toxicity Modeling

In accordance with the QAPP, the GRI-STR model was set up and run to determine the potential for toxicity given the specific ion analysis of the Tyson Waldron effluent. In order to run the GRI-STR model to further evaluate proposed mineral levels and to predict toxicity potential based on dissolved mineral concentrations additional constituents were analyzed from samples collected from Outfall 001 (and at all ambient stations) during this study. The data used in the GRI-STR model are provided in Table 4.3.

Table 4.3. Data collected for and used in the GRI-STR salinity modeling (Tyson Waldron Outfall 001).

Date/Statistic	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Alk (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	Na (mg/L)
03/04/11	200	140	940	210	4.6	62	64	160
04/19/11	180	230	820	150	4.2	67	60	150
05/26/11	210	200	860	130	6.3	58	62	170
06/16/11	220	320	950	100	6.5	59	66	170
07/06/11	210	120	1200	120	11	82	58	160
08/02/11	210	250	920	140	6.8	72	62	180
09/07/11	230	250	1000	160	7.0	81	62	190
10/19/11	210	150	690	140	6.1	43	52	170
11/14/11	220	200	880	180	9.1	65	53	160
12/8/2011	200	110	770	200	14	61	52	160
1/24/2012	240	230	780	170	5.4	63	55	170
2/21/2012	200	210	810	160	5.3	62	55	160
Minimum	180	110	690	100	4	43	52	150
Maximum	240	320	1200	210	14	82	66	190
Average	211	201	885	155	7	65	58	167
N	12	12	12	12	12	12	12	12

The maximum value measured for each mineral was input into the GRI-STR model to represent the worst case combination of minerals in the effluent. The model was run assuming organisms were exposed to 100% effluent (no dilution). The resulting 48-h LC-50 was greater than 100% effluent for each organism. Survival in the 100% effluent was predicted at 89% or greater after 48-h of exposure for each organism. Control quality assurance standards allow for 90% survival, which is consistent with the predicted survival under worse case minerals levels. A summary of the results are provided in Table 4.4. The GRI-STR model was not repeated for the ambient stations because the ambient worst case scenarios were all lower than the Outfall worst case scenario.

Table 4.4. Summary of results of GRI-STR Model.

Organism	Percent Survival at 48-h
Ceriodaphnia	89.5
Daphnia	89.3
Fathead Minnow	96.3

4.3 Effluent *In-situ* Measurements

Each time samples were collected from the Tyson Waldron Outfall 001 during the study *in-situ* measurements were also obtained. Table 4.5 provides the results of those measurements.

Table 4.5. *In-situ* measurements from Tyson Waldron Outfall 001 during the study period (March 2011 – February 2012).

Date	Time	Flow (cfs)	Temp (ºC)	D.O mg/L[1]	Sp. Cond (µS)	pH (su)	Turb (ntu)
03/04/11	1130	1.51	25.9	2.3	1130	7.2	2.7
04/19/11	1525	1.59	27	2.9	1098	7.4	1.8
05/26/11	1215	1.28	27.4	3.4	1100	7	0.94
06/16/11	1215	1.80	31.3	2.34	1240	6.5	2.8
07/06/11	1300	1.77	30.2	3.15	1260	7.3	1.93
08/02/11	1130	1.67	32	2.9	1530	7.1	1.37
09/07/11	1015	1.45	25.9	2.42	1660	6.8	0.97
10/19/11	1210	1.44	22	2.8	1340	7.2	0.77
11/14/11	1345	1.6	24	2.51	1330	6.95	1.06
12/8/2011	1415	1.64	18	3	1157	7.4	1
1/24/2012	1305	1.44	19	2.71	1279	7.9	2.26
2/21/2012	1150	1.39	19.31	1.45	1215	7.14	2.1
	Maximum	1.8	32.0	3.4	1660	7.9	2.8
	Minimum	1.3	18.0	1.45	1098	6.5	0.8
	Average	1.6	25.2	2.7	1278	7.2	1.6

[1] DO measurements obtained prior to the discharge cascade which adds oxygen to the effluent.

4.4 Whole Effluent Toxicity Testing

Approximately 5 years of quarterly WET tests (from January 2006 – October 2011), a total of 27 tests, were obtained for the Tyson Waldron Facility and reviewed. A summary of the WET tests is provided in Appendix E. The facility permit requires chronic testing of *Ceriodaphina dubia* and *Pimephales promelas* at the critical effluent dilution of 100% effluent. The survival rate (survival NOEL) for *C. dubia* has been 100% in every test reviewed. With the exception of a single test (initiated on August 17, 2010) the reproduction no observed effect concentrations

(NOEC) has also been 100%. For *P. promelas* the survival no observed effect level (NOEL) and the growth NOEC has been 100% for every test conducted, except one, which was also the August 17, 2010 test. Facility records were examined and it was determined that the Tyson Waldron wastewater treatment plant was in a state of upset during the August 2010 WET testing period. The anaerobic lagoon had experienced a cap loss, which resulted in the facility shut down and ultimately in sending wastewater to the City of Waldron Wastewater Treatment Plant. Following the one-time upset and WET failure, Tyson was required to conduct two successive monthly follow up tests, which for both organisms was passed at 100% NOEC and NOEL, for growth/reproduction and survival, respectively. Specific conductance for all WET tests ranged from 856 µs/cm to 2007 µs/cm and the average was 1223 µs/cm. As shown in Table 4.5, specific conductance measured during this study ranged from 1098 µs/cm to 1660 µs/cm and averaged 1278 µs/cm, indicating that dissolved minerals concentrations in the effluent during WET testing were similar to, if not higher than, the analytical results obtained during the current study. No toxicity of any kind resulted from the 100% effluent tests at the maximum specific conductance (2007 µs/cm) observed in the historical data. Complete WET tests are available from ADEQ.

4.5 City of Waldron Effluent Chloride, Sulfate, and TDS Data

Because the Tyson Waldron Facility discharge and the City of Waldron Wastewater Treatment Plant discharge are comingled at the Unnamed Tributary, effluent DMR data available for the City Wastewater Treatment Plant were examined (Table 4.6). The City of Waldron Wastewater Treatment Plant NPDES Permit (AR0035769) contains final limits for chloride, sulfate, and TDS. DMR data provided by the ADEQ for the City of Waldron are contained in Appendix F.

Table 4.6. Chloride, Sulfate, TDS and Monthly Average Flow from the City of Waldron Wastewater Treatment Plant.

Date	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Flow (mo. avg. mgd)
10/31/2010	70	93.6	178	0.396
11/30/2010	60	41.4	205	0.295
12/31/2010	75	74.1	211	0.368
1/31/2011	75	58.4	234	0.399
2/28/2011	25	84.4	158	0.781
3/31/2011	31.5	100.8	156	0.631
4/30/2011	6.5	136.1	136	0.75
5/31/2011	25.5	71.8	140	0.066
6/30/2011	50	109.3	217	0.688
7/31/2011	10	133.1	193	0.524
8/31/2011	57.5	125.4	246	0.501
9/30/2011	55	87.6	211	NA
10/31/2011	70	93.6	178	0.396
11/30/2011	50	78.1	209	0.431
12/31/2011	35	91.7	188	0.446
1/31/2012	30	82.6	166	0.491
2/29/2012	20	65.2	138	0.393
3/31/2012	35	102.2	164	0.456
Maximum	75.0	136.1	246.0	0.781
Minimum	6.5	41.4	136.0	0.066
Average	43.4	90.5	184.9	0.471
99th Percentile	94.1	148.2	261.1	na

5.0 Field Study

5.1 Introduction

A field study consisting of collection of physical, biological, *in-situ*, and chemical data from stations located on the Poteau River and the Unnamed Tributary to the Poteau River was completed between March 2011 and February 2012 (Figure 5.1). Monitoring stations used in the study were the Poteau River upstream of the Tyson Waldron Outfall 001 discharge (PR-1), the Poteau River downstream from the Tyson Waldron Outfall 001 and the City of Waldron discharges and the confluence with the Unnamed Tributary that receives the discharge (PR-2), further downstream in the Poteau River (PR-3), and in the Unnamed Tributary downstream from the Tyson Waldron Outfall 001 and the City of Waldron discharges (UT-2). The QAPP specified only two Poteau River Stations, however habitat and biological data were needed for a separate study so biological and habitat data from a third Poteau River station, Station PR-3, is provided for purposes of this study also. As outlined in the QAPP for the project, the field study consisted primarily of habitat characterization, spring and fall macroinvertebrate collections, fall fish collection at stations PR-1, PR-2, and UT-2 (PR-3 added); and twelve monthly collections of water quality samples, and *in-situ* and flow measurements at stations PR-1, PR-2, and UT-2.

5.2 Habitat Characterization

Physical habitat in streams includes all those physical characteristics that influence or provide sustenance to biological attributes, both botanical and zoological, within the stream. Stream physical habitat varies naturally, as do biological characteristics; thus, habitat conditions differ even in the absence of point and anthropogenic non-point disturbance. Within a given ecoregion, stream drainage area, stream gradient, and the local geology are likely to be strong natural determinants of many aspects of stream habitat, because of their influence on discharge, flood stage, and stream energy (both static and kinetic). In addition, land-use activities or instream physical modifications, such as channelization, channel diversion or dam construction directly or indirectly impact the habitat in a stream. The habitat quality of a stream or a reach of a stream plays a significant role in the quality of the fishery that can be attained in that stream or stream reach. The objectives of a habitat characterization are to: assess the availability and quality of habitat for the development and maintenance of benthic invertebrate and fish communities, and to evaluate the role of habitat quality in relation to biological integrity and overall stream system health.

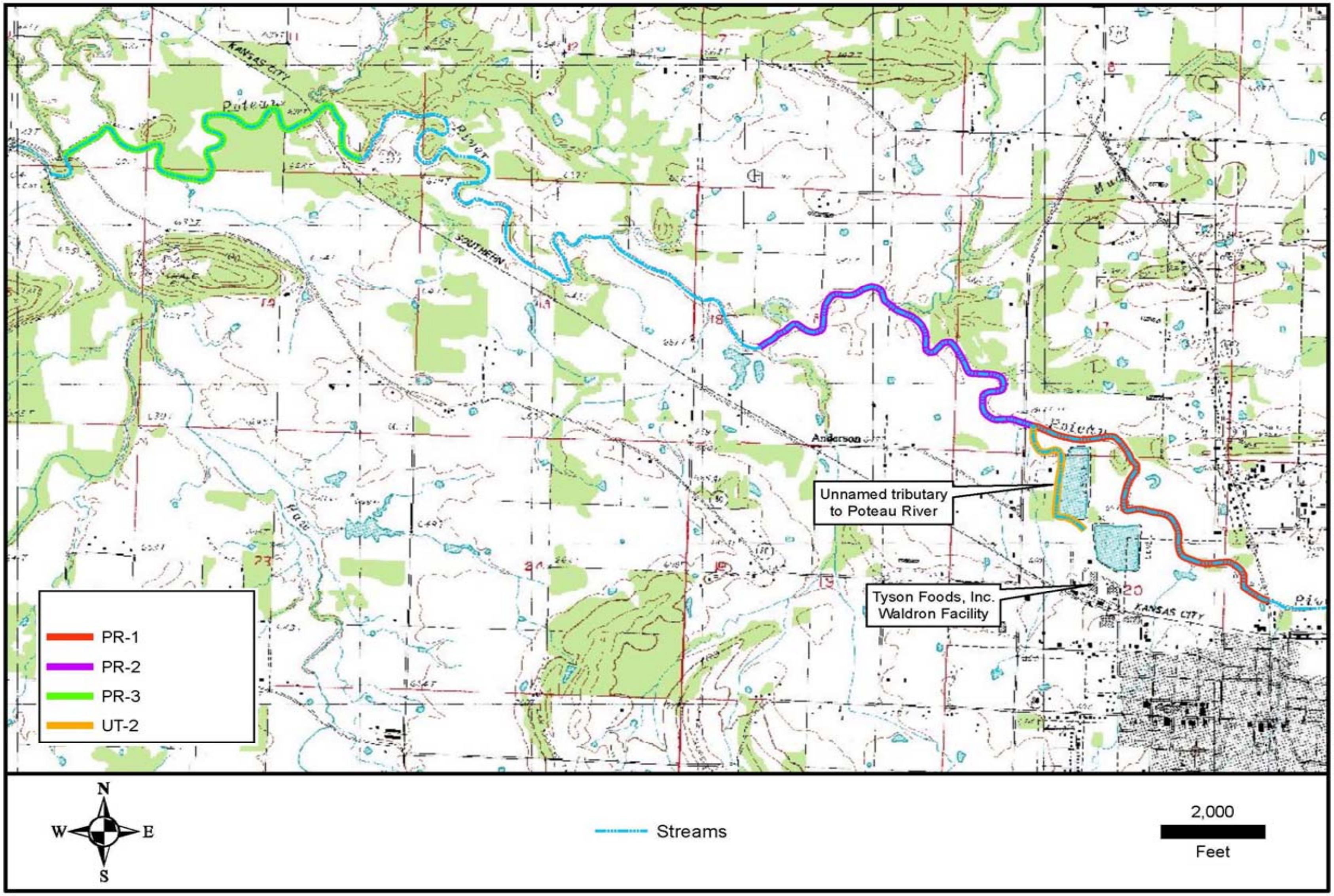

Figure 5.1. Study reaches utilized for water physical characteristics evaluation, water quality analysis (PR-3 not included) and biological collections in the 2011 – 2012 study.

There are three main headings for the components of the physical habitat characterization; each with several categories. Measurements for each of the components (14 categories total) are taken in ten equally spaced sub-reaches at each station, and recorded on copies of a two-page field form entitled Stream Habitat Assessment (Semi-Quantitative), and include:

1) Channel Morphology
  a) Reach Length Determination
  b) Riffle-Pool Sequence
  c) Depth and Width Regime

2) Instream Structure
  a) Epifaunal Substrate
  b) Instream Habitat
  c) Substrate Characterization
  d) Embeddedness
  e) Sediment Deposition
  f) Aquatic Macrophytes and Periphyton

3) Riparian Characteristics
  a) Canopy Cover
  b) Bank Stability and Slope
  c) Vegetative Protection
  d) Riparian Vegetative Zone Width
  e) Land-use Stream Impacts

Physical habitat measurements from a field habitat characterization are used in conjunction with water chemistry, temperature, macroinvertebrate and fish community analyses, and other data sources to determine the status of the target streams attainment of uses (e.g. fishing, swimming, aesthetics, or other recreation) and the water quality required to maintain those uses.

In addition to direct habitat feature measurements, habitat potential was evaluated using procedures adapted from EPA’s rapid bioassessment protocols (Barbour, et al., 1999). This procedure was used to numerically score each of 10 habitat features. This effort resulted in categorizing each survey reach as “optimal”, “suboptimal”, “marginal” or “poor” with respect to habitat providing the physical features necessary to support balanced populations of aquatic life.

5.3 Results from Habitat Characterization

5.3.1 Station PR-1

The Poteau River at PR-1 was the furthest upstream location used for habitat characterization. Habitat assessments were done in April and October 2011. Watershed size upstream of PR-1 is approximately 46.5 mi^2. The habitat characterization covered 1,000 ft of total stream length. A typical portion of reach PR-1 is presented photographically in Figure 5.2. The average bankfull width and depth (the point at which the stream enters its active floodplain) of the stream was 50.0 ft and 1.9 ft, respectively. Measured flow was 7.5 cfs on the day of the survey with an average velocity of 0.1 fps. Stream morphology was distributed between riffle, run, and pool habitat at 15%, 32%, and 54%, respectively. A detailed breakdown of the complete habitat characteristics at each station is provided in Appendix G.

Figure 5.2. Typical habitat sampled at PR-1.

Average instream depth at PR-1 was 0.4 ft in riffles and ranged from 0.3 ft to 1.0 ft deep. Instream pool depth averaged 1.4 ft and ranged from 1.0 ft to 2.3 ft deep. Instream wetted width averaged 44.3 ft and 42.2 ft in riffles and pools, respectively.

Instream stable habitat for PR-1 measured 31% for macroinvertebrates and 40% for fish. Dominate substrate for the reach was bedrock in riffles and gravel in run and pool habitats.

Stream bank stability for PR-1 was moderately stable with average bank protection of 70% for the left bank and 83% for the right bank. Riparian protection widths averaged >54 ft for the left bank and between 36-54 ft for the right bank. Land-use impacts were minor primarily affected by urban encroachment and pasture lands along the stream corridor.

Using the measured physical characteristics described above an overall habitat potential score was established. The habitat potential score for PR-1 was 12.9 out of 20 which placed it in the sub-optimal category. Table 5.1 and Figure 5.3 provide a summary of the habitat potential breakdown.

Table 5.1.a. Habitat potential summary scores Poteau River, April 19-20, 2011.

	Reach			
Parameters	**PR-1**	**PR-2**	**PR-3**	**UT-2**
1. Epifaunal Substrate	10	8	11	18
2. Pool Substrate	10	8	7	16
3. Pool Variability	5	9	9	7
4. Channel Alteration	15	15	15	6
5. Sediment Deposition	15	14	15	15
6. Channel Sinuosity	6	10	8	4
7. Channel Flow Status	18	19	17	19
8. Bank Stability				
Left Bank	7	8	8	5
Right Bank	8	7	7	7
9. Vegetative Protection				
Left Bank	6	4	5	7
Right Bank	5	4	7	6
10. Riparian Vegetative Zone Width				
Left Bank	8	8	7	3
Right Bank	7	8	4	9
Score (Total)	120	122	120	122
Score Average	12.0	12.2	12.0	12.2
Ranking	S	S	S	S

Table 5.1.b. Habitat potential summary scores Poteau River, October 18-19, 2011.

	Reach			
Parameters	**PR-1**	**PR-2**	**PR-3**	**UT-2**
1. Epifaunal Substrate	12	11	13	12[1]
2. Pool Substrate	13	13	9	8
3. Pool Variability	5	9	8	2
4. Channel Alteration	15	15	15	6
5. Sediment Deposition	15	12	15	13
6. Channel Sinuosity	6	10	8	4
7. Channel Flow Status	14	15	13	15
8. Bank Stability				
Left Bank	7	8	7	7
Right Bank	8	7	6	8
9. Vegetative Protection				
Left Bank	5	5	4	2
Right Bank	6	4	6	6
10. Riparian Vegetative Zone Width				
Left Bank	9	9	6	6
Right Bank	7	8	4	10
Score (Total)	122	126	114	99
Score Average	12.2	12.6	11.4	9.9
Ranking	S	S	S	M

[1] Habitat evaluators in fall took into consideration the quality of the substrate in their score, i.e. the cobble/gravel contained abundant rubble (bricks, broken blocks, etc.)

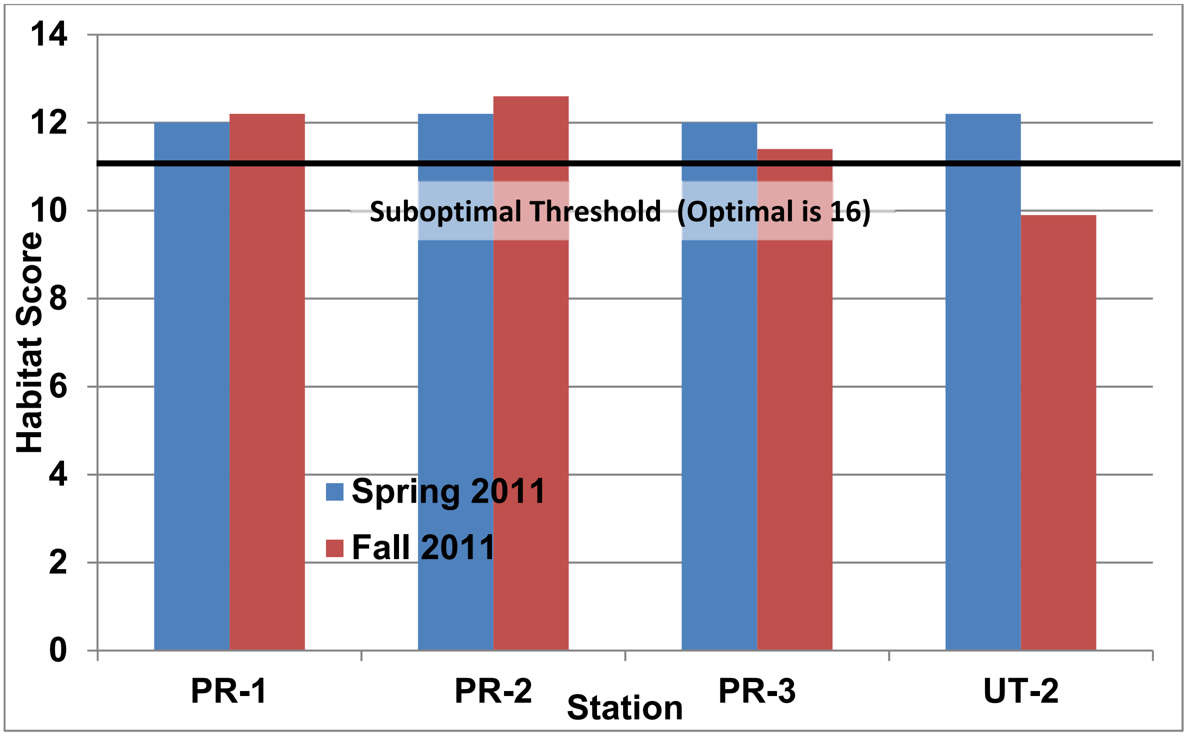

Figure 5.3. Summary of habitat quality in each biological assessment reach. The line indicates minimum score for sub-optimal habitat.

5.3.2 Station PR-2

Station PR-2 was located directly downstream of Highway 71 and the discharges from Tyson Waldron Facility and the City of Waldron WWTP. Watershed size upstream of PR-2 is approximately 47.9 mi^2. The habitat characterization covered 960 ft of total stream length. A typical portion of reach PR-2 is presented photographically in Figure 5.4. The average bankfull width and depth of the stream were 48 ft and 2.7 ft, respectively. Measured flow was 9.3 cfs on the day of the survey with an average velocity of 0.2 fps. The morphological characteristics were distributed between riffles, runs, and pools at 8%, 10%, and 82%, respectively.

Figure 5.4. Typical Habitat Sampled at Station PR-2.

Average instream depth at PR-2 was 0.5 ft deep in riffles and ranged from 0.4 ft and 1 ft deep. Pool depth averaged 1.8 ft and ranged from 1.3 ft to 3.2 ft deep. Instream wetted width averaged 38.5 ft and 39.2 ft in riffles and pools, respectively.

Instream stable habitat for PR-2 measured 25% for macroinvertebrates and 34% for fish. Dominate substrate for the reach was course gravel and cobble in riffles, cobble in runs, and bedrock in pool habitats.

Stream bank stability for PR-2 was moderately stable with average bank protection of 76% for the left bank and 70% for the right bank. Riparian protection widths averaged >54 ft for the left and right banks. Land-use impacts were moderate based on effects of urban encroachment on the stream.

Using the measured and estimated characteristics as described above an overall habitat potential score was calculated. The potential score for PR-2 was 13.2 out of 20, which placed it in the sub-optimal category. Table 5.1 and Figure 5.3 provide a summary of the habitat potential breakdown.

5.3.3 Station PR-3

PR-3 was the furthest downstream station on the Poteau River. Watershed size upstream of PR-3 is approximately 74 mi^2. The habitat characterization covered 1040 ft of total stream length. Photos typical of reach PR-3 are presented in Figure 5.5. The average bankfull width and depth of the stream were 52 ft and 1.8 ft, respectively. Measured flow was 28.9 cfs on the day of the survey with an average velocity of 1.0 fps. The morphological characteristics were distributed between riffles, runs, and pools at 20%, 33%, and 48%, respectively.

Figure 5.5. Typical habitat sampled at PR-3.

Average instream depth at PR-3 was 0.7 ft deep in riffles and ranged from 0.5 ft and 1.7 ft deep. Pool depth averaged 1.5 ft and ranged from 1.3 ft to 2.5 ft deep. Instream wetted width averaged 46.3 ft and 50.0 ft in riffles and pools, respectively.

Instream stable habitat for PR-3 measured 40% for macroinvertebrates and 48% for fish. Dominate substrate for the reach was cobble in riffles and bedrock in run and pool habitats.

Stream bank stability for PR-3 was moderately stable with average bank protection of 77% for the left and the right banks. Riparian protection widths averaged >54 ft for the left bank and between 36-54 ft for the right bank. Land-use impacts were moderate based on the effects of pasture encroachment on the stream.

Using the measured physical characteristics described above an overall habitat potential score was established. The habitat potential score for PR-3 was 11.6 out of 20 which placed it in the sub-optimal category. Table 5.1 and Figure 5.3 provide a summary of the habitat potential breakdown.

5.3.4 Station UT-2

Station UT-2 was the Unnamed Tributary of the Poteau River which receives treated wastewater from the City of Waldron WWTP and the Tyson Waldron Facility (Figure 5.3). UT-2 is man-made (and/or man altered) all the way to the Poteau River. Based on historical images, when Tyson was constructed in 1962 a channel was dug between the Tyson outfall and the City of Waldron outfall connecting both discharges to an unnamed ephemeral tributary of the Poteau River that runs north along Hwy 71. This man-made channel (UT-2) may have originally been part of a historical bend in the Poteau River that was cut off when the Highway was constructed and has been highly altered and channelized. The UT-2 channel has also been the victim of significant local dumping in the past. The banks are steep, and the bottom composed of a variety of material, including large amounts of rubble (concrete pieces and various other man-made rock like materials, including bricks).

Habitat was homogeneous throughout the reach evaluated. Watershed size upstream of UT-2 is approximately 0.1 mi^2. The habitat characterization covered 188 ft of total stream length. A typical portion of reach UT-2 is presented photographically in Figure 5.6. The average bankfull width and depth of the stream were 9.4 ft and 1.3 ft, respectively. Measured flow was 2.5 cfs on the day of the survey with an average velocity of 0.7 fps. The morphological characteristics were distributed between riffles, runs, and pools at 84%, 7%, and 9%, respectively.

Figure 5.6. Typical habitat sampled at UT-2.

Average instream depth at UT-2 was 0.3 ft deep in riffles and ranged from 0.2 ft and 0.6 ft deep. Pool depth averaged 0.7 ft and ranged from 0.6 ft to 1.0 ft deep. Instream wetted width averaged 9.0 ft and 10.0 ft in riffles and pools, respectively.

Instream stable habitat for UT-2 measured 85% for macroinvertebrates and 76% for fish. Dominate substrate for the reach was cobble in riffle, run, and pool habitats.

Stream bank stability for UT-2 was moderately unstable for the left bank with average bank protection of 29%. The right bank was moderately stable with an average bank protection of 69%. Riparian protection widths averaged >54 ft for the right bank and between 9-15 ft for the left bank. Land-use impacts for UT-2 were major based on industrial encroachment on the stream.

Using the measured physical characteristics described above an overall habitat potential score was established. The habitat potential score for UT-2 was 9.8 out of 20 which placed it in the marginal category. Table 5.1 and Figure 5.3 provide a summary of the habitat potential breakdown.

5.3.5 Discussion Regarding Habitat Quality

Habitat quality in the Poteau River and in the Unnamed Tributary in general is sufficient to support the designated Arkansas River Valley Ecoregion uses. The sub-optimal habitat would not necessarily be expected to support the optimal or highest quality Arkansas River Valley fishery. Habitat quality at the upstream station, PR-1, was ranked second highest of any of the reaches evaluated (sub-optimal), but is not substantially better or worse than the other Poteau River stations. Reaches PR-2 and PR-3 were also ranked sub-optimal. Habitat quality in the Unnamed Tributary was ranked marginal, primarily because of its channelization and small watershed size. The Unnamed Tributary contains homogenous habitat throughout the reach assessed and would not be expected to support an optimal Arkansas River Valley fishery.

Stream morphology was more evenly distributed in Reaches PR-1 and PR-3 whereas PR-2 was highly dominated by pooled habitat. Habitat in the Unnamed Tributary was appreciably different than that of the Poteau River reaches evaluated in that it was dominated by riffles and exhibited much higher velocities. Pools in the UT-2 reach evaluated were shallow and of poor quality. Although probably adequate for a seasonal fishery due to the consistent flow from the City of Waldron and Tyson Waldron discharges, the fishery quality in the Unnamed Tributary is likely limited by habitat quality.

5.4 Ambient Water Quality

Measurements of water quality at Stations PR-1, PR-2, and UT-2 were made during 12 separate site visits completed during the study period. *In-situ* measurements consisting of pH, dissolved oxygen, temperature, and specific conductance were obtained. A sample for site analysis of turbidity was collected, along with samples for laboratory analysis of chloride, sulfate, TDS, calcium, magnesium, potassium, sodium, and alkalinity. Ambient water quality data collected for this study are provided in Appendix D.

5.4.1 Chemical Characteristics

Summary statistics for chloride, sulfate, and TDS from Stations PR-1, PR-2, and UT-2 are shown in Table 5.2.

Table 5.2. Summary statistics for selected parameters (March 2011 – February 2012).

Station	Statistic	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
PR-1	Minimum	2.8	4.7	44.0
	Average	25.9	28.7	195.7
	Maximum	160	180	810
	STD DEV	45.3	48.9	231.6
PR-2	Minimum	6.7	8.8	74
	Average	97	93	461
	Maximum	190	220	1000
	STD DEV	76.3	77.5	325.4
UT-2	Minimum	35	21	170
	Average	136	125	583
	Maximum	180	200	980
	STD DEV	46.5	51.2	212.6

Summary statistics for alkalinity, calcium, magnesium, potassium, and sodium from Stations PR-1, PR-2, and UT-2 are shown in Table 5.3.

Table 5.3 Summary statistics for selected parameters (March 2011 – February 2012).

Station	Statistic	Alkalinity (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)
PR-1	Minimum	7.2	2.9	2.0	2.0	3.2
	Average	31.6	6.7	8.8	7.3	20.7
	Maximum	100.0	17.0	47.0	40.0	120.0
	STD DEV	26.6	4.3	13.0	11.0	33.5
PR-2	Minimum	15.0	3.2	2.7	3.2	5.2
	Average	73.2	6.8	29.9	27.1	79.4
	Maximum	130.0	11.0	74.0	53.0	160.0
	STD DEV	43.7	2.6	24.5	20.8	62.8
UT-2	Minimum	47.0	6.9	9.0	10.0	29.0
	Average	105.2	8.8	39.1	37.0	109.4
	Maximum	160.0	12.0	68.0	50.0	150.0
	STD DEV	29.6	1.4	16.3	12.7	38.7

5.4.1.1 Station PR-1

Individual measurements of chloride, sulfate, and TDS from Station PR-1 are provided in Table 5.4. The data from PR-1 were, on occasion, atypical for surface waters not receiving a point source discharge. During 4 of the 12 sampling trips during the study period TDS was elevated above levels typical for natural stream systems in the Arkansas River Valley Ecoregion. Figure 5.7 shows the results for chloride, sulfate, and TDS, along with flow measurements taken as the water samples were being collected.

Table 5.4. Results of flow measurements, and chloride, sulfate and TDS analysis from Station PR-1.

Date	Flow (cfs)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
03/04/11	4.31	12	16	470
04/19/11	7.46	6.4	8.3	100
05/26/11	146.7	2.8	4.7	91
06/16/11	0.59	7.1	11	74
07/06/11	0.01	47	32	300
08/02/11	0.006	160	180	810
09/07/11	0	57	51	260
10/19/11	0.06	16	17	76
11/14/11	1.51	5.2	14	82
12/8/2011	171.6	3.0	5.2	50
1/24/2012	5.9	6.8	12	44
2/21/2012	24.7	6.4	13	67

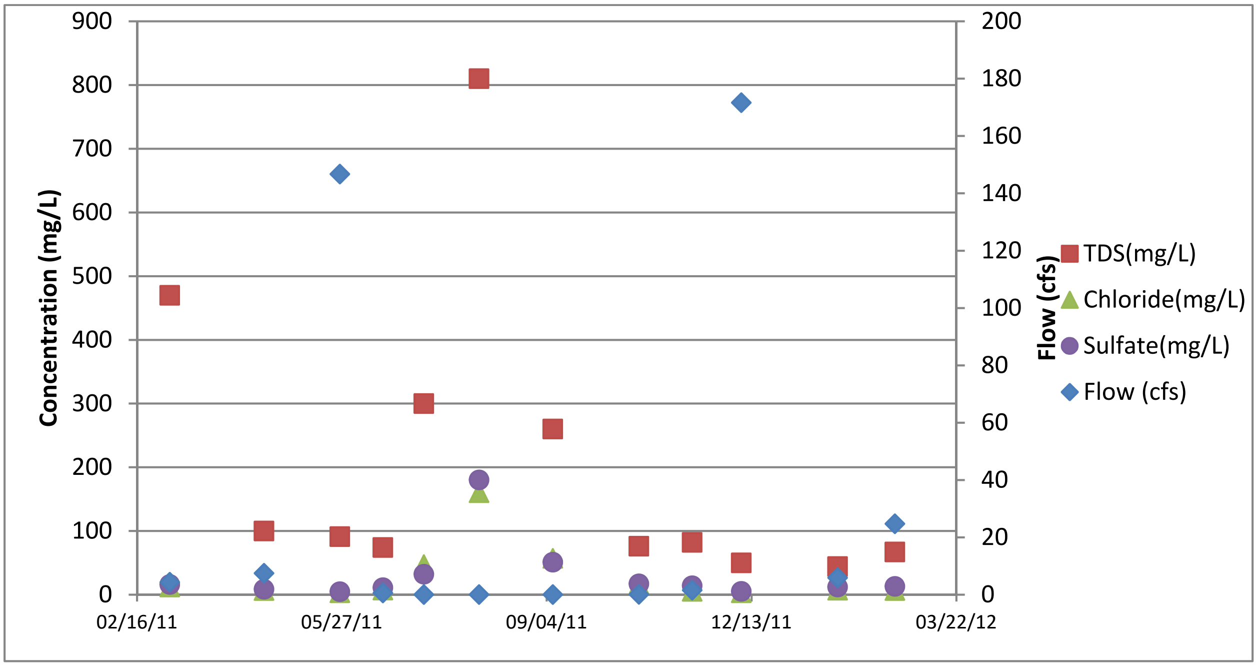

Figure 5.7. Chloride, sulfate, TDS, and flow during the study period at Station PR-1.

Since there are no permitted discharges upstream of PR-1, the source of elevated TDS is not known, however, the results obtained at PR-1 indicate something out of the ordinary was occurring with some regularity in the upstream reach of the Poteau River during the study period (see Section 6.0 Non-Point Source Evaluation).

5.4.1.2 Station PR-2

Chloride, sulfate, and TDS results obtained for PR-2 reflect a station downstream from two permitted discharges, Tyson Waldron, and the City of Waldron WWTP. Concentrations of dissolved minerals were generally elevated compared to the upstream station, although the maximum values were not substantially different (see Table 5.2).

Table 5.5. Results of flow measurements, and chloride, sulfate and TDS analysis from Station PR-2.

Date	Flow (cfs)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
03/04/11	6.17	65	52	560
04/19/11	9.3	35	48	230
05/26/11	140.0	6.7	9.0	96.0
06/16/11	1.89	160	220	660
07/06/11	0.93	190	110	1000
08/02/11	0.58	170	200	730
09/07/11	1.13	190	200	870
10/19/11	1.19	180	120	600
11/14/11	2.98	100	92	460
12/8/2011	195.0	10	8.8	74
1/24/2012	7.06	40	39	160
2/21/2012	31.7	15	20	88

Figure 5.8 provides a representation of the chloride, sulfate, TDS and flow measurements obtained at Station PR-2 during the study period.

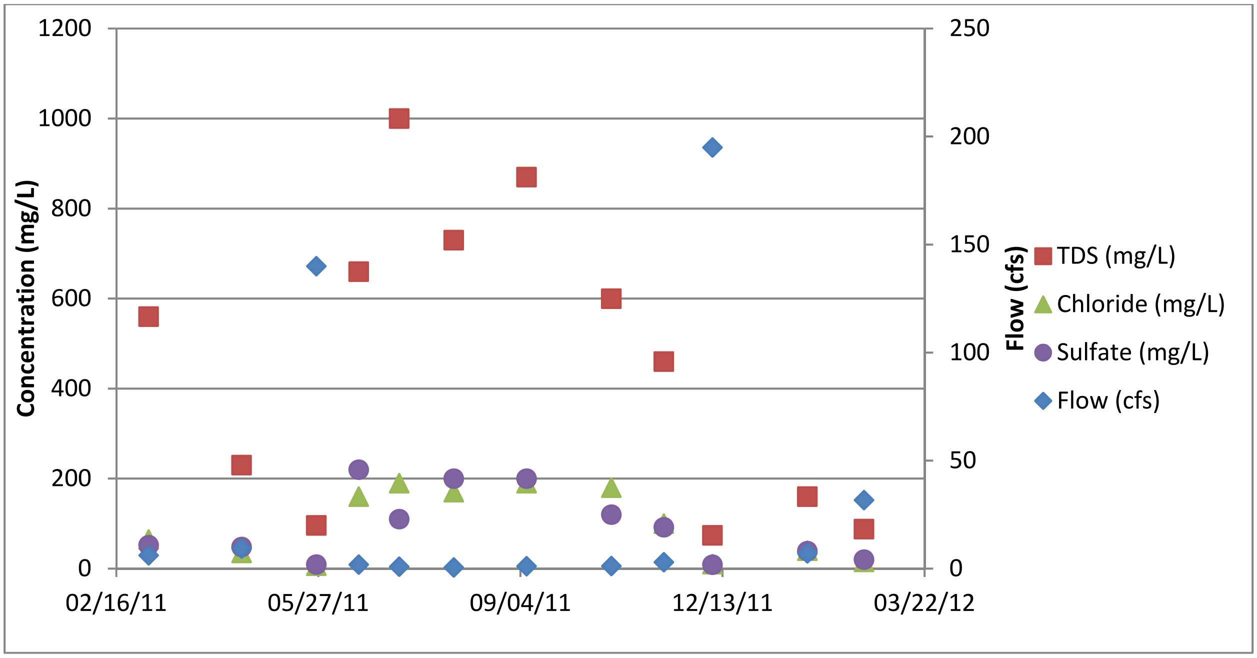

Figure 5.8. Chloride, sulfate, TDS, and flow during the study period at Station PR-2.

5.4.1.3 Station UT-2

Station UT-2 directly receives discharge from the City of Waldron WWTP and Tyson Waldron. The Unnamed Tributary is ephemeral upstream of the discharges. As shown in Table 5.2 the minimum and average values for chloride, sulfate, and TDS were higher than for either

PR-1 or PR-2, and the maximum values were about the same as PR-1 and PR-2. Table 5.6 provides the individual measurements of flow, chloride, sulfate, and TDS from UT-2.

Table 5.6. Results of flow measurements, and chloride, sulfate and TDS analysis from Station UT-2.

Date	Flow (cfs)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
03/04/11	1.56	160	120	590
04/19/11	2.52	110	130	550
05/26/11	0.96	160	160	640
06/16/11	0.65	160	200	710
07/06/11	1.67	180	110	980
08/02/11	1.4	180	200	750
09/07/11	1.65	180	180	780
10/19/11	1.53	180	110	730
11/14/11	1.43	150	130	730
12/8/2011	17.9	36	22	180
1/24/2012	2.3	170	140	560
2/21/2012	45.1	78	75	320

As shown in Figure 5.9 the majority of TDS measurements at UT-2 were in the 500 to 800 mg/L range; and both chloride and sulfate were in the 20 to 200 mg/L range.

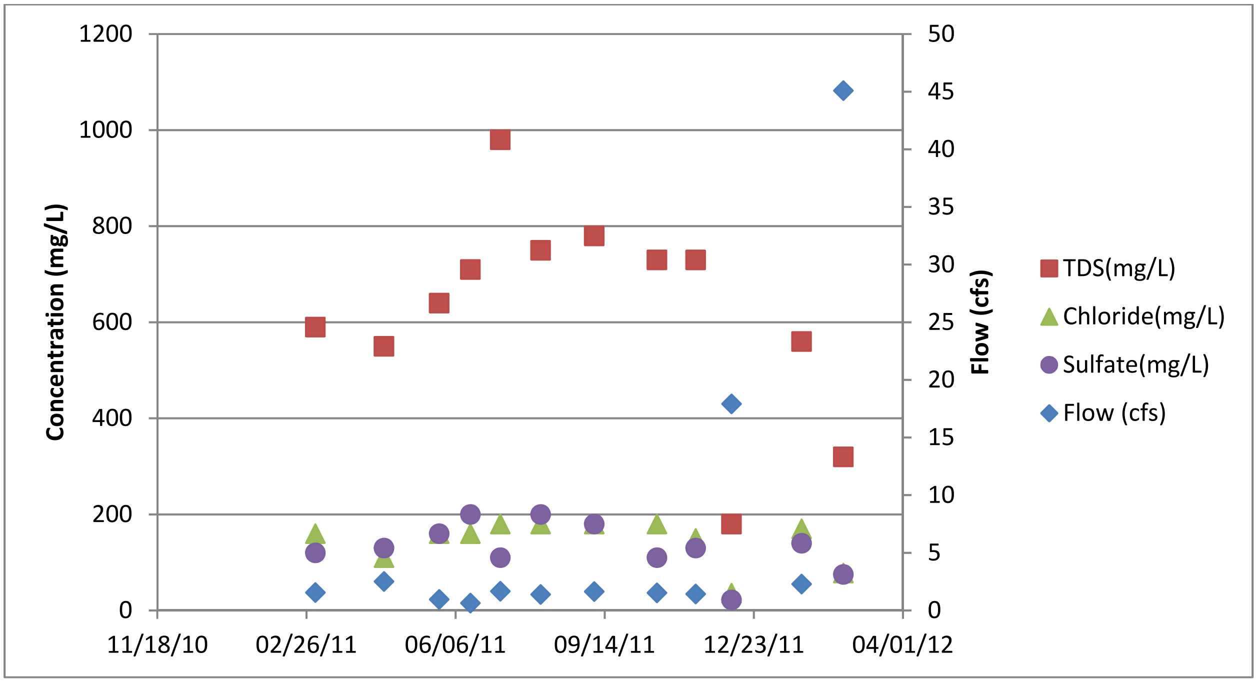

Figure 5.9. Chloride, sulfate, TDS, and flow during the study period at Station UT-2.

5.4.2 *In-situ* Measurements

In-situ measurements were taken during each site visit and are provided on a site by site basis in Tables 5.7, 5.8, and 5.9.

Table 5.7. *In-situ* measurements from PR-1 during the study period (March 2011 – February 2012).

Date	Time	Flow (cfs)	Temp (ºC)	D.O (mg/L)	Sp. Cond (µS)	pH (su)	Turb (ntu)
03/04/11	1405	4.31	14.8	9.6	86	8	8.2
04/19/11	1235	7.46	20.8	7.5	66	7.5	12.5
05/26/11	1030	146.7	19.8	9.64	42	6.2	27.1
06/16/11	1030	0.59	24.9	4.41	95	7.13	8.14
07/06/11	1130	0.01	28	5.7	730	7.6	5.45
08/02/11	1500	0.006	33.8	10.8	1180	8.4	3
09/07/11	1155	0	20.1	8.3	407	8.4	5.6
10/19/11	1335	0.06	12.3	7.7	188	8	14.2
11/14/11	1255	1.51	18.4	8.75	84	7.24	9.83
12/8/2011	1215	171.6	6.9	11.4	43	6.5	18
1/24/2012	1210	5.9	6.8	11.8	75	8	5.7
2/21/2012	1020	24.7	8.53	11.7	73	6.93	36.7
	min	0.0	6.8	4.4	42.0	6.2	3.0
	avg	30.2	17.9	8.9	255.8	7.5	12.9
	max	171.6	33.8	11.8	1180	8.4	36.7

Table 5.8. *In-situ* measurements from PR-2 during the study period (March 2011 – February 2012).

Date	Time	Flow (cfs)	Temp (ºC)	D.O (mg/L)	Sp. Cond (µS)	pH (su)	Turb (ntu)
03/04/11	1320	6.17	16.6	8.23	360	8.4	7
04/19/11	1055	9.3	20	6.95	230	7.6	12.4
05/26/11	1000	140.0	19.8	9.4	53.0	6.4	22.9
06/16/11	1000	1.89	27.4	4.41	950	7.26	5.06
07/06/11	1100	0.93	28	5.26	1170	7.6	5.18
08/02/11	1430	0.58	32.4	6.8	1300	7.8	11.4
09/07/11	1125	1.13	22	7.05	1360	7.6	1.3
10/19/11	1300	1.19	17.1	7.65	1130	8.2	2.3
11/14/11	1225	2.98	21.2	7.24	850	7.47	7.95
12/8/2011	1130	195.0	7.0	10.8	97	6.9	27
1/24/2012	1130	7.06	8.1	11.3	262	8.2	4.3
2/21/2012	950	31.7	8.84	11.07	141	7.09	34
	min	0.6	7.0	4.4	53.0	6.4	1.3
	avg	33.2	19.0	8.0	658.6	7.5	11.7
	max	194.97	32.4	11.3	1360	8.4	34

Table 5.9. *In-situ* measurements from UT-2 during the study period (March 2011 – February 2012).

Date	Time	Flow (cfs)	Temp (ºC)	D.O (mg/L)	Sp. Cond (µS)	pH (su)	Turb (ntu)
03/04/11	1210	1.56	21.8	6.6	880	7.6	5
04/19/11	1600	2.52	23.8	6.65	722	7.56	3.4
05/26/11	1115	0.96	23.7	7.01	860	7.3	4.32
06/16/11	1100	0.65	28.5	4.37	940	7.1	7.7
07/06/11	1220	1.67	29.5	6.14	1100	7.5	12.9
08/02/11	1005	1.4	30.4	4.34	744	7.3	2.9
09/07/11	1050	1.65	24	6.37	1280	7.3	1.9
10/19/11	1235	1.53	19.8	7.3	1120	7.8	1.89
11/14/11	1320	1.43	22.5	7.41	1040	7.31	3.05
12/8/2011	1300	17.9	8.8	11.8	264	7.3	46.2
1/24/2012	1240	2.3	16.1	6.6	900	7.9	1.2
2/21/2012	1055	45.1	8.63	10.44	110	6.86	10
	min	0.7	8.6	4.3	110.0	6.9	1.2
	avg	6.6	21.5	7.1	830.0	7.4	8.4
	max	45.1	30.4	11.8	1280.0	7.9	46.2

5.4.3 Diel Measurements

Diel measurements were obtained at Station PR-2 between 0831 hrs. on October 18, 2011 through 1259 hrs. on October 19, 2011. Figure 5.10 shows the diel cycle for temperature and dissolved oxygen during the period measured. Other data collected during the 24+ hour period are provided in Appendix H.

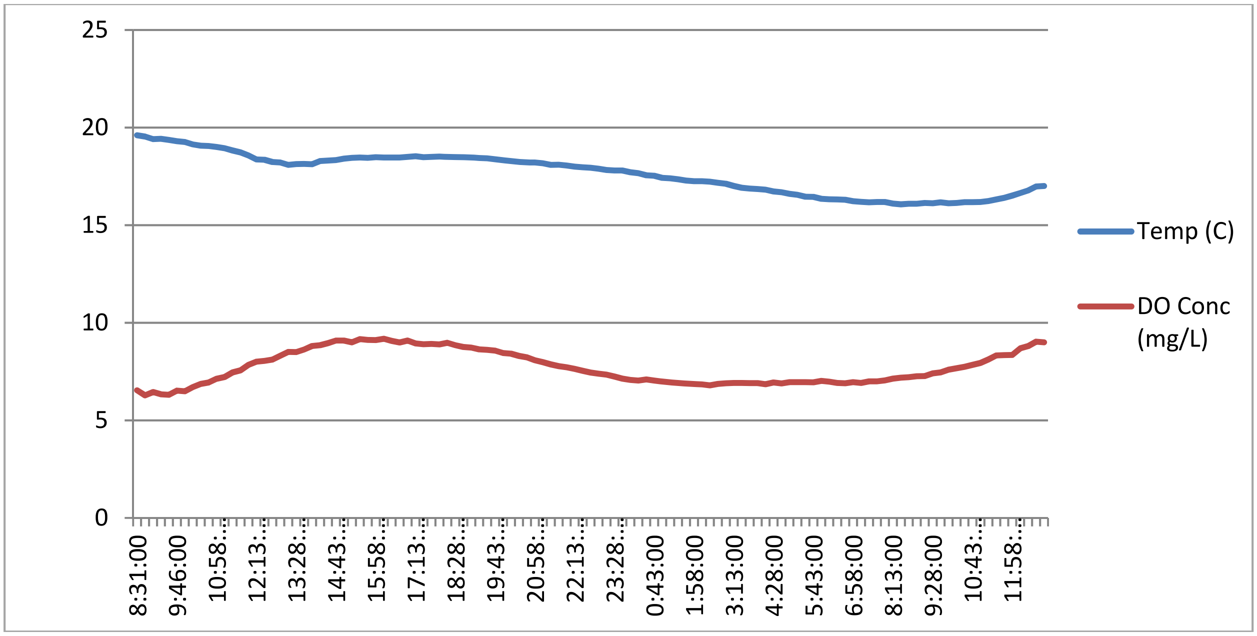

Figure 5.10. Diel measurements of temperature and dissolved oxygen obtained October 17-18, 2011 at PR-2.

5.4.4 Discussion Regarding Water Quality Parameters Evaluated

Water quality parameters were within ranges supporting the fishery uses. Temperatures measured on August 2, 2011 exceeded the numerical temperature criteria (31ºC) for the Arkansas River Valley Ecoregion at PR-1, which was the highest temperature recorded at 33.8ºC, and at PR-2 (32.4º C), but not at UT-2, which was 30.4ºC. The two Poteau River stations were measured during the afternoon, whereas the UT-2 measurement was taken at mid-morning. These temperatures were not surprising as Arkansas was experiencing a heat wave in early August, and air temperatures in the Waldron area reached 106ºF on August 1 and 108ºF on August 2, 2011. Other *in-situ* parameters were reasonably similar among stations.

Data for chloride, sulfate, and TDS indicate that PR-1 averages over the study period were lower than PR-2 and UT-2, as expected in an “upstream-downstream” assessment associated with two point source discharges. The maximum values from PR-2 and UT-2 were not substantially higher than the upstream station (PR-1) and ranged from a high percent difference of 19% higher for TDS at PR-2, to the lowest percent difference of only 10% higher for sulfate at UT-2. The average values for chloride and TDS measured during this study from PR-2 and UT-2 were less than the respective numerical criteria, while the average sulfate for the study period exceeded the numerical criteria for both PR-2 and UT-2. For the upstream station, PR-1, average values measured during this study exceeded the Ecoregion Reference Stream Data listed in Regulation 2.511 for chloride, sulfate, and TDS. The magnitude of measured values relative to the respective criteria for each station was greatest at the upstream station, PR-1.

5.5 Benthic Macroinvertebrate Community

5.5.1 Introduction

Benthic macroinvertebrates inhabit the sediment or live on the bottom substrates of streams, rivers and lakes. The presence of these organisms and their diversity and tolerance to environmental perturbation at an expected level reflects the maintenance of a systems biological integrity. Monitoring these assemblages is useful in assessing the aquatic life (or fisheries) status of the waterbody and detecting trends in ecological condition.

5.5.2 Methods

Benthic macroinvertebrate sampling was completed at three stations along the Poteau River (PR-1, PR-2, PR-3) and in UT-2 on April 19 and October 18, 2011. The Poteau River was sampled as a riffle/pool predominant stream, collecting half the sample in gravel and cobble riffles and half the samples in pool (non-riffle) habitats such as root wads, depositional areas, emergent vegetation, etc. Collection and sample processing was completed according to GBM^c SOP's and EPA protocols (Barbour, 1999) and are generally considered semi-quantitative.

Samples of each representative habitat (riffle and pool) were condensed in the field, preserved in Kaylee's solution, and taken back to the GBM^c laboratory for further processing. Macroinvertebrate samples were processed based on EPA methodology (Barbour, 1999). Samples were rinsed and placed in a sorting tray. The sample was randomly distributed on the tray and a grid placed over the material. Random numbers were selected to determine which grid(s) would be picked of organisms and enumerated. A total of 100 (+/-10%) organisms were picked from the riffle habitat and a total of 100 (+/-10%) organisms was picked from the pool habitat.

A cursory examination of the remaining sample material was conducted to locate and remove large or rare specimens, which were preserved in the same jar. All organisms from the samples were identified to appropriate taxonomic levels (generally to genus), according to the QAPP. All identifications were completed using widely accepted taxonomic references including *An Introduction to the Aquatic Insects of North America* (Merritt and Cummins, 2008) and *Fresh Water Invertebrates of the United States* (Pennak, 1989). Macroinvertebrates were identified down to the lowest taxonomic level, usually genus.

A series of biometrics were analyzed for each collection from a stream station/reach. All organisms from each habitat type were lumped together for inclusion in the community metric analysis. The primary biometrics assessed were taxa richness (number of different taxa), EPT (Ephemeroptera, Plecoptera, and Trichoptera) richness, biotic index, Shannon-Weiner Diversity Index (base-e), percent EPT, and community ordinal and trophic composition structure. The biotic index was calculated following the formula developed by Hilsenhoff (EPA, 1989). Tolerance values used in the calculations were from a Missouri Department of Natural Resources database (Sarver, 2001) which is based on tolerance values developed by Lenat, Hilsenhoff, Bode, and others, or from those provided in *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers*, (EPA, 1999). A comprehensive listing of the macroinvertebrate taxa identified from the 2011 samples is presented in Appendix I. A summary of the biometric scores are presented in Tables 5.10 – 5.11.

5.5.3 Results and Discussion

5.5.3.1 Station PR-1

In spring 2011, the sample from PR-1 was dominated by Dipterans (69%) and Colepoterans (17%). Taxa richness and EPT richness were 29 and 6, respectively, both the highest of the reaches assessed in the Poteau River during the spring assessment. The Biotic Index calculation (a measure of macroinvertebrate sensitivity to environmental perturbation) resulted in a value of 6.65 which portrays a community less sensitive to water quality and habitat perturbation compared with streams receiving scores in the “good” category of 4.51 – 5.50 (values scored from 0-10, with 0 being the most sensitive). The score of 6.65 may indicate organic enrichment of the upstream station. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 2.19. The trophic structure of the community was dominated by collectors (43%) and filterers (23%).

The PR-1 sample collected in fall 2011 was dominated by Dipterans (42%) and Ephemeropterans (18%). Taxa richness and EPT richness were 29 and 2, respectively. The Biotic Index increased in the fall 2011 sample and resulted in a value of 6.80. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 2.59. Collectors (43%) and scrapers (28%) dominated the community trophic structure.

5.5.3.2 Station PR-2

The PR-2 sample from spring 2011 was dominated by Dipterans (90%) and Colepoterans (3%). Taxa richness and EPT richness were 19 and 3, respectively. The Biotic Index resulted in a value of 7.32 which again portrays a community less sensitive to water quality and habitat perturbation relative to scores indicating “good” water quality. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 1.25. The community trophic structure was dominated by collectors (70%) and filterers (16%).

In fall 2011, the PR-2 sample was dominated by Dipterans (67%) and Trichopterans (15%). Taxa richness and EPT richness were 17 and 4, respectively. The Biotic Index calculated for the fall collection was higher than in the spring and resulted in a value of 7.62. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 1.48. The community trophic structure was dominated by collectors (69%) and filterers (15%).

5.5.3.3 Station PR-3

The spring 2011 sample from PR-3 was dominated by Dipterans (52%) and Ephemeropterans (16%). Taxa richness and EPT richness were 27 and 5, respectively. The Biotic Index resulted in a value of 7.09. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 1.99. The community trophic structure was dominated by collectors (60%) and filterers (18%).

The PR-3 sample from fall 2011 was dominated by Trichopterans (34%) and Dipterans (19%). Taxa richness and EPT richness were 32 and 8, respectively, both the highest of the reaches assessed in the Poteau River during the fall assessment. The Biotic Index resulted in a value of 6.88. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in an increased value of 2.56 compared to the spring sample. The community trophic structure was dominated by filterers (42%) and collectors (34%).

5.5.3.4 Station UT-2

Although limited in diversity, a benthic community was being maintained at UT-2. In spring 2011, the UT-2 sample was dominated by Dipterans (83%) and individuals from the phylum Annelida (10%). Taxa richness and EPT richness were 6 and 0, respectively. The Biotic Index resulted in a value of 7.04. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 1.19. The community trophic structure was dominated by collectors (58%) and filterers (30%).

The UT-2 sample from fall 2011 was dominated by individuals from the phylum Annelida (49%) and Dipterans (17%). Taxa richness and EPT richness were 13 and 1, respectively. The Biotic Index resulted in a value of 7.7. A Shannon-Weiner Diversity Index (base-e) was calculated and resulted in a value of 1.86. The community trophic structure was dominated by predators (41%) and filterers (24%).

5.5.4 Summary of Findings

All study reaches supported a benthic invertebrate community during both the spring and fall. In spring 2011, each reach had a community dominated by Dipterans with a range of 52% to 90%. In fall Dipterans dominated reaches PR-1 (42%), PR-2 (67%), while Tricopterans (34%) and Annelida (48%) dominated PR-3 and UT-2, respectively. Most reaches were dominated by collector-gatherers during both seasons, except in the fall at UT-2 (predators; 41%) and PR-3 (filterers; 42%). Domination by collector-gatherers is common in Arkansas River Valley streams of small watershed size.

Ranges of key biometrics showed variable results between sites and between seasons. In the spring taxa richness varied between sights ranging from 6 species at UT-2 to 29 species at PR-1. Fall collections also varied across sites with 13 species being present at UT-2 to 32 species at PR-3. Taxa richness decreased slightly in fall when compared to the spring sample for PR-2, increased from spring to fall for PR-3 and UT-2, and stayed the same for PR-1. EPT richness ranged from 0 species at UT-2 to 6 species at PR-1 in the spring, while EPT richness ranged from 1 species at UT-2 to 8 species at PR-3 in the fall. Percent abundance of EPT taxa increased in all reaches from spring to fall, with PR-3 having higher abundance for both seasons (27% to 49%; spring and fall respectively).

Diversity varied slightly between reaches for both seasons and increased in all reaches from spring to fall. In spring, UT-2 had the lowest diversity (1.19) compared to the upstream reach PR-1 (2.19). Station PR-2 had the lowest diversity value in the fall at 1.48 compared to the upstream site, PR-1, which had the highest species diversity value, at 2.59.

The biotic index score for all reaches sampled in spring and fall 2011 are representative of a community more tolerant to environmental perturbation, particularly organic enrichment (Hilsenhoff 1987, Huggins & Moffett, 1998). Scores among all stations for both seasons varied little with PR-1 scoring the most sensitive at 6.65 and PR-3 the least sensitive at 7.32 in spring. In the fall collection PR-1 scored the most sensitive at 6.8 and UT-2 scored the least sensitive at 7.7.

Table 5.10. Macroinvertebrate community metric analysis for the Poteau River watershed near Waldron, AR in spring 2011.

Parameter				
Spring 2011	PR-1	PR-2	PR-3	UT-2
COMMUNITY MEASURES				
Total number of Taxa (Richness)	29	19	27	6
EPT Richness	6	3	5	0
EPT % Abundance	3.7	1.8	26.5	0
Diversity Indices (Shannon-Wiener)	2.19	1.25	1.99	1.19
Total % of 5 Dominant Taxa	81	93	84	97
PERCETAGE OF THE 4 DOMINANT ORDINAL GROUPS				
Annelida		3		9.5
Gastropoda	3.9			6.8
Ephemeroptera	2.2		16.1	
Odonata		1.2		
Hemiptera				0.3
Plecoptera				
Coleoptera	17	3.1	13.3	
Diptera	69.2	89.8	52	83.4
Trichoptera			10.4	
Crustacea				
FUNCTIONAL FEEDING ASSEMBLAGES %				
Shredders	0	0.4	0.5	0
Scrapers	15	3.3	14.3	6.8
Filterers	23.4	16.1	18.1	30
Collectors	43.3	70.3	60.2	58.1
Predators	18.2	9.8	6.9	5.1
Biotic Index	6.65	7.32	7.09	7.04

Table 5.11. Macroinvertebrate community metric analysis for the Poteau River watershed near Waldron, AR in fall 2011.

Parameter	PR-1	PR-2	PR-3	UT-2
COMMUNITY MEASURES				
Total number of Taxa (Richness)	29	17	32	13
EPT Richness	2	4	8	1
EPT % Abundance	17.8	18.3	49.3	7.8
Diversity Indices (Shannon-Wiener)	2.59	1.48	2.56	1.86
Total % of 5 Dominant Taxa	67	87	66	89
PERCETAGE OF THE 4 DOMINANT ORDINAL GROUPS				
Annelida	7.1	4.3		48.3
Gastropoda				15.6
Ephemeroptera	17.8		15.5	
Odonata				7.8
Plecoptera				
Coleoptera	8.1	5.7	12.5	
Diptera	42.1	67	18.9	17.1
Trichoptera		15.2	33.8	7.8
Crustacea	7.1			
FUNCTIONAL FEEDING ASSEMBLAGES %				
Shredders	0	0	0	0
Scrapers	27.9	4.3	8.8	15.6
Filterers	3.6	15.2	41.6	24.4
Collectors	43.1	68.7	33.7	19
Predators	22.3	11.7	15.9	41
Biotic Index	6.8	7.62	6.88	7.7

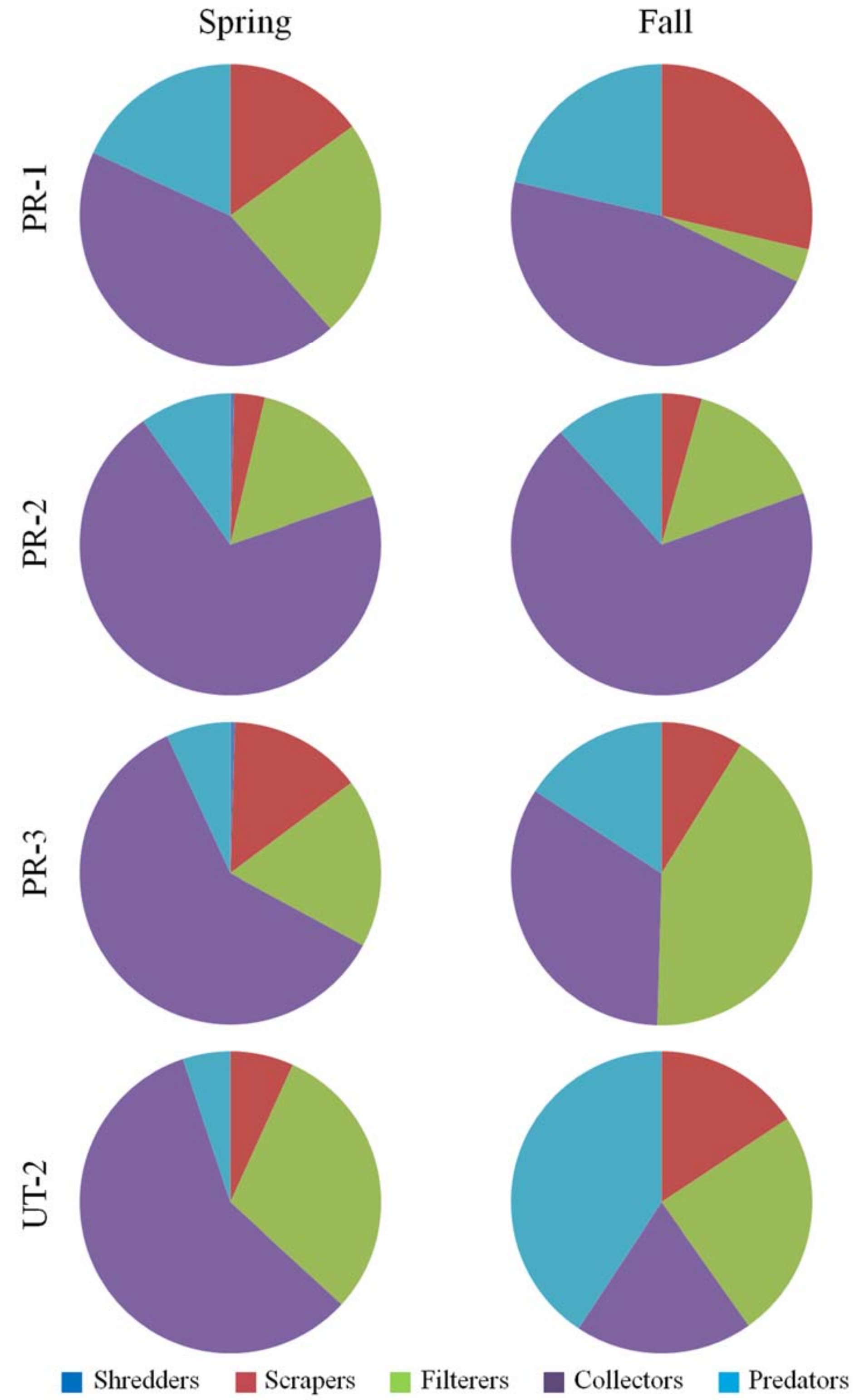

Figure 5.11. Comparison of community trophic structure between spring and fall 2011 across all sample reaches of the Poteau River.

As a result of comments received from ADEQ on the draft 2012 Study Report additional macroinvertebrate community analysis was performed using ADEQ's Multimetric Index (Biological Condition Criteria) which is largely based on EPAs Rapid Bioassessment Procedures (Plafkin, 1989). EPA's procedures (Plafkin, 1989) generally allows for similarities achieving 54% or greater to be considered in "attainment of aquatic life" (Fishery) uses. According to this Index the stations in the Poteau River downstream of the effluent discharges achieve a similarity in excess of 60% compared to the upstream reference station and are in full attainment of the fishery use (Figure 5.12).

For UT-2 macroinvertebrates was 21% and 71% similar in the spring and fall, respectively. Based on a 54% use attainment threshold, the UT-2 would fail in the spring, but pass in the fall. Considering that the PR-1 station is much larger and more developed (providing more diverse habitat) with minimal recent man-made channel alterations and a natural substrate, and the UT-2 biota were still comparable in the fall sample (when there is generally more concentrated effluent present), it is reasonable to conclude that the effluent is not causing a significant adverse impact to the biota that could potentially inhabit this highly altered stream segment.

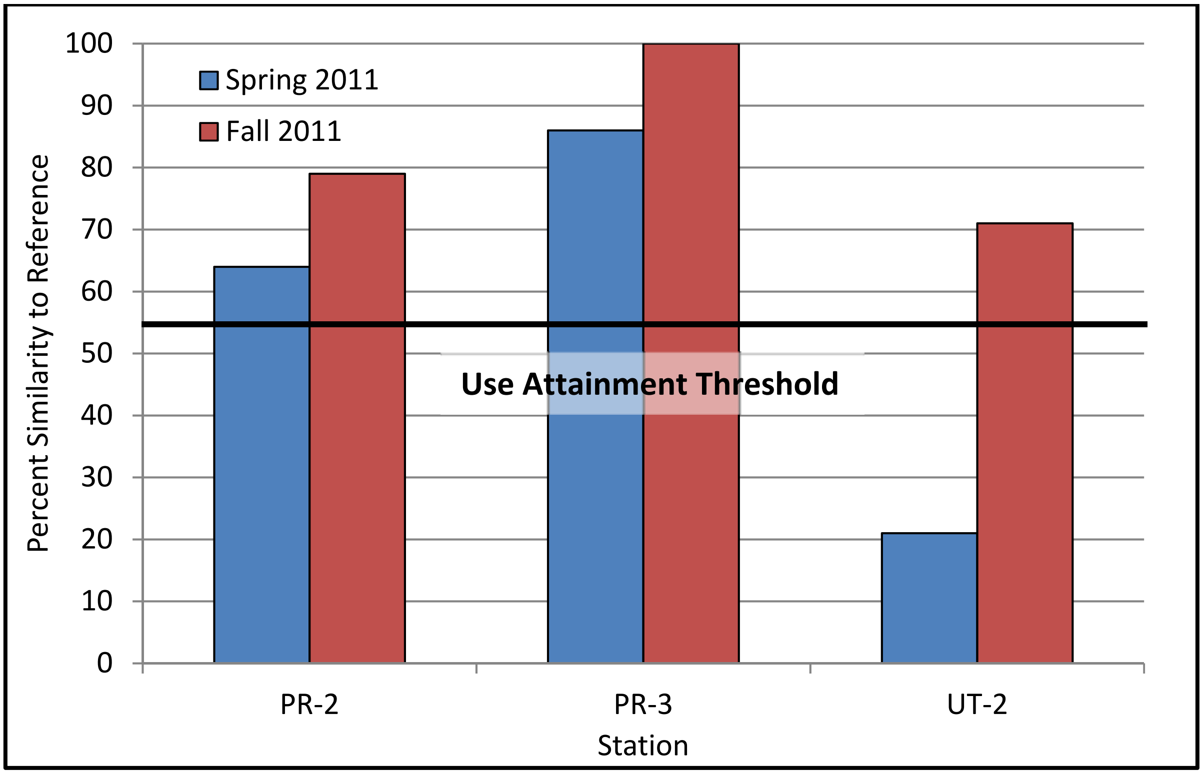

Figure 5.12. Scores for Poteau River macroinvertebrates collections according to the ADEQ Multimetric Scoring System (provided by ADEQ in their comments on the 2012 study).

5.5.5 Conclusions

Based on the analysis of the macroinvertebrate collection from the Poteau River, the following conclusions are provided:

- Although the benthic community assemblages demonstrated variability both spatially and temporally, a benthic community was being maintained at all stations. The variability demonstrated appeared to be associated with: 1) habitat quantity and quality of each reach, 2) typical seasonal progression, and 3) non-point source inputs, permitted point sources, and un-permitted point sources.
- The fall assemblages were generally better at PR-2 and PR-3 than the spring assemblages, with the exception of UT-2. This phenomenon is typically unusual downstream of point source discharges during lower flow seasons and suggests that non-point sources control water quality conditions rather than the point sources at higher flows.
- The macroinvertebrate community was in attainment of the fishery use at both the Poteau River stations during both the spring and the fall according to the ADEQ multimeric index. The Unnamed tributary was also found to be supporting of the Fishery use based on weight of evidence.
- The diversity and functionality of the benthic communities are typical of Arkansas River Valley ecosystems.
- The benthic communities of all study reaches were generally dominated by Dipterans which decreased the overall diversity and biometric scoring. Taxa richness was highest at the downstream reach and likely reflected habitat quality development.
- The lowest diversity was demonstrated at UT-2, which has a significantly smaller watershed that the other reaches examined, and is also limited in habitat.
- The functional feeding assemblages were dominated by collectors at all reaches, followed by filterers, then predators. This progression of dominance is typical for small to medium watershed size streams within the Arkansas River Valley Ecoregion (see ADEQ 1987).
- The functional feeding assemblages were different in the spring compared to the fall at three of four reaches reflecting typical seasonal differences i.e., increased numbers of predators in the fall consuming dipterans, thus resulting in their overall reduction.

- Based on the Biotic Index the benthic communities at all stations appear to have been influenced by organic enrichment.

5.6 Fish Community

5.6.1 Introduction

The condition of the fish community (abundance, diversity, sensitivity, species present, etc.) is an indicator of the water quality and habitat quality of a waterbody. Monitoring the fish community is useful in assessing the aquatic life (fisheries) status of a waterbody and indicating potential perturbations to the system. Fish were collected from three stations along the Poteau River (PR-1, PR-2, PR-3) and in UT-2 during the fall of 2011 (October 18-19, 2011). Station PR-1 is upstream of the wastewater discharges from both the Tyson Waldron Facility and the City of Waldron WWTP. Stations PR-2 and PR-3 are downstream of these wastewater discharges. A map depicting the sample reaches is presented in Figure 5.1.

5.6.2 Methods

A three-person crew of experienced field biologists conducted the sampling. The fish collections were made using a Smith-Root backpack electroshocker. At times a seine was used as a block net, held across the downstream terminus of riffle areas while the electroshocker was moved through the riffle from upstream to downstream, to collect fish from that type of habitat. The shocker is equipped with an automated timing mechanism which records the amount of time that electricity is actually being applied, referred to as “pedal down time” (PDT).

Fish community sampling was conducted prior to the collection of macroinvertebrate samples, and habitat data. Shocked fish were captured with hand held dip nets and held in buckets until the sampling was completed. The entire stream width within the sampling reach was sampled. Both PDT and the total collection time were recorded. The fish sampling was terminated when, in the opinion of the principal investigator, a representative collection had been obtained. Similar levels of effort in collection of fish were used in all Poteau River monitoring reaches. Sampling information was recorded on the Fish Community Collection Forms and general comments (perceived fishing efficiency, missed fish, and gear operation suggestions) were also recorded. A completed listing of fish collected at each station is presented in Appendix J.

At the end of each sampling reach effort, collected fish were preserved in formalin for later identification in the lab. Fish identifications were made according to the Fishes of

Arkansas (Robison, 1988) and The Fishes of Missouri (Pflieger, 1975) to species level where possible.

The fish collections from each reach were compared according to several biometrics including: species richness, sunfish richness, species diversity, abundance, dominant family groups, percent of tolerant (intermediate and intolerant) species, trophic structure, percent of hybrids, percent of diseased fish, and key and indicator species (number of species and percent composition) as listed in Reg. No. 2.

5.6.3 Results and Discussion

The aquatic life field study demonstrated that fishery uses were being maintained at all study reaches as demonstrated by the dominance of intolerant and intermediate species, and the percent composition of Arkansas River Valley Key and Indicator Species.

5.6.3.1 Station PR-1

A total of 317 fish were collected during the 30.2 minute PDT sampling effort at the PR-1 station. This equates to a relative fish abundance of 10.5 fish/minute of PDT. The fish community had a taxa richness of 15 and a Shannon-Wiener Diversity Index of 2.79. The sunfish family (Centrarchidae) had the highest taxa richness with 5 species (Table 5.12). As typical of small to medium size streams of the Arkansas River Valley, the sunfish and minnow (Cyprinidae) families were the dominant groups based on numbers of individuals and accounted for 52.1% and 22.4% of the collection, respectively. The perch (Percidae) family was sub-dominant, representing 20.2% of the collection at PR-1. No other family contained more than 2.2% of the collection. Figure 5.12 compares the dominant fish families collected at each station.

Fish community trophic structure at PR-1 was dominated by insectivores (79%) and herbivores (17.4%). The tolerance analysis of the fish community indicated that the community was dominated by facultative species (intermediate in sensitivity, neither tolerant nor intolerant) at 50.6%, followed by pollution intolerant species (43.2%), and pollution tolerant species (6.1%). Figure 5.13 illustrates the fish community trophic structure results among stations, and Figure 5.14 shows percent composition among station collections on a tolerance basis.

At station PR-1, four fish species were collected that were Key and Indicator species for the Arkansas River Valley. A total of 47.6% of the total fish community was comprised of Key and Indicator species defined in Regulation 2 for the Arkansas River Valley Ecoregion. Figure 5.15 compares fish community Key and Indicator species among stations.

5.6.3.2 Station PR-2

The fish community at PR-2 was typical of a small to medium sized Arkansas River Valley stream and had the highest relative abundance of any reach sampled. The community at PR-2 included a total of 692 fish collected during the 31.8 minute PDT sampling effort. This equates to a relative fish abundance of 21.74 fish/minute of PDT. The fish community at PR-2 had a taxa richness of 18 and a Shannon-Wiener Diversity Index of 2.89, both increases relative to Station PR-1.

The minnow family had the highest taxa richness (6 species), and was the dominant family collected, accounting for 53% of the collection (Table 5.12, Figure 5.12). This was followed by sunfishes and perches accounting for 36.7% and 5.9%, respectively. The PR-2 fish community trophic structure was dominated by insectivores, which made up 76.2% of the collection, followed by omnivores at 20.7% (Figure 5.13). The fish community was dominated by intolerant species at 56.9%, followed by intermediate species (25.9%), and pollution tolerant species (17.2%) (Figure 5.14).

Evaluation of key metrics such as abundance, taxa richness, species diversity, and percent of intolerant species suggests an improvement of the fish community at PR-2 relative to PR-1. Four fish species were collected that were Key and Indicator species for the Arkansas River Valley Key and these four species comprised 43.4% of the fish community at PR-2. The Key and Indicator species numbers and percent composition at Stations PR-1 and PR-2 were similar (Figure 5.15).

5.6.3.3 Station PR-3

The fish community at PR-3 was the most diverse and contained the highest species richness of any of the reaches sampled. A total of 466 fish were collected during the 29 minute PDT sampling effort at PR-3, equating to a relative fish abundance of 16.05 fish/minute of PDT. The fish community at PR-3 had a taxa richness of 22 and a Shannon-Wiener Diversity Index of 3.48 (Table 5.12).

Similar to Reach PR-2, the minnow family had the highest taxa richness (7 species) and the highest percent of total individuals collected (48.1%). The sunfish family had the second highest percent of total individuals collected at PR-3 comprising 40.3% (Figure 5.12). Also similar to Reach PR-2, the fish community trophic structure at PR-3 was dominated by insectivores and omnivores accounting for 67.4% and 23.8%, respectively (Figure 5.13). PR-3 was dominated by species with intermediate tolerance to perturbation at 51.9%, followed by tolerant species at 24.5%, and intolerant species at 23.6%. Six Key and Indicator species comprised 34.8% of the fish community at PR-3 (Figure 5.14). This represents an increase in two species but a decrease in percent composition relative to stations PR-1 and PR-2 (Figure 5.15).

5.6.3.4 Station UT-2

Despite the extremely small watershed size and limited habitat of Reach UT-2 the fish community included a total of 289 individuals collected during the 18.9 minute PDT sampling effort. This equates to a relative fish abundance of 15.3 fish/minute of PDT. The fish community at UT-2 had a taxa richness of 13 and a Shannon-Wiener Diversity Index of 2.5.

Again, as typical of small Arkansas River Valley streams, the minnow and sunfish families had the highest taxa richness (5 species each) and accounted 54.3% and 25.3%, respectively. Fish community structural analyses are provided in Table 5.12. The UT-2 fish community trophic structure was dominated by insectivores accounting for 48.1% followed by herbivores at 45.3%. The fish community was dominated by species intermediate to perturbation at 63.3%, followed by intolerant species (18.7%), and pollution tolerant species (18.0%). Three Key and Indicator species comprised 23.9% of the fish community at UT-2.

5.6.3.5 Summary of Findings

Fish communities were dominated by species intermediate to perturbation at all stations, except PR-2, which was comprised of a greater percentage of intolerant species. Diversity and species richness were highest at the furthest downstream station, PR-3 (3.48 and 22, respectively) and lowest at UT-2 (2.50 and 13, respectively). The percent composition of Key and Indicator species was greatest at station PR-1 (4 species, 47.6%), PR-2 was similar to PR-1 at 4 species and 43.4%, and PR-3 was highest in number of Key and Indicator species (6) and lowest of Poteau River stations in percent composition at 34.8%. UT-2 contained the lowest number and percentage of Key and Indicator species with 23.9%.

Fish community trophic structure was consistent at all stations of the Poteau River with insectivores accounting for the highest percentages (48.1%-79.0%). Herbivores followed insectivores in abundance at PR-1 (17.4%) and UT-2 (45.3%), while omnivores comprised the second most abundant trophic group at station PR-2 (20.7%) and PR-3 (23.8%). Fishes from the minnow family dominated the communities at PR-2 (53.0%), PR-3 (48.1%), and UT-2 (54.3%), while station PR-1 was dominated by individuals from the sunfish family, comprising 52.1% of the community. Individuals from the sunfish family comprised the second most abundant family at PR-2, PR-3, and UT-2 (36.7%, 40.3%, and 25.3%, respectively). The minnow family was the second most abundant family at PR-1, accounting for 22.4% of the community.

Table 5.12. Fish community structural analysis for the Poteau River at Waldron, AR, October 2011.

Parameter	PR-1	PR-2	PR-3	UT-2
COMMUNITY MEASURES				
Richness (Total Number of Species)	15	18	22	13
Darter Richness (Number of Species)	2	3	4	0
Sunfish Richness (Number of Species)	5	5	5	5
% Pollution Tolerant Species	6.1	17.2	24.46	18.0
% Pollution Intermediate Species	50.6	25.9	51.9	63.3
% Pollution Intolerant Species	43.2	56.9	23.6	18.7
Diversity Indices (Shannon-Wiener)	2.79	2.89	3.48	2.50
Abundance, fish collected/minute	10.5	21.7	16.1	15.3
Number of Key & Indicator Species	4	4	6	3
% Key & Indicator Species numbers of total fish	47.6	43.4	34.8	23.9
TROPHIC STRUCTURE				
% Herbivores	17.4	2.0	7.7	45.3
% Omnivores	1.6	20.7	23.8	4.5
% Insectivores	79.0	76.2	67.4	48.1
% Piscivores	1.9	1.2	1.1	2.1
PERCENT OF 5 DOMINANT FAMILY GROUPS				
CYPRINIDAE	22.4	53.0	48.1	54.3
ATHERINIDAE	0.3	0.0	1.3	0.0
FUNDULIDAE	0.6	0.1	1.1	0.0
POECILIIDAE	2.2	2.9	0.4	14.9
LEPISOSTEIDAE	0.0	0.0	0.2	0.0
ICTALURIDAE	2.2	1.3	0.6	5.5
CENTRARCHIDAE	52.1	36.7	40.3	25.3
PERCIDAE	20.2	5.9	7.9	0.0
Total % of 5 Dominant Groups	99.1	99.9	98.7	100.0

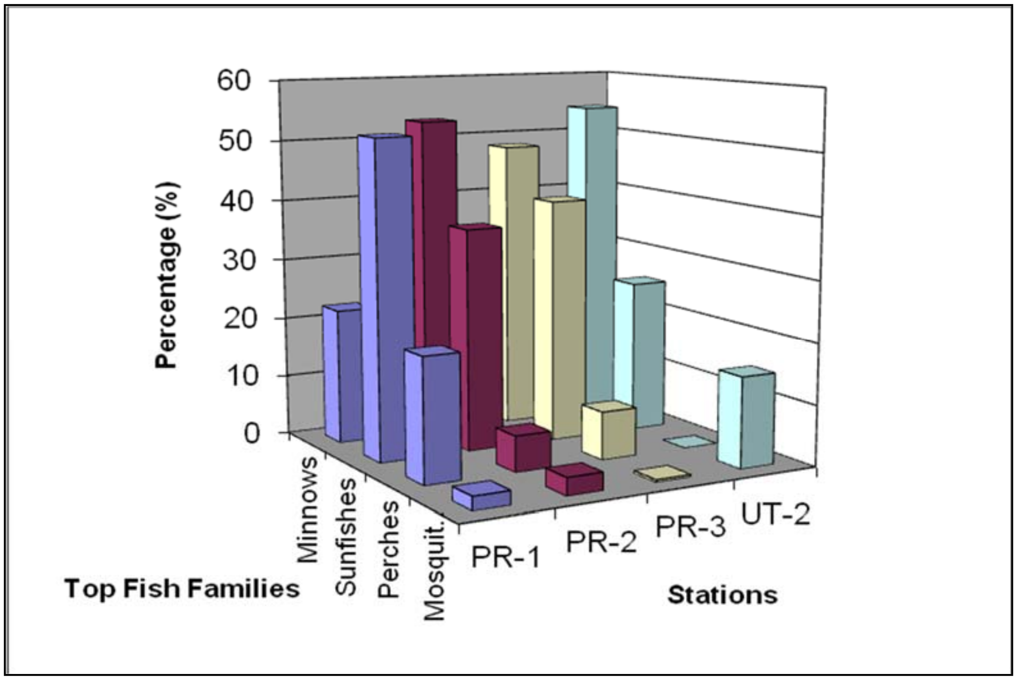

Figure 5.13. Comparison of dominant fish families collected in each reach of the Poteau River and the UT.

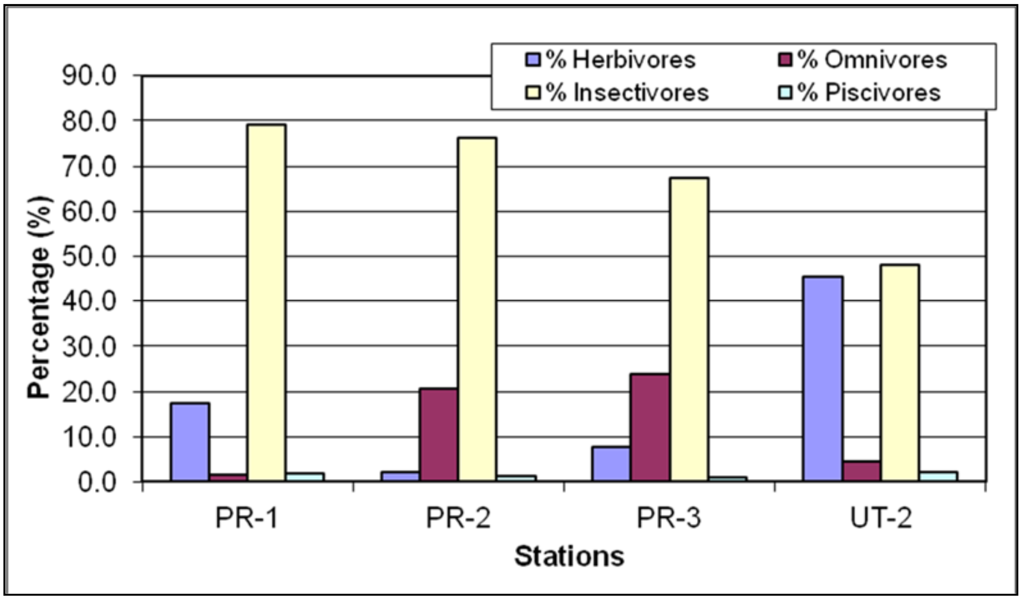

Figure 5.14. Comparison of community trophic structure in each reach of the Poteau River and the UT.

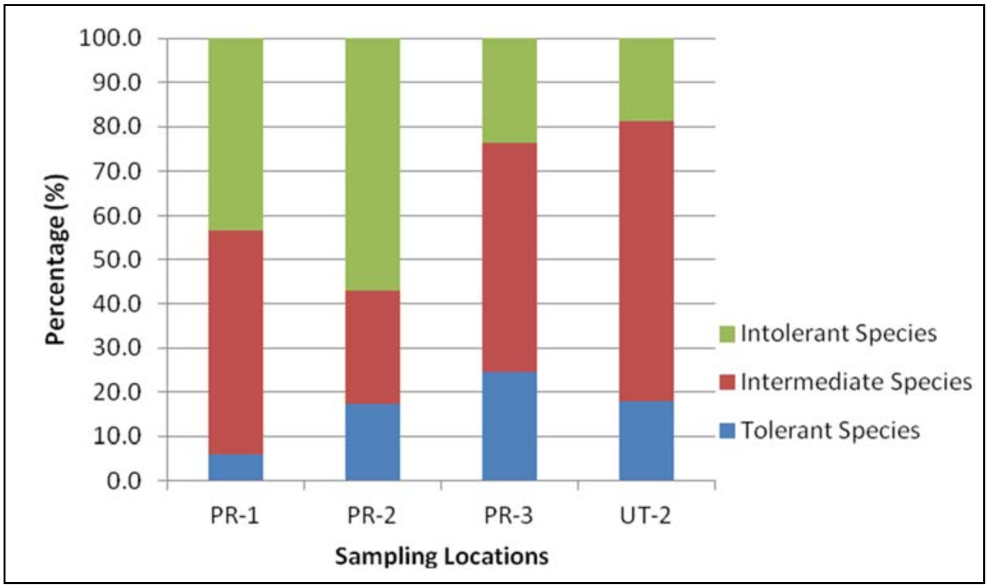

Figure 5.15. Comparison of percent composition of fish community tolerance to perturbation.

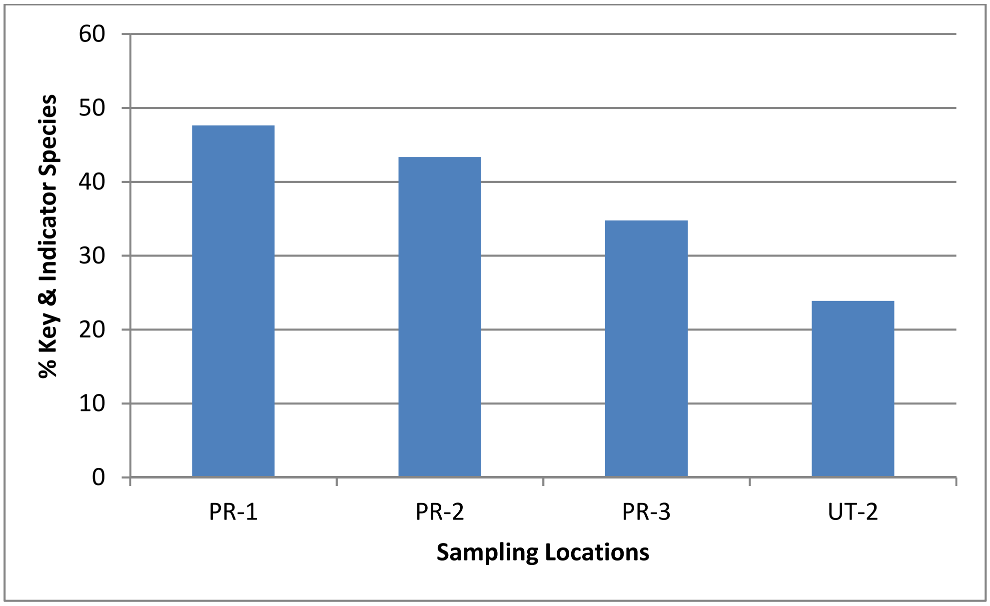

Figure 5.16. Percent of ecoregion “key and Indicator” species collected from each reach.

The fish community at each station was also assessed using the ADEQ Index of Biotic Integrity (ADEQ 2012 Assessment Methodology) and all stations scored above the use attainment threshold (Figure 5.17). The Index of Biotic Integrity, referred to more recently as the “Community Structure or Similarity Index”, utilizes 9 fish community metrics. Metric ranges for each ecoregion were developed by ADEQ from their least disturbed stream sites to arrive at ranges typical for a given ecoregion. These 9 metrics are then calculated for the study stations

(PR-2, PR-3 and UT-2) and scores compared to the ecoregion scores to determine use attainment.

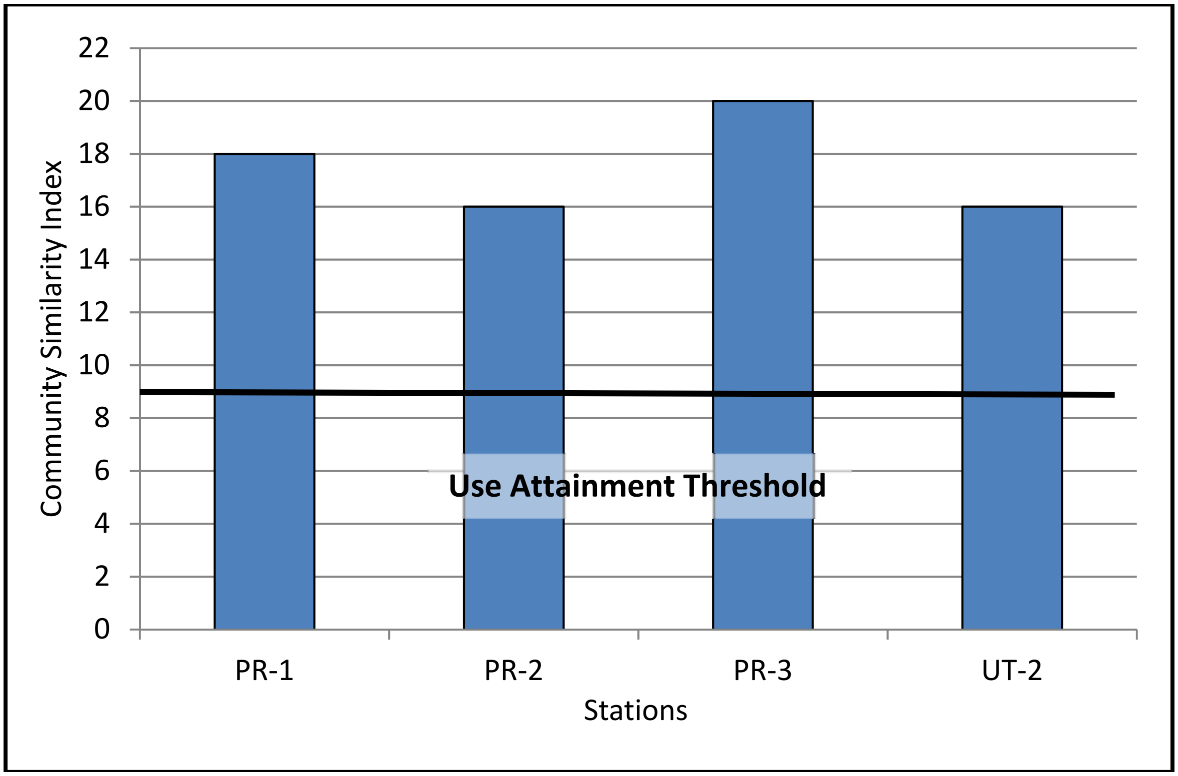

Figure 5.17. Fish Index of Biotic Integrity (Community Structure or Similarity Index).

5.6.4 Conclusions

Based on the results of the fish collections, the following conclusions are provided:

- The aquatic life field study demonstrated that fishery uses were being maintained at all study reaches as demonstrated by the Index of Biotic Integrity and the dominance of intolerant and intermediate species.
- The fish communities in the Poteau River reaches sampled were found to contain significant percent composition of ecoregion Key and Indicator Species as identified in Arkansas Regulation No. 2.
- A direct comparison of the fishes collected at PR-1 and PR-2 indicates that the communities are fairly similar. However, the collection at PR-2 was superior to PR-1 in most metrics. PR-2 contained greater individual abundance, greater species richness, greater darter richness, greater species diversity, and a greater percentage of intolerant species compared to PR-1.

5.7 Comparison with Historical Collections

The aquatic life survey completed on the Poteau River (April 19 and October 18, 2011) by GBM^c & Associates characterized instream aquatic life communities of the perennial stream. The survey results for fishes were then compared to historical data collected by ADEQ. A comparison of the macroinvertebrates between a 1994 ADEQ collection and the GBM^c 2011 collection was not made because of differences in collection time periods (i.e., spring collections were made in May 19, 1994 and April 19, 2011, fall collections were obtained August 30, 1994 and October 18, 2011), and collection-picking techniques. ADEQ also collected benthic macroinvertebrate samples in 2002 using techniques more similar to those used by GBM^c in 2011. The 2002 ADEQ collections were made near Station PR-3. The spring and fall collections from 2002 were dominated by Dipterans (39% - 53%) with Tricopterans or Ephemeropterans being the second most dominant ordinal group, similar to the GBM^c collections. The fish data were compared to collections completed in the spring and late-summer of 1994 and in fall only of 2011.

5.7.1 Fish Community Comparisons

The fish collections completed in 2011 by GBM^c at PR-1 and PR-2 were compared to collections completed in 1994 by ADEQ. Collections from PR-1 shared Centrarchidae as the common dominant family (GBM^c- 52.1% and ADEQ- 57.6%), while collections from PR-2 shared Cyprinidae as the dominant family (GBM^c- 53% and ADEQ- 61.3%).

The number of taxa collected at PR-1, 15 species was lower compared to the ADEQ collections (29 species), sharing 13 taxa in common. The number of taxa collected at PR-2 (18 species) in 2011 was similar to those collected by ADEQ in 1994 (25 species), having 14 species in common. The 2011 collection at PR-1 resulted in two darter species and the collection by ADEQ in the fall of 1994 resulted in seven darter species. The collection taken at PR-2 in 2011 resulted in three darter species compared to the five darter species collected by ADEQ in the fall of 1994.

Table 5.13. Comparison of fish community structural analysis between ADEQ's fall 1994 and GBM^c 2011 fall collections for the Poteau River at Waldron, AR.

Parameter	ADEQ PR-1	GBMc PR-1	ADEQ PR-2	GBMc PR-2
COMMUNITY MEASURES	8/30/1994	10/18/2011	8/30/1994	10/18/2011
Richness (Total Number of Taxa)	29	15	25	18
Darter Richness (Number of Taxa)	7	2	5	3
Sunfish Richness (Number of Taxa)	4	4	4	4
% Pollution Tolerant Species	24.5	8.2	14.0	16.6
% Pollution Intermediate Species	24.0	32.5	34.6	24.4
% Pollution Intolerant Species	51.3	59.3	51.4	59.0
Diversity Indices (Shannon-Wiener)	3.28	2.00	3.42	2.89
Number of Key & Indicator Species Taxa	6	4	5	4
% Key & Indicator Species numbers of total fish	37.9	47.6	20.8	43.4
TROPHIC STRUCTURE				
% Herbivores	16.6	17.0	29.3	2.0
% Omnivores	8.1	1.6	22.6	20.7
% Insectivores	73.8	80.4	46.2	76.9
% Piscivores	1.2	0.9	1.9	0.4
PERCENT OF 5 DOMINANT FAMILY GROUPS				
CATOSTOMIDAE	0.6	--	1.6	--
CYPRINIDAE	30.8	22.4	61.3	53.0
ATHERINIDAE	1.8	0.3	0.4	--
FUNDULIDAE	2.0	0.6	0.8	0.1
POECILIIDAE	1.7	2.2	1.3	2.9
LEPISOSTEIDAE	0.4	--	0.9	--
ICTALURIDAE	0.8	2.2	1.1	1.3
CENTRARCHIDAE	57.6	52.1	26.3	36.7
PERCIDAE	4.3	20.2	6.3	5.9
Total % of 5 Dominant Groups	92.2	99.1	95.4	99.9

6.0 Non-Point Source Evaluation

A limited evaluation of potential non-point sources of pollutants was completed in February 2012 to determine if there were obvious sources that could adversely affect water quality in the Poteau River near Waldron. Land-uses in the watershed were reviewed to assist in that effort and are shown in Figure 6.1.

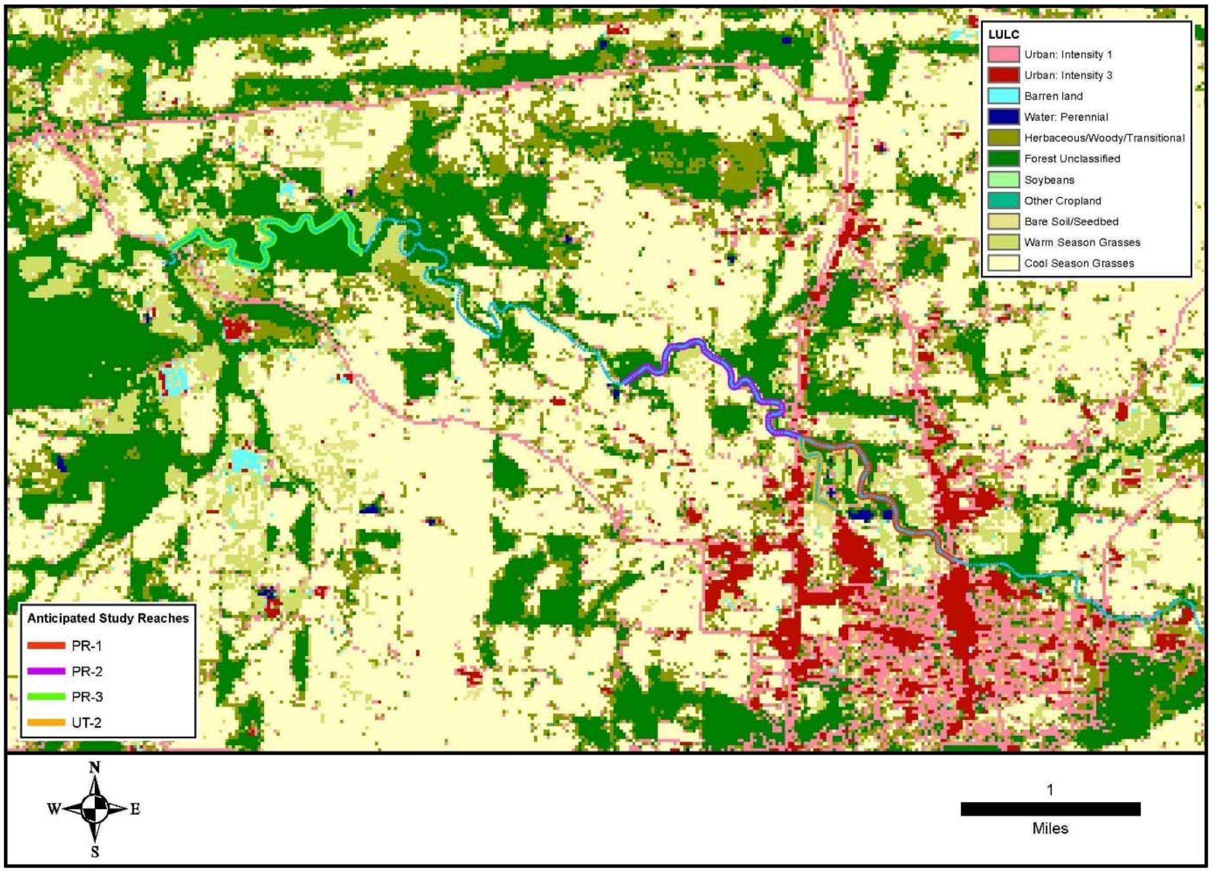

Figure 6.1. Land-use categories in the Poteau River watershed near Waldron.

As shown in Figure 6.1 the stream reach just upstream of Station PR-1 contains the majority of the urban land-use in the vicinity. Runoff from urban areas is known to affect both the hydrology of a stream system, through higher overall volumes of runoff and increased peak runoff flow, as well as delivery of increased pollutant loads (EPA 2003).

Additionally, the field investigation identified two specific potential sources of pollutant loading to the stream in the Waldron area. First, a livestock auction facility with holding pens very near the stream banks was observed. The livestock auction is located approximately 1.2 miles upstream from the Unnamed Tributary / Poteau River confluence. Figures 6.2 and 6.3 are photographs (2-21-2012) of the holding pens of the livestock auction adjacent to the Poteau River.

Figure 6.2. Holding pens and drainage way associated with the livestock auction (2-21-12).

Figure 6.3. Holding pens and drainage way associated with the livestock auction (2-21-12).

As can be clearly seen in the photographs, drainage from the holding pens has created a conveyance ditch in at least two separate areas where storm water can be transported directly to the Poteau River upstream of Station PR-1. Further investigation revealed that the livestock auction has received pollution complaints in the past and an ADEQ investigation report for the livestock auction is included as Appendix K. Animal manure deposited in such close proximity to the stream represents a significant source of organic enrichment to the Poteau River and has the potential to affect the stream communities, particularly during the wet periods of spring when runoff is more common.

Second, during the course of collection of monthly water quality samples in the Poteau River at the confluence with the Unnamed Tributary, a greenish water color was noted on a few occasions. On February 21, 2012 the greenish colored water was again observed and its source investigated. Figure 6.4 is a photograph of the Poteau River / Unnamed Tributary confluence area.

Figure 6.4. Confluence of the Unnamed Tributary and the Poteau River (2-21-12).

Upon further investigation the source of the green water was determined to be coming from the City of Waldron's Equalization Basin via a piped discharge. Figure 6.5 is a photograph of the equalization basin and Figure 6.6. is a photograph of the discharge pipe from the equalization basin.

Figure 6.5. City of Waldron's Equalization Basin (2-21-12).

Figure 6.6. Discharge from the City of Waldron's Equalization Basin.

The discharge from the Equalization Basin meanders approximately 250 feet where it enters the Unnamed Tributary at the confluence between the City's permitted outfall and the Tyson Waldron discharge. As shown in Figure 6.7 the Unnamed Tributary was highly colored on February 21, 2012 as a result of the Equalization Basin discharge, which the ADEQ determined was a discharge of untreated or partially treated wastewater in violation of the Clean Water Act. The ADEQ inspection report for the Equalization Basin discharge is contained in Appendix L.

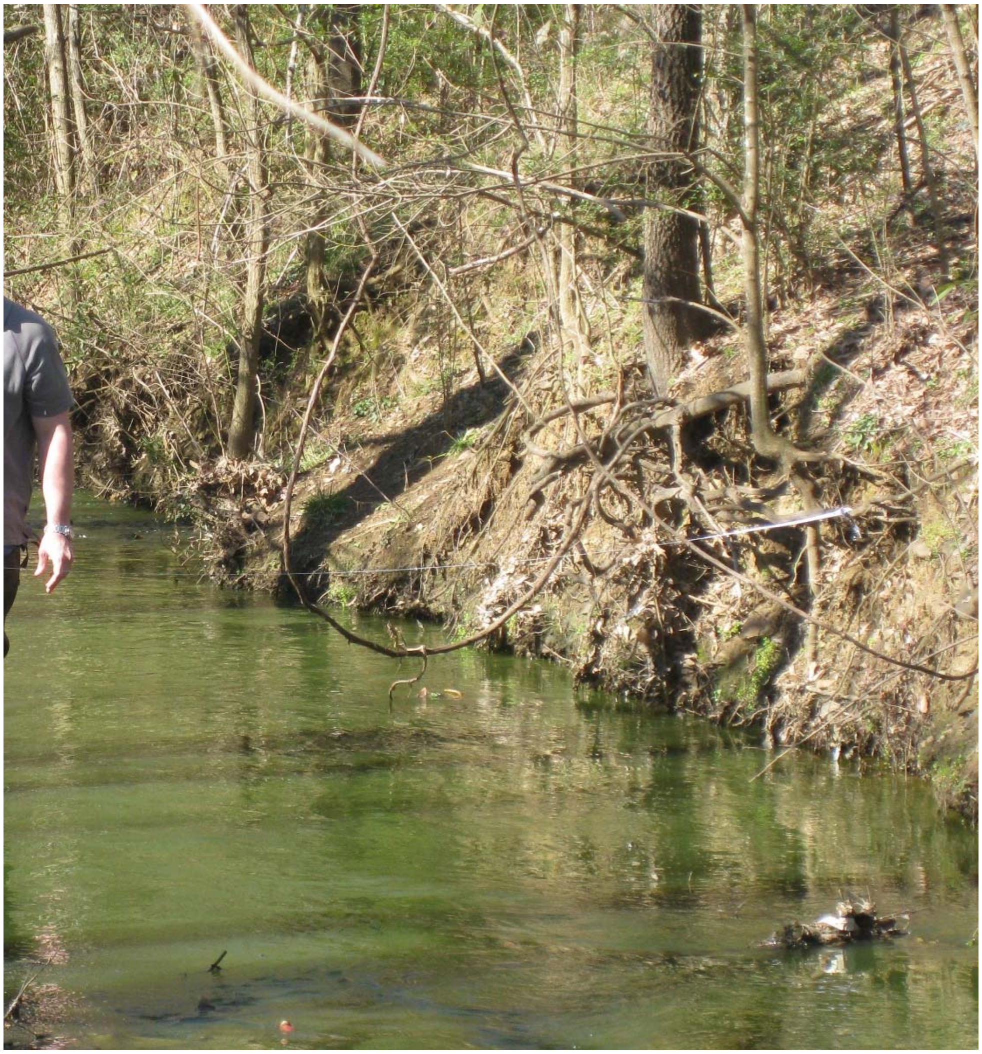

Figure 6.7. The Unnamed Tributary to the Poteau River downstream from the Equalization Basin discharge (2-21-12).

Although it is not known how frequently the discharge from the Equalization Basin occurs the water of the Unnamed Tributary was observed to be greenish on three occasions during the study period. Given that the field team was on-site only 12 days during the study period the occurrence of the green water discharge seems relatively frequent and represents an unaccounted for source of organic enrichment affecting water quality in both the Unnamed Tributary and in the downstream reaches of the Poteau River.

The location relationship between the Equalization Basin, the Livestock Auction, the Unnamed Tributary and the Poteau River are shown on the Google Earth image as Figure 6.8.

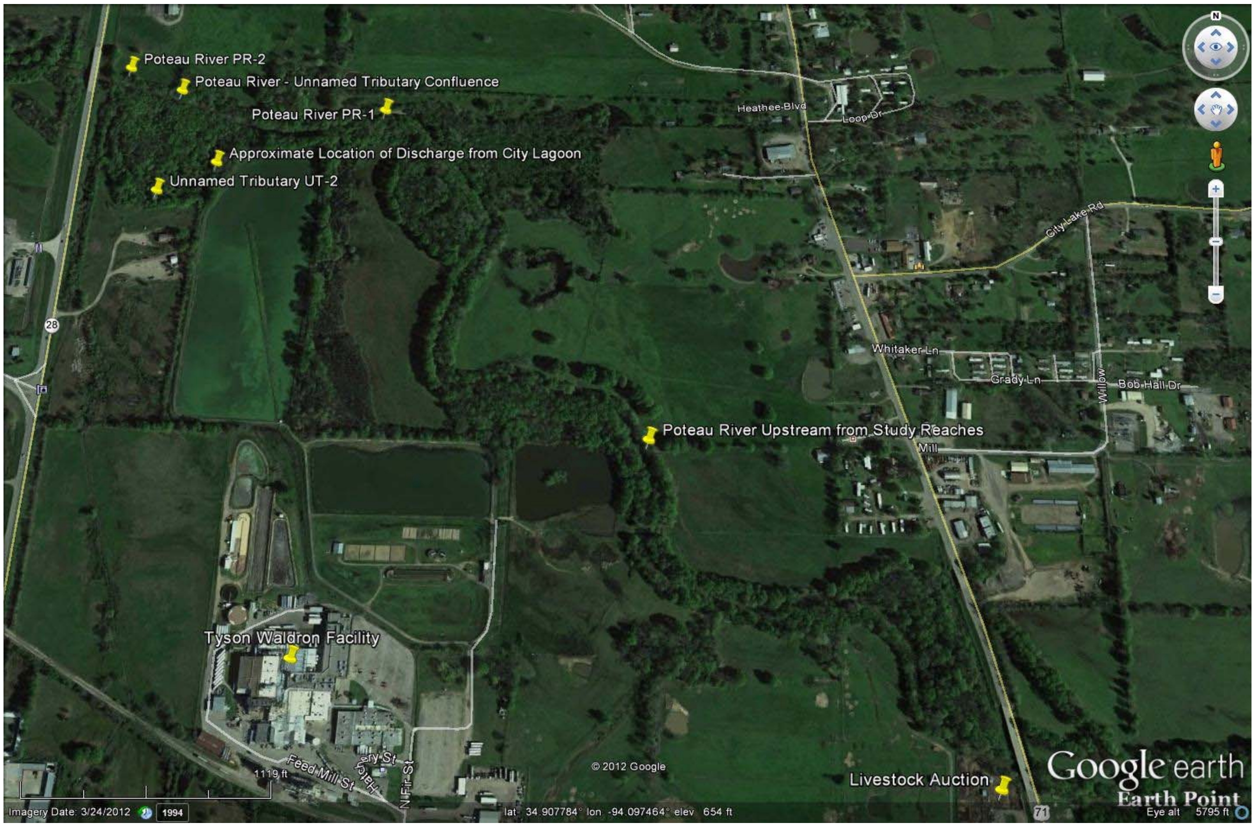

Figure 6.8. Google Earth Image of various points associated with the non-point assessment.

7.0 Alternatives Analyses

This section summarizes the analyses of alternatives for the Tyson Waldron Facility to comply with the effluent limitations for chloride, sulfate, and TDS in NPDES AR0038482.

In addition to examining the development of site specific criteria, several alternatives to amending the water quality criteria were considered. Alternatives were examined to determine whether, and to what extent and with what impacts, the final permit limits for chloride, sulfate, and TDS could be met by Tyson Waldron without amending the water quality criteria. These alternatives were as follows:

1) no action,

2) no discharge,

3) treatment,

4) source reduction/pollution prevention,

5) Water Quality Standards modification.

7.1 No Action

No action would maintain the current discharge situation. This alternative is impractical in the near term and is likely unsustainable over the long-term.

7.1.1 Current Wastewater Facility Performance

Final permit limits became effective on September 1, 2013. Monthly average limits are 150 mg/L for chloride, 70 mg/L sulfate, and 660 mg/L TDS. Daily maximum limits are 225 mg/L, 105 mg/L and 990 mg/L for chloride, sulfate, and TDS, respectively. The figures below represent discharge monitoring report (DMR) data for chloride, sulfate and TDS from 2011 to 2018 raw data in Appendix C). The red line on each figure represents the permit limit and the date when final permit limitations for specific mineral parameters went into effect. The notable decline in chloride, sulfate and TDS is the result of BMPs implemented in the processing facility and chemical usage changes in the wastewater treatment plant, all designed to reduce mineral levels at the outfall. Further details on this are provided in later sections.

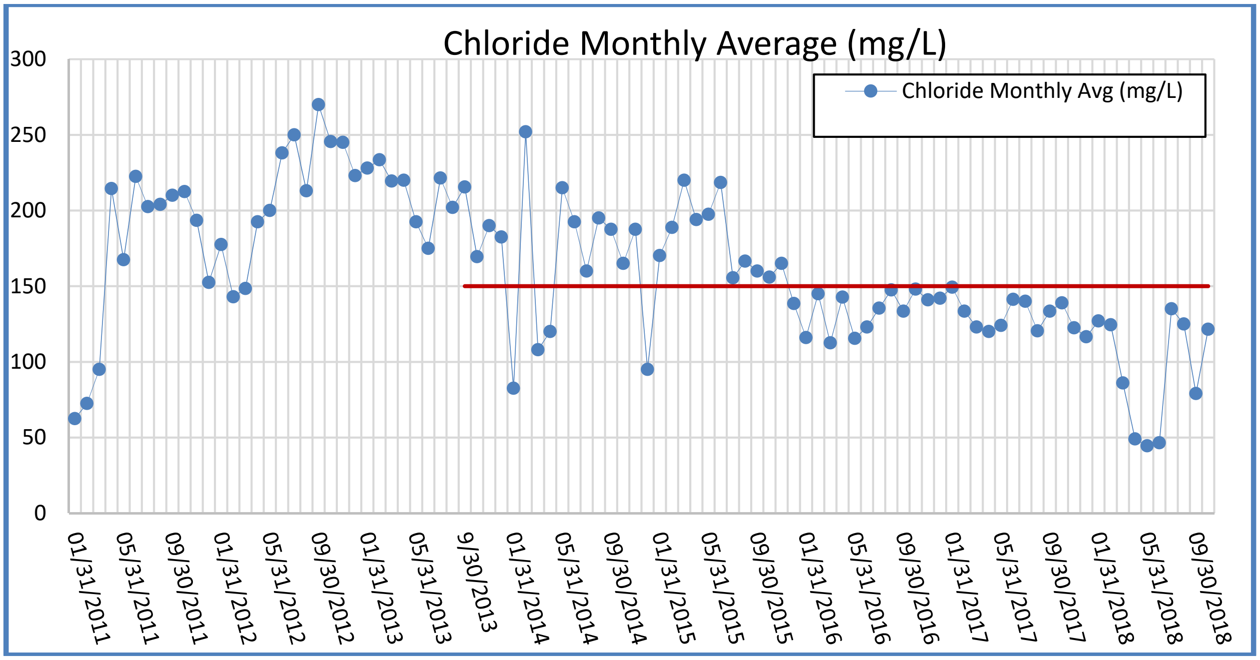

Figure 7.1. Chloride concentrations have been below the monthly average permit limits of 150 mg/L since 12/31/2015.

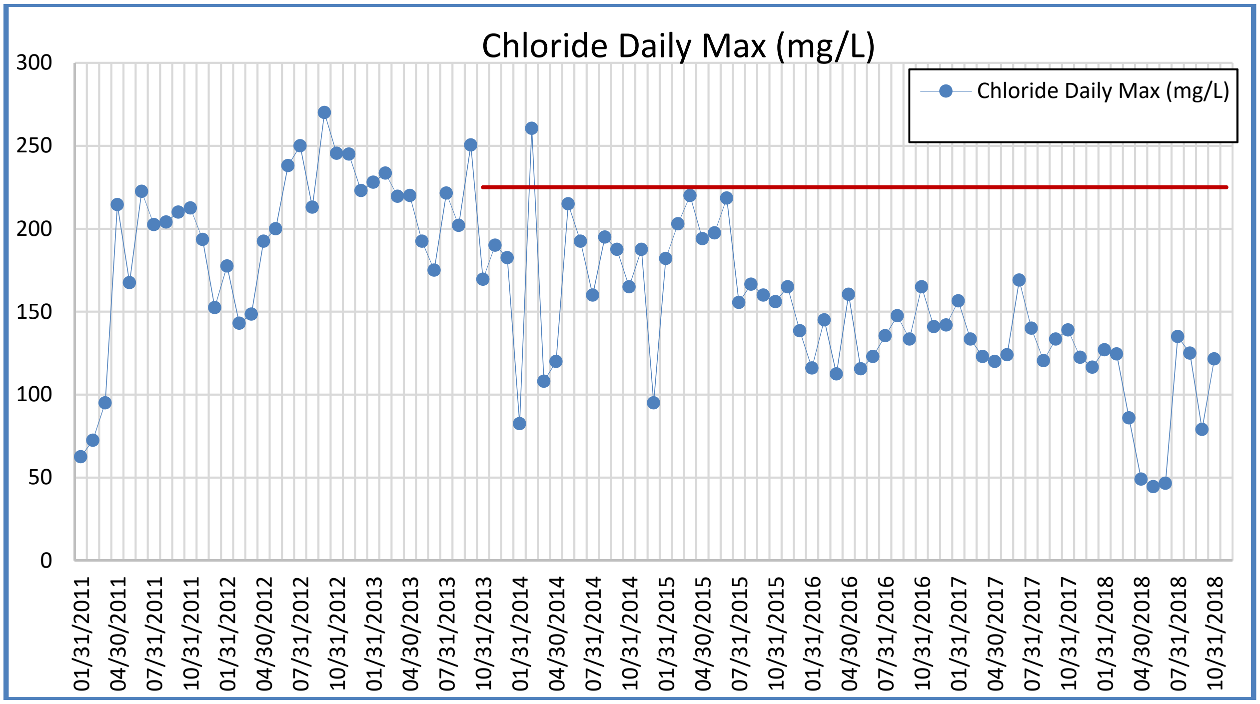

Figure 7.2. Chloride concentrations have been below daily max permit limits of 225 mg/L since 3/31/2014.

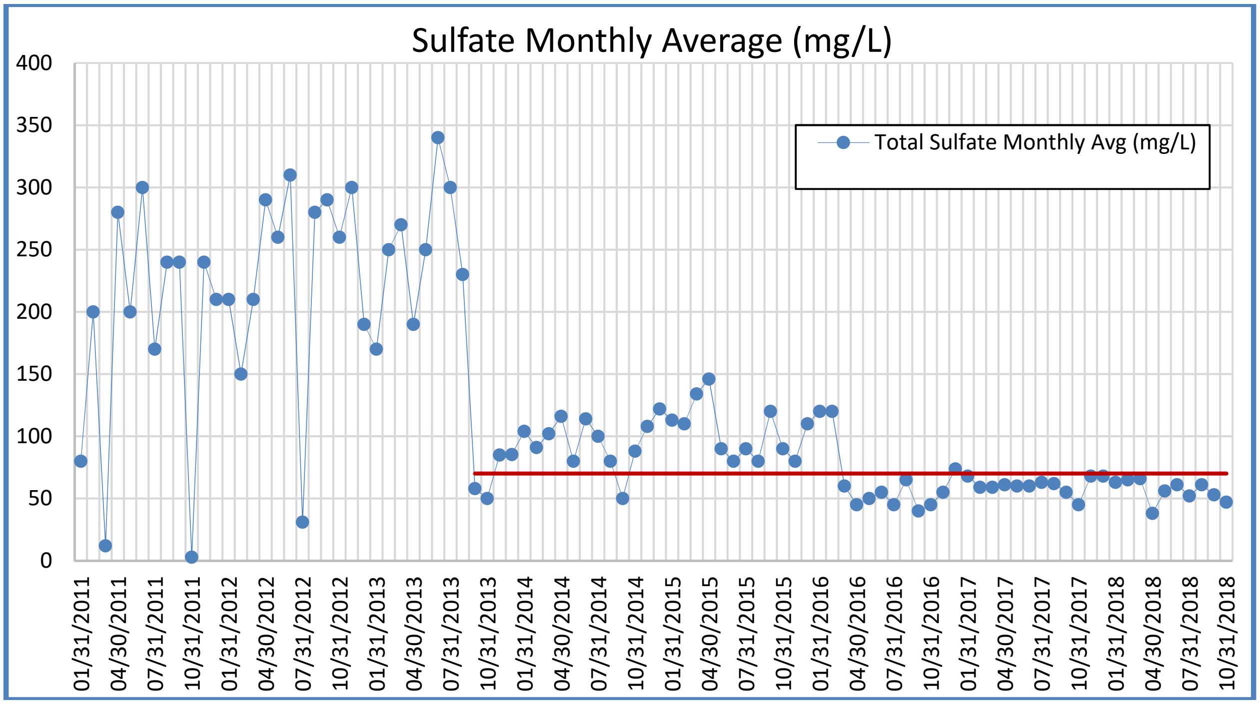

Figure 7.3. Sulfate concentrations have been below monthly average permit limits of 70 mg/L since 3/31/2016 with the exception of one excursion on 12/31/2016.

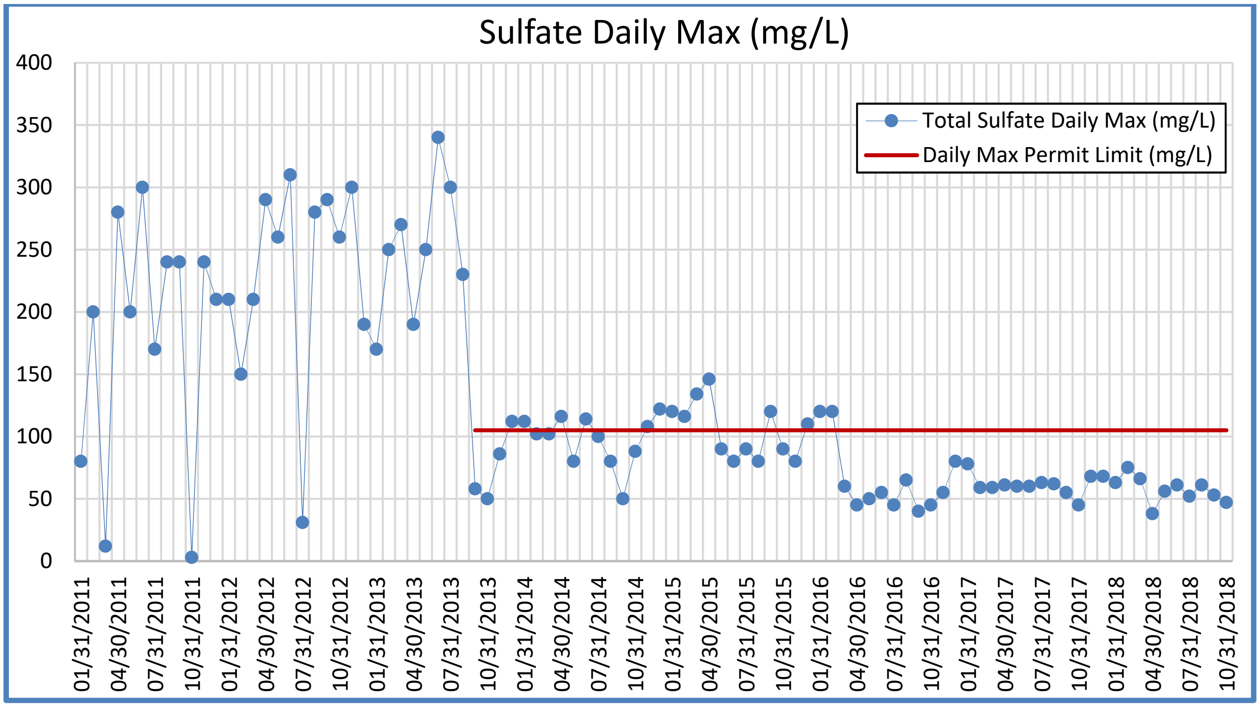

Figure 7.4. Sulfate concentrations have been below daily max permit limits of 105 mg/L since 2/29/2016.

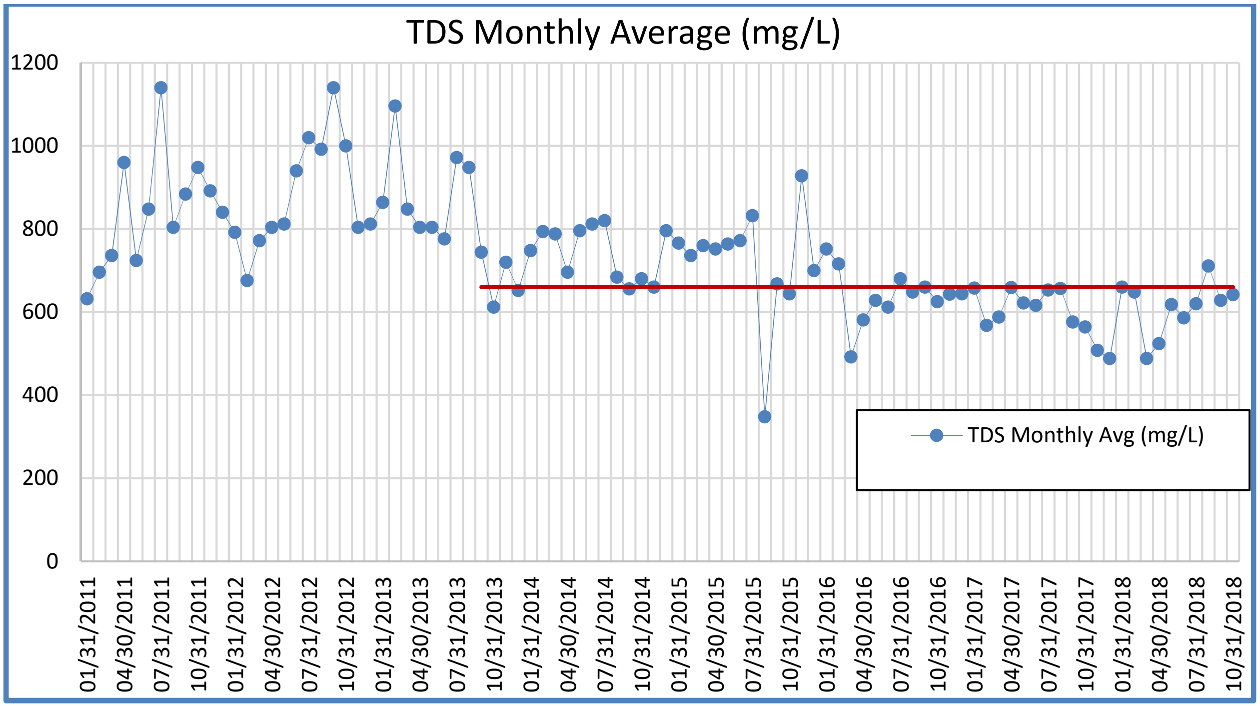

Figure 7.5. TDS concentrations have been below monthly average permit limits of 660 mg/L since 7/31/2016.

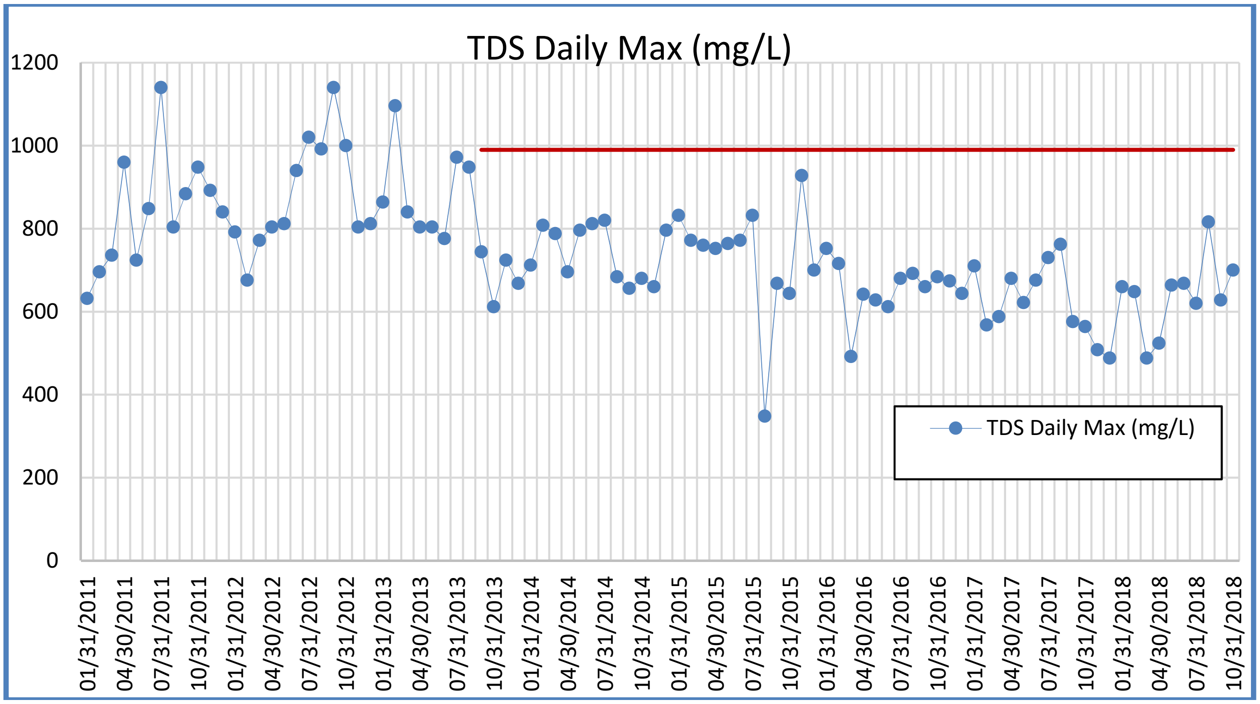

Figure 7.6. TDS concentrations have been below daily max permit limits of 990 mg/L since the permit limit was in place.

The effluent DMR data for the seven-year period depicted in Figures 7.1 thru 7.5 demonstrate that the facility had great difficulty meeting the chloride, sulfate, and TDS permit limits when they first took effect; and even today the facility runs at the very edge of permit limits despite all diligent and reasonable efforts to reduce the discharge of dissolved minerals. The effort to reduce dissolved minerals can be seen by comparing the data before and since September 2013. For chloride, Tyson Waldron has had 23 monthly average and 2 daily maximum excursions since September 1, 2013. Sulfate concentrations have exceeded the monthly average permit limits 28 times with 14 daily maximum excursions since September 1, 2013. TDS concentrations have exceeded the monthly average permit limits 26 times since September 1, 2013.

Beginning in 2013, Tyson Waldron actively evaluated ways to reduce the discharge of dissolved minerals. The facility first implemented all production and housekeeping oriented BMPs that could be identified to reduce the amount and concentration of dissolved minerals in the facility's process waters. This included the development of a marination re-capture system, which combined marinade recirculation/reuse with capture in a secondary vessel to prevent transport to the wastewater system; and the installation of drip pans to catch both excess marinade and brine drippings before entering the process water drains. These systems capture as much as 1000-2000 gallons of marinade each day with expected reductions of chloride and TDS as high as 80 mg/L. These systems were considered fully functional by March 2014. The facility also began a separate program in 2013 to optimize the existing treatment system, including an evaluation of different treatment chemicals that would contain less dissolved minerals. The program particularly focused on sulfate and TDS reduction, while maintaining required phosphorus removal. Tyson's effort continued through 2016 and evaluated combinations of aluminum chlorohydrate (ACH), sodium aluminate and aluminum sulfate (see list below) to both maximize phosphorus removal and minimize the level for dissolved minerals discharged by the facility.

- Sep 2013 - Aluminate Chlorohydrate added to replace some Aluminum Sulfate
- March 2014 - Sodium Aluminate added to replace Aluminum Sulfate. Effort failed, and Aluminum Sulfate was re-introduced
- June 2014 – Phosphorus numbers were elevated so Aluminum Chlorohydrate was reduced and Aluminum Sulfate increased as it reacts more quickly to precipitate phosphorus
- Feb 2015 – Phosphorus was again elevated so amount of both Aluminum Chlorohydrate and Aluminum Sulfate were increased
- July 2015 – Reduced Aluminum Chlorohydrate usage
- Feb 2016 – Re-introduced Sodium Aluminate at a different application point in the plant to provide a longer contact period. Other two chemicals were reduced. Combination appears effective.
- July 2016 – Aluminum Sulfate use eliminated

Since late 2015/early 2016 the facility has operated an optimized treatment system that meets permit limits most of the time, though an occasional excursion does still occur. Compliance with daily maximum limits has been achieved through implementation of process area BMPs and by use of alternative treatment chemicals and treatment system optimization. However, monthly average concentrations of each mineral parameter remain right at the permit limits and are exceeded occasionally.

As indicated by the data presented above, achieving compliance with permit limits for chlorides, sulfates and TDS has not been possible on a consistent basis. Routine process variability, market changes, climatic changes, or possible changes in regulatory requirements will continue to present challenges to achieving compliance with currently applicable mineral requirements.

The wastewater treatment plant operations at the Tyson Waldron Facility fall well outside what is considered to be the normal operating performance for wastewater treatment plants as it relates to chlorides, sulfates and TDS. New wastewater treatment plants use standard engineering practice numbers to determine the expected pollutant reduction targets (i.e., to what level do pollutants need to be reduced) based on a statistical plant “reliability” coefficient for each pollutant. To state it another way "what percent of the time does the plant meet the permit limits (reduction reliability)". Typically, a plant strives to meet permit limits 95% or 99% the time to create the reduction reliability. To achieve these reduction reliability levels a plant should be designed to reduce pollutants to approximately 51% of the permit limit in order to attain a 95% reliability for meeting permit limits. In order to attain a 99% reliability of meeting permit limits, a plant should be designed to reduce pollutants to 37% of the permit limit. The Tyson Waldron Facility discharges chlorides, sulfates, and TDS at levels that average well over 80% of current permit limits. For chloride the facility discharges at 95% of the permit limit, for sulfate 82% of the permit limit, and for TDS 92% of the permit limit. This far exceeds the 51% or 37% of the permit limit for reduction reliability like the Tyson Waldron facility achieves for its other permit parameters., These averages are nowhere near the margin of safety needed to reliably and sustainably operate the facility's wastewater treatment plant.

7.1.2 Constraints Affecting Plant Operations and Permit Compliance

The U.S. Department of Agriculture (USDA) frequently updates the mandatory standards for sanitation and food safety. These mandatory standards often require the facility to use water and chemicals (most containing dissolved minerals) to prevent pathogen introduction and improve cleanliness. For example, in 2015 Tyson added sodium thiosulfate to the facility's process in order to neutralize Peracetic Acid (PAA), which is used to reduce the microbial contamination on equipment and increase food safety. This change added new sulfate to the waste stream. Other recent changes to meet sanitation requirements are listed below:

- 2011-
    - revised *Salmonella* performance standards for poultry (broiler, turkey) carcasses;
    - addition of *Campylobacter* performance standards for poultry (broiler, turkey) carcasses
    - approximately 75 FSIS sample sets taken per month
    - approximately 18,000 samples annually across ground beef, chicken and turkey products (carcasses)
    - 52-sample "fixed window" assessment of establishments against performance standards

- 2015-
  - Proposed Rule for new *Salmonella* and *Campylobacter* performance standards for chicken parts and comminuted chicken and
  - new sampling and assessment method for poultry sampling (carcasses, parts, comminuted).

- 2016-
  - Final Rule for new *Salmonella* and *Campylobacter* performance standards for chicken parts and comminuted chicken and turkey (effective May 2017) and
  - new sampling and assessment method for poultry sampling (effective May 2016) establishing large establishments sampled once/week
  - approximately 56,000 samples taken from July 2017-June 2018 for chicken and turkey carcasses and chicken parts (no data is publicly available on annual sampling of ground beef or comminuted products for *Salmonella*/*Campylobacter* at this time)
  - ongoing 52-week "moving window" assessment of all poultry slaughter and parts-producing establishments against performance standards

Changes in federal sanitation and food safety requirements occur regularly and, once adopted, the standards become required operating procedure for facilities like the Tyson Waldron Facility. With no margin of safety in the permit limits for dissolved minerals, any change in USDA requirements could increase the currently discharged mineral levels at the Tyson Waldron Facility and put the facility consistently out of compliance with its NPDES permit.

7.1.3 Environmental Considerations: Water Conservation and Recycling

Tyson Poultry has established water conservation goals at nearly all of its facilities in order to reduce water use (from ground water and surface water sources) and to promote industry sustainability and environmental sustainability of water resources. The Tyson Waldron Facility cannot implement these desired water conservation practices because it would concentrate mineral levels in the wastewater stream. The facility currently uses water from a local reservoir that is purchased through the City of Waldron. An estimated 6.1 gallons of water is used to process each chicken through the Tyson Waldron Facility. The facility could reduce the amount of water used to process one chicken down to approximately 5 gallons if water conservation practices were implemented. This would equate to a conservation savings of 70.2 million gallons of water per year.

The reservoir that supplies the City of Waldron and the Tyson Waldron Facility (as a customer of the City) with water has a watershed size of only 7 square miles in the Kings Creek-Petit Jean River Watershed. This reservoir has a total storage capacity of approximately 684 million gallons. Average annual use has been around 528 million gallons. Long dry periods adversely impact this system's small capacity. In fact, this small reservoir has seen periods of very low water levels in recent years. Future changes in the regional climate or increased water use could negatively influence this small system and require water watershed-wide conservation measures. The Tyson Waldron Facility could voluntarily put into place new water conservation practices benefiting the system but cannot, for risk of increasing the concentration of dissolved minerals that would put the facility out of compliance with its NPDES permit.

7.1.4 Environmental Considerations: Reduction in Nutrient Loading

The Tyson Waldron Facility could decrease discharge flow by 10-20% implementing basic water conservation practices. This would yield a proportional 10-20% reduction in load of many conventional pollutants such as phosphorus and BOD. Water reuse at the Tyson Waldron Facility may increase phosphorous concentrations in the process water, but the excess can be effectively and efficiently removed by the wastewater treatment plant (unlike minerals) and less volume would be discharged.

Additionally, the Tyson Waldron Facility could examine opportunities to reduce phosphorus levels further if they were to get some relief from the low permit limits for minerals. If the in-stream water quality standards can be changed through the proposed rulemaking, the facility could begin to utilize a more aggressive treatment chemical combination that is anticipated to reduce phosphorus levels even further. Currently they are limiting the use of aluminum sulfate, which is the industry standard for phosphorus precipitation, in order to try to keep sulfate levels low. Should the standard be changed providing higher permit limits, the facility can again utilize this chemical at greater levels to achieve lower phosphorus concentrations and loading discharged out the outfall. These actions would also allow a further decrease in the total load of nutrients entering the Poteau River and Lake Wister. Lake Wister is currently on the Oklahoma 303(d) list as a category 5a water. The listed causes of impairment include chlorophyll-α, pH, total phosphorus, turbidity, and mercury. The Poteau River is an Arkansas Priority Watershed with phosphorous identified by ANRC as a key concern (ANRC, 2017).

Thus, a reduction in water use at the Tyson Waldron Facility would have an immediate (10%-20% reduction) and direct effect by reducing nutrient levels entering the Poteau River and Lake Wister.

Recognizing the data from the stream study and the inability of the facility to consistently meet minerals compliance (as discussed) under the permit the best way forward is to proceed with the site-specific rule making. This request is based upon using the sound science related to the stream and provides the environmental benefit of lowering the overall phosphorus discharge to the Poteau River and dispersion further downstream. Reducing the phosphorus loading from the Tyson Waldron Facility will support and contribute to the water resource goals of both Arkansas and Oklahoma.

7.1.5 Economic Impacts and Competitive Viability

The uncertainty created by the on-going minerals issue at Tyson Waldron Facility limits company officials strategic ability to (1) incorporate new or more competitively mixed product lines, (2) implement sustainability practices that would conserve water and reduce nutrient loading in local waterbodies, and (3) consideration for potential future expansion (if needed).

The Tyson Waldron Facility currently operates at 97% of the plant capacity and is among the company’s top performing facilities according to several key corporate performance metrics, which include, but are not limited to, the following: (1) leadership, (2) low employee turnover/high employee retention, (3) safety, (4) poultry growing conditions, (5) proximity to distribution, and (6) product yield. Tyson facilities that perform at a similar level will typically target an annual growth rate of 3%. Yet, the Tyson Waldron Facility does not have the ability for growth due to the uncertainty of the minerals limits and the ability to meet those limits.

Tyson spends nearly $80,000 per year for nutrient treatment at the Tyson Waldron Facility. The facility currently utilizes ACH Chemistries to treat for phosphorus because of the NPDES permit limits on chlorides, sulfates and TDS. If the Tyson Waldron Facility could utilize the more common Alum or Ferric Chloride, the facility would save an estimated $55,000/year in treatment costs. This change would also eliminate one load per week of sludge, which would save nearly $23,500/year in treatment costs. Moreover, Tyson uses nearly 70.2 MG more water per year, at a cost of just over $573,000/year, because the facility cannot recycle and reuse water. Taken together, the Tyson Waldron Facility incurs more than $650,000 in additional expense per year because of the facility’s low chlorides, sulfates, and TDS permit limits. The constraint on growth and the increased operational costs put the Tyson Waldron Facility at a competitive disadvantage.

Tyson is Scott County’s largest employer, providing 865 jobs at the Tyson Waldron Facility complex and supporting nearly 100 farm families in the surrounding area. The facility’s contribution includes local property and sales tax receipts totaling over $140,000/year. Tyson is a vital part of the town and the local economy.

The "no action" alternative does not ensure consistent compliance and jeopardizes the long-term competitive ability of the Tyson Waldron Facility and precludes implementation of environmentally beneficial activities. This is not an acceptable alternative for Tyson Foods or ADEQ.

7.2 No Discharge

The no discharge alternative is not a feasible option. Potential remedies to provide a no discharge option considered include transfer of wastewater from the Tyson Waldron Facility to the City of Waldron. This option was rejected for three main reasons. First, the wastewater discharged from Tyson Waldron greatly exceeds the design capacity of the City WWTP. Second, the City's WWTP would not reduce the concentrations of chloride, sulfate, and TDS. Third, the resulting discharge from the City would place the combined wastewater back in the same location, the Unnamed Tributary. The issue would simply be transferred from one entity to another.

A second option considered was transfer of the wastewater from the Tyson Waldron Facility to another Tyson Facility for treatment and discharge. This option was rejected because of the cost of hauling up to 1.25 million gallons of wastewater each day and because any treatment plant receiving the wastewater would have similar dissolved mineral reduction capabilities as the Tyson Waldron Facility and again any dissolved minerals issues would simply be transferred to a different location.

7.3 Treatment

EPA has no Best Available Technology (BAT) for removal of chloride, sulfate, or TDS from waste streams. While ion exchange and reverse osmosis treatment technologies exist, these methods currently are not cost effective on a large scale and are not typically recommended for treatment of waters prior to discharge. Also, the concentrated reject streams generated from such processes present their own unique set of potential environmental risks.

The technical limitations and uncertain environmental effects of concentrated waste streams generated from ion exchange and reverse osmosis treatment make the treatment alternative infeasible when other alternatives are considered.

Despite these limitations, Tyson Foods has investigated the capital and annual operating costs to install advanced treatment for reduction of dissolved minerals in the effluent. Specifically, the treatment process includes ultra-filtration, reverse osmosis, and concentration/crystallization of the facility effluent in addition to ancillary storage and equipment. Information on the treatment system cost estimates are provided in Appendix M.

The estimated capital cost ($30.5 million) and annual operating cost ($4.5 million) would be overly burdensome and place the facility at a significant competitive disadvantage. These costs would jeopardize the continued operation of the Tyson Waldron Facility, the largest employer in Scott County.

7.4 Source Reduction/Pollution Prevention

Concentrations of dissolved minerals discharged by Tyson Waldron have increased over the past 20 years. Table 7.1 provides mean (monthly average) chloride, sulfate, and TDS concentrations from 1992 -1993 data reported in a 1994 Section 4(G) report, (FTN 1994), compared with the current concentrations reported on DMRs.

Table 7.1. Mean concentrations of chloride, sulfate, and TDS; percent increase over time.

Parameter	1992-1993 Data	2011-2012 Data	Percent Increase	2016-2018 Data
Chloride (mg/L)	109	180	65%	121
Sulfate (mg/L)	51	185	263%	61
TDS (mg/L)	452	842	86%	617

Facility design flow has not increased during the same period of time as the referenced 1994 report cites the design flow as 1.25 mgd, which is the same as reported in the Statement of Basis for the current NPDES permit.

Increases in dissolved minerals from the Tyson Waldron Facility are the result of increased boiler blowdown from the production of increased volumes of hot water, and cleaners needed to comply with USDA rules regarding food safety; and increased quantities of marinades associated with the product. The increase in sulfate discharged, which has gone up much more substantially than chloride or TDS is primarily the result of aluminum sulfate use, which is added in the treatment system to attain compliance with phosphorus limits.

Source reduction considerations, many of which have been completed and discussed in Section 7.1, include use of an alternative chemical treatment for phosphorus removal in wastewater, limited use of marinades in production, and adjustment of internal practices to reduce the amounts of dissolved minerals inadvertently lost as drips and spills. Using less hot water in facility cleaning or reduction or altering cleaners was not considered a potential source reduction category. Use of treatment chemicals other than aluminum sulfate as a phosphorus precipitant has been explored and is discussed in Section 7.1. Reduction of the marinades used in production is not a feasible area for source reduction as it would alter the final product which is not acceptable for continued facility operations. The facility follows practices designed to minimize the amounts of dissolved minerals sent to the treatment system from drips and spills. Although it might be possible to further minimize these losses, the relative contribution from drips and spills that remain is not significant and total elimination would not allow reliable compliance with the final limits.

7.5 WQS Modifications

Amendment of the water quality standards is considered a viable option as noted in the current facility permit. The purpose of this study was to collect data sufficient to evaluate the merit of deriving site specific criteria, and to derive those criteria if warranted.

8.0 Selected Alternative

Based on the facility biomonitoring record, the results of the aquatic life field study, water quality sampling, toxicity modeling, and the assessment of alternatives presented above, the selected alternative is to modify the WQS using site specific criteria for chloride, sulfate, and TDS. Data and calculations are presented in the Appendix B.

9.0 References

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Introduction

This report serves as an addendum to the 2012 study report *Poteau River study - Section 2.306 Site Specific Water Quality Study* (GBM^c, 2012). It supplements the 2012 study with additional bioassessment and water quality sampling as recommended by the Arkansas Department of Environmental Quality (ADEQ), Planning Section during correspondence in 2014 and early 2015. The main purposes of the study addendum are:

1. assess fishery (aquatic life) use attainment in the Poteau River, and
2. determine if non-point sources are having an impact in the river, and if they are, are they the cause of any impairment to the fishery designated use in the river.

Methodology

The approach (methodology) to macroinvertebrate collection, macroinvertebrate sorting and identification, habitat analysis and water quality monitoring followed that of the original Quality Assurance Project Plan (QAPP) (GBM^c, March 2, 2011) with the intent to "…replicate, to the extent possible…" the 2012 study methodology. The unnamed tributary that was sampled in the 2012 study does not have a suitable reference, therefore, sampling was not repeated in the 2015 addendum. The unnamed tributary is small and man-made (and/or man altered) all the way to the Poteau River, and lacks anything similar to compare to as a reference.

The following monitoring stations were utilized (Figure ADD-1).

1. PR-1 Poteau River upstream site, original reference site from 2011/2012 study.
2. PR-2 Poteau River first downstream site, from 2011/2012 study (at AR0055).
3. PR-3 Poteau River second downstream site, from 2011/2012 study.
4. PR-0.5 Poteau River upstream of Hwy 71B bridge crossing (new site).
5. JC-1 Jones Creek approximately ¼ mile upstream of confluence with Poteau River. Serves as an additional reference site in the Poteau River watershed (new site).
6. PR-0E Poteau River East Fork upstream of the transmission line crossing just north of Waldron (new site).
7. PR-0W Poteau River West Fork, upstream of Hwy 80 crossing (new site).

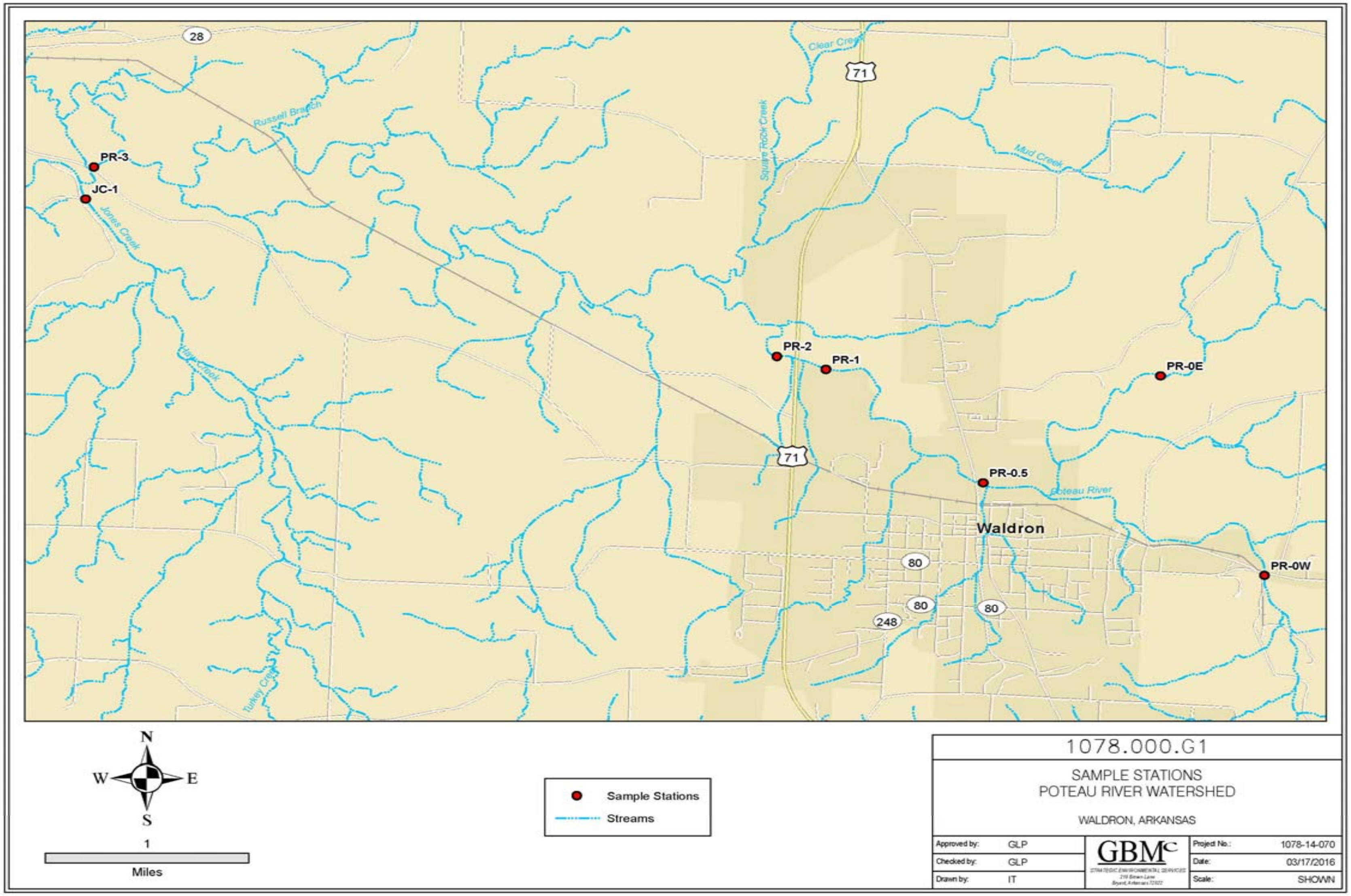

Figure ADD-1. Monitoring Stations

Stations PR0E, PR-0W, PR-0.5 and PR-1 are in the Poteau River upstream of the point source dischargers (Tyson Poultry, Inc. and the City of Waldron) and are utilized in this study as reference/background conditions where warranted (i.e. bioassessment comparisons). Stations PR-0E and PR-0W are also generally upstream of developed land use influences (residential, commercial and industrial land uses) from the City of Waldron and are more rural in nature. Station JC-1 is an independent reference station in the Poteau River watershed and is also used as a reference/background condition where warranted. JC-1 is mostly affected by rural land uses.

Ambient water quality sampling and *in-situ* measurements were completed each month from January 2015 through December 2015. An additional high flow storm water sample was collected in April 2015. Macroinvertebrate collections were completed in the spring and fall seasons. Semi-quantitative habitat analysis, including the pebble counts (100 pebble observations per sample reach following Wolman, (1954) were also completed during the spring and fall assessments. Fish collections were not repeated during this study. Flow was measured according to the velocity-area method at each station during each ambient sample event. Flow was also measured during the high flow events where safety and access allowed. Where flow could not be measured during these high flow events it was estimated using a combination of methods including estimated cross sectional area and velocity attained from the floating orange method, and interpolation of flows measured at nearby monitoring stations.

Water samples from each station were analyzed for the parameters listed in Table ADD-1. Parameters measured in the field (mostly *in-situ*) include pH, temperature, dissolved oxygen, specific conductance, and turbidity.

Table ADD-1. Water quality sample parameters.

Parameter	Number samples/Station
TDS	13
Chloride	13
Sulfate	13
Ammonia	13
Nitrate-Nitrite	13
Total Phosphorus	13
TSS	13
Total copper	13
Total zinc	13
Total cadmium	13
TOC	13

Results

Water Quality

A summary of the baseflow water quality results (concentrations in mg/L) is provided in Table ADD-2. Baseflow and storm flow samples are analyzed for this report, separately. In this analysis the term baseflow is used to describe samples not immediately affected by recent storm water run-off events, while storm flow will refer to samples directly affected by storm water run-off. One storm event sample was collected during the rise in flow (between beginning of rise and peak flow) from a storm event on April 13, 2015. In addition, one of the ambient sampling events (May 27, 2015) occurred during a wet time period with the actual sample being collected the day after a rain event, while the flow hydrograph was still decreasing fairly rapidly. This sample event, though carrying lower concentrations then expected if collected during the rise in flow, is included in the storm flow analysis in this report. Baseflow and storm flow water quality average concentrations for some of the key constituents are plotted in Figures ADD-2-7.

Phosphorus, nitrate and TDS were generally higher in the river downstream of the NPDES point source (PS) dischargers than upstream, under baseflow conditions. Copper and zinc concentrations in the river were similar upstream and downstream of the point source dischargers during baseflow. Potential sources for metal contribution between PR-0W and PR0.5 include a junkyard, the City of Waldron waste transfer and recycling facility, and general urban run-off from most of Waldron. Sediment, phosphorus, and metals concentrations increased during storm events while TDS and nitrate generally decreased or remained about the same as the baseflow concentrations. Notably, the phosphorus and metals concentrations at PR-0.5 and PR-1, above the point source dischargers were higher than the concentrations downstream of the point source dischargers.

Table ADD-2. Summary of baseflow[1] water quality.

Statistic/Station	Flow (cfs)	Temp (°C)	D.O (mg/L)	Sp. Cond (µS)	pH (su)	Turbidity (ntu)	Ammonia (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Total Phosphorus (mg/L)	Phosphate (mg/L)	Sulfate (mg/L)	TDS (mg/L)	TSS (mg/L)	TOC (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Zinc (mg/L)
PR-0E																			
min	0.0	3.2	2.8	50.7	6.4	2.5	0.03	4.5	1.40	0.00	0.10	0.00	1.0	4.0	4.0	6.3	0.0001	0.0007	0.0031
avg	22.7	16.7	8.1	308.2	7.2	21.8	0.18	11.9	1.46	0.01	0.16	0.14	8.1	108.0	21.3	10.8	0.0006	0.0031	0.0112
max	175.3	28.7	13.4	747.9	7.9	55.1	0.86	21.0	2.09	0.04	0.40	0.63	42.0	268.0	74.0	21.0	0.0040	0.0066	0.0440
STDEV	52.3	8.6	3.5	265.9	0.4	15.5	0.26	6.1	0.21	0.01	0.10	0.17	12.3	82.6	22.7	4.6	0.0012	0.0019	0.0118
PR-0W																			
min	0.0	4.6	4.6	46.2	6.2	2.1	0.03	6.0	1.40	0.00	0.00	0.00	1.0	8.0	0.4	3.1	0.0001	0.0009	0.0020
avg	8.5	15.9	9.3	259.6	7.2	13.3	0.09	13.5	1.45	0.00	0.08	0.10	18.4	85.5	7.7	6.6	0.0006	0.0028	0.0075
max	52.5	27.4	14.1	747.1	7.8	32.3	0.43	26.0	1.94	0.01	0.10	0.20	40.0	148.0	44.0	11.0	0.0040	0.0076	0.0230
STDEV	15.5	7.9	3.7	206.8	0.4	9.2	0.11	7.1	0.16	0.00	0.04	0.05	14.8	41.5	12.4	2.2	0.0012	0.0023	0.0074
PR-0.5																			
min	0.0	3.1	3.2	49.9	6.4	1.7	0.03	5.5	1.40	0.00	0.10	0.00	1.0	4.0	1.0	5.8	0.0001	0.0018	0.0045
avg	41.3	15.9	8.5	309.3	7.2	15.7	0.07	11.3	1.40	0.00	0.11	0.15	11.7	89.5	16.2	7.3	0.0006	0.0036	0.0133
max	304.0	28.6	13.8	747.7	7.8	36.5	0.27	20.0	1.40	0.01	0.20	0.28	36.0	232.0	55.0	8.4	0.0040	0.0067	0.0270
STDEV	90.1	8.5	3.7	257.7	0.4	10.2	0.07	4.9	0.00	0.00	0.03	0.08	9.6	68.8	16.7	0.8	0.0012	0.0017	0.0083
PR-1																			
min	0.0	2.3	5.1	49.7	6.4	1.1	0.03	6.0	1.40	0.00	0.10	0.05	1.0	16.0	1.2	4.8	0.0001	0.0017	0.0020
avg	34.7	16.6	9.6	286.3	7.6	11.1	0.06	25.1	2.22	0.01	0.10	0.13	18.9	110.5	5.4	7.8	0.0006	0.0033	0.0130
max	265.8	29.2	14.7	748.6	8.8	23.5	0.13	129.5	10.41	0.06	0.10	0.42	90.0	548.0	14.0	12.0	0.0040	0.0069	0.0640
STDEV	78.6	9.1	2.8	241.6	0.7	7.6	0.03	35.5	2.72	0.02	0.00	0.11	25.1	150.5	3.7	1.8	0.0012	0.0018	0.0179
PR-2																			
min	0.5	3.3	5.3	72.8	6.2	2.5	0.01	8.0	1.40	0.00	0.10	0.10	5.0	8.0	1.2	4.9	0.0001	0.0019	0.0038
avg	39.4	18.2	9.0	580.5	7.4	10.4	0.16	68.1	9.81	0.04	0.26	0.58	41.5	333.8	5.5	7.3	0.0006	0.0039	0.0103
max	232.3	29.9	12.9	1169.0	8.0	23.8	0.62	149.5	22.53	0.18	0.70	2.24	70.0	808.0	18.8	8.2	0.0040	0.0069	0.0180
STDEV	68.2	8.6	2.7	309.1	0.5	7.5	0.17	56.6	9.34	0.05	0.20	0.62	28.5	318.6	5.8	1.0	0.0012	0.0017	0.0037
PR-3																			
min	1.0	4.7	7.6	50.2	6.0	2.2	0.02	6.0	1.40	0.00	0.10	0.10	1.0	32.0	0.8	5.3	0.0001	0.0016	0.0020
avg	51.6	17.7	10.8	373.0	7.6	11.7	0.05	49.3	4.44	0.01	0.13	0.25	37.3	228.4	6.0	7.6	0.0006	0.0037	0.0086
max	333.0	31.2	15.8	747.8	8.6	24.9	0.18	129.5	15.90	0.04	0.20	0.50	79.0	556.0	17.2	11.0	0.0040	0.0066	0.0190
STDEV	98.6	8.9	2.4	255.2	0.8	8.6	0.04	44.0	4.33	0.01	0.05	0.13	28.7	188.5	4.9	1.5	0.0012	0.0019	0.0055
JC-1																			
min	0.0	4.1	5.6	40.3	6.1	4.2	0.02	4.5	1.40	0.00	0.01	0.00	1.0	8.0	2.5	3.4	0.0001	0.0005	0.0014
avg	87.6	17.9	9.1	259.1	7.4	12.2	0.05	8.4	1.40	0.00	0.09	0.08	4.9	84.4	6.2	5.7	0.0008	0.0021	0.0052
max	586.0	32.1	13.8	748.3	8.8	22.0	0.10	16.5	1.40	0.01	0.10	0.14	19.0	308.0	15.0	7.0	0.0040	0.0076	0.0150
STDEV	172.1	9.3	2.7	263.6	0.7	5.0	0.02	3.4	0.00	0.00	0.03	0.04	5.2	89.7	3.6	1.1	0.0013	0.0024	0.0041

[1] Results for storm flow samples and each individual ambient sample are provided in Appendix D.

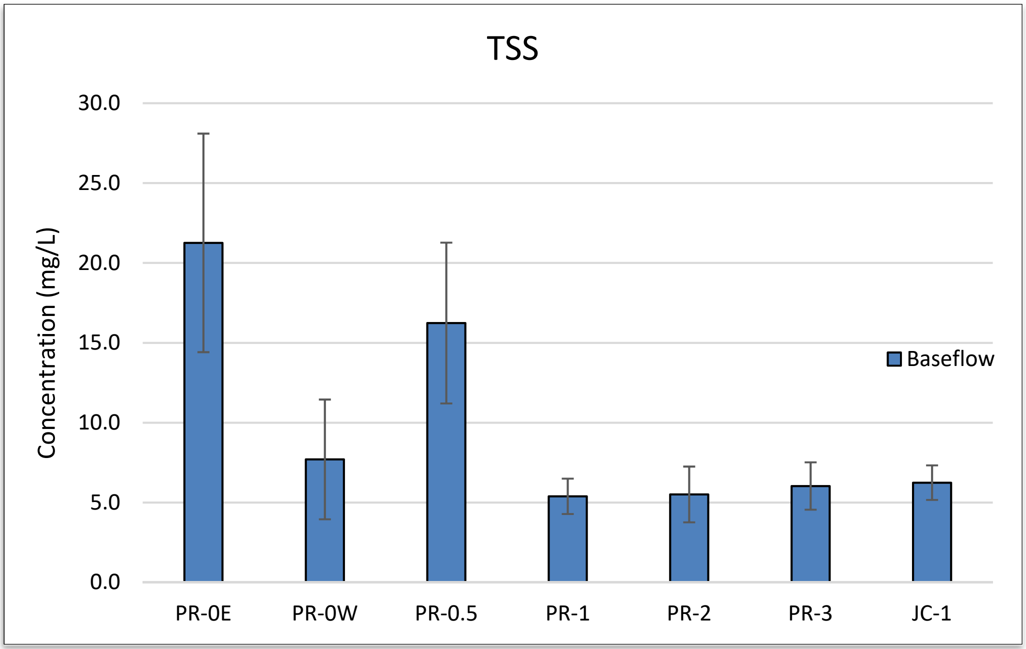

Figure ADD-2. Average baseflow TSS concentration (mg/L) at each station. The average monthly data was used for the baseflow samples (n=11) and error bars reflect standard error calculated.

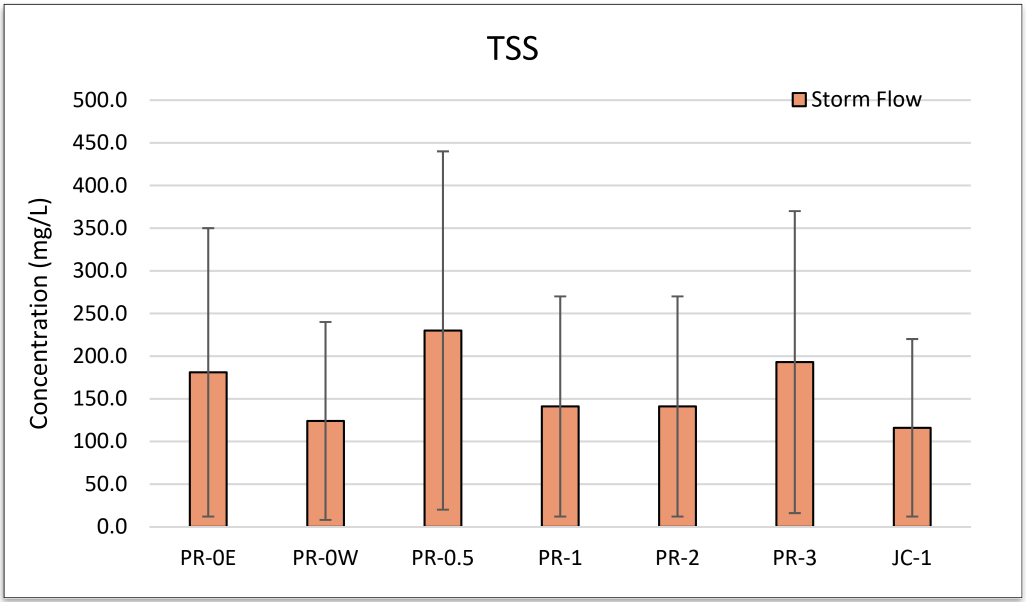

Figure ADD-3. Average storm flow TSS concentration (mg/L) at each station. The two storm event samples were average for storm flow (n=2) and error bars reflect standard error calculated.

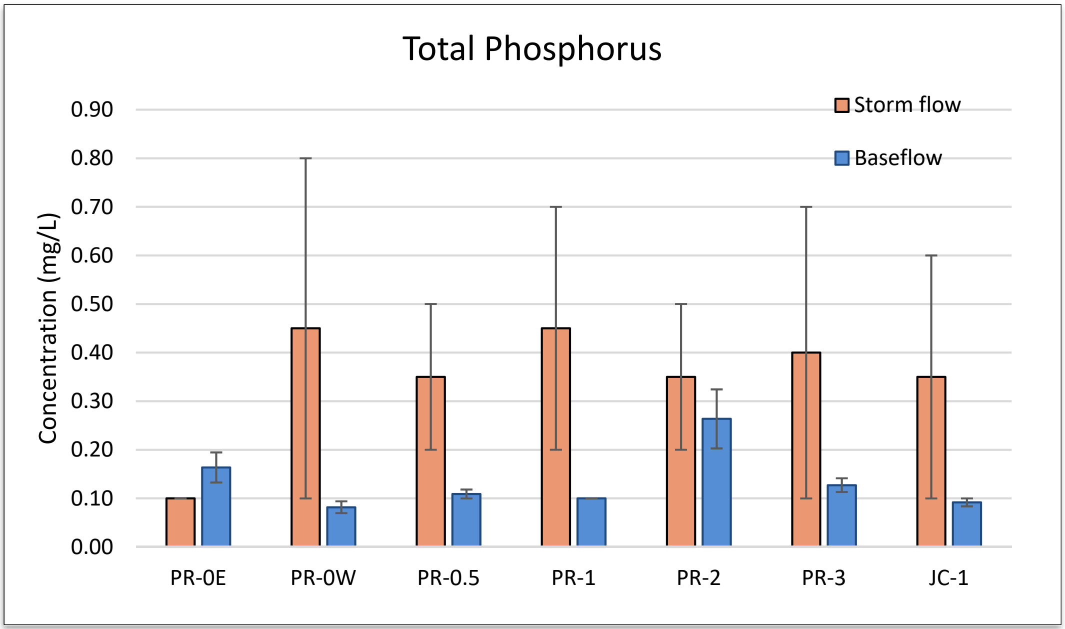

Figure ADD-4. Total phosphorus concentrations (mg/L) at each station. Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

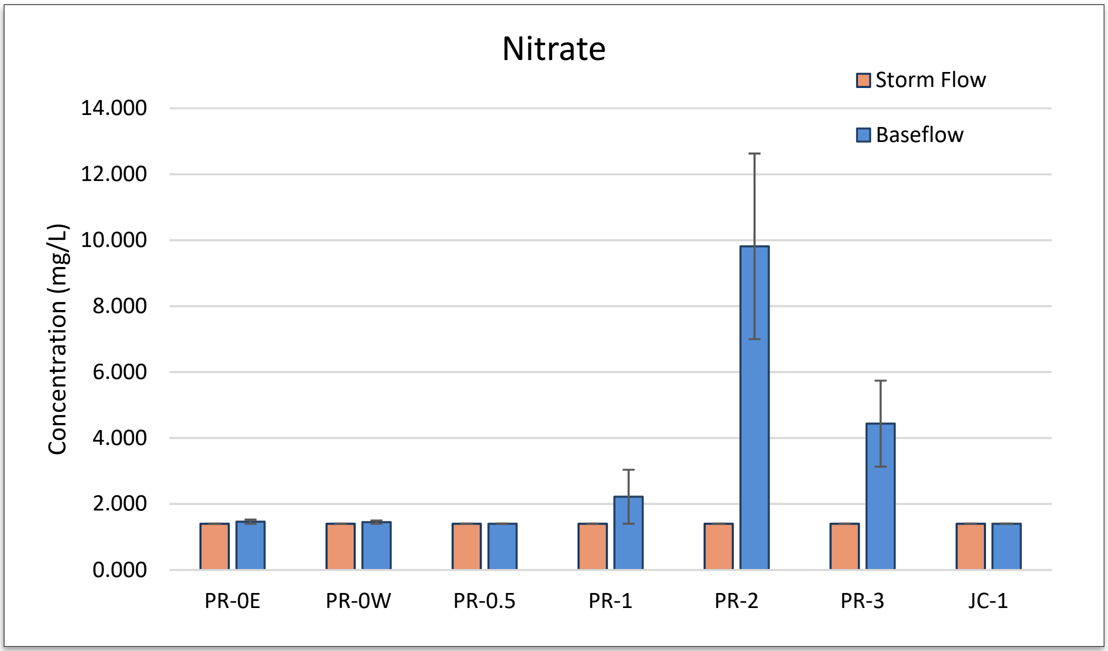

Figure ADD-5. Average nitrate concentrations (mg/L) at each station. Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

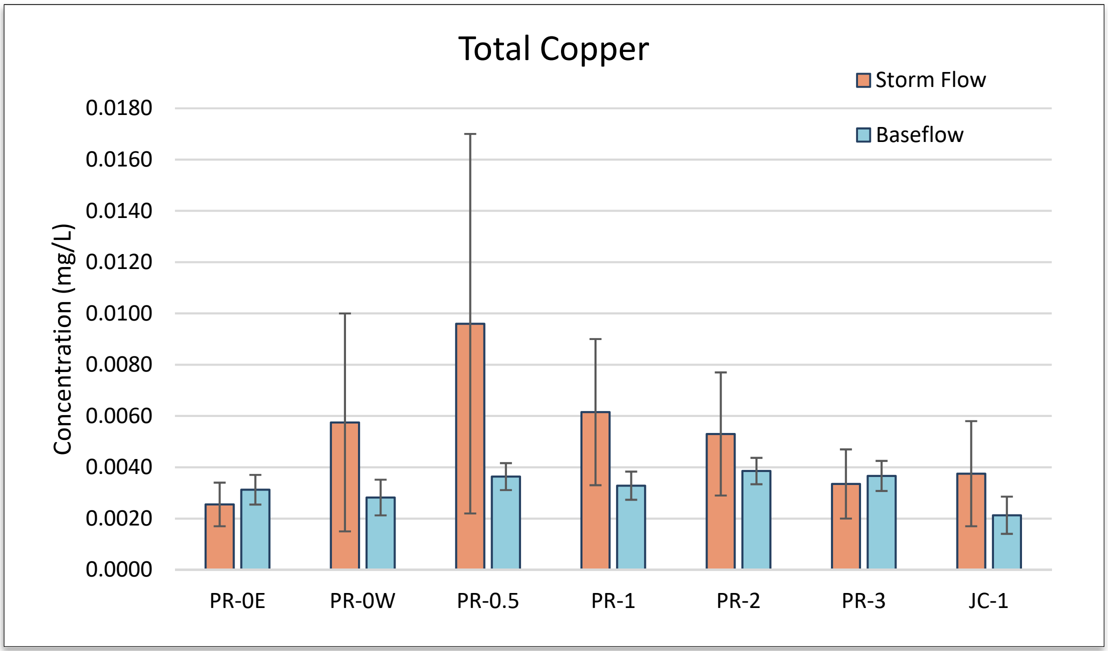

Figure ADD-6. Average total copper concentrations (mg/L) at each station. Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

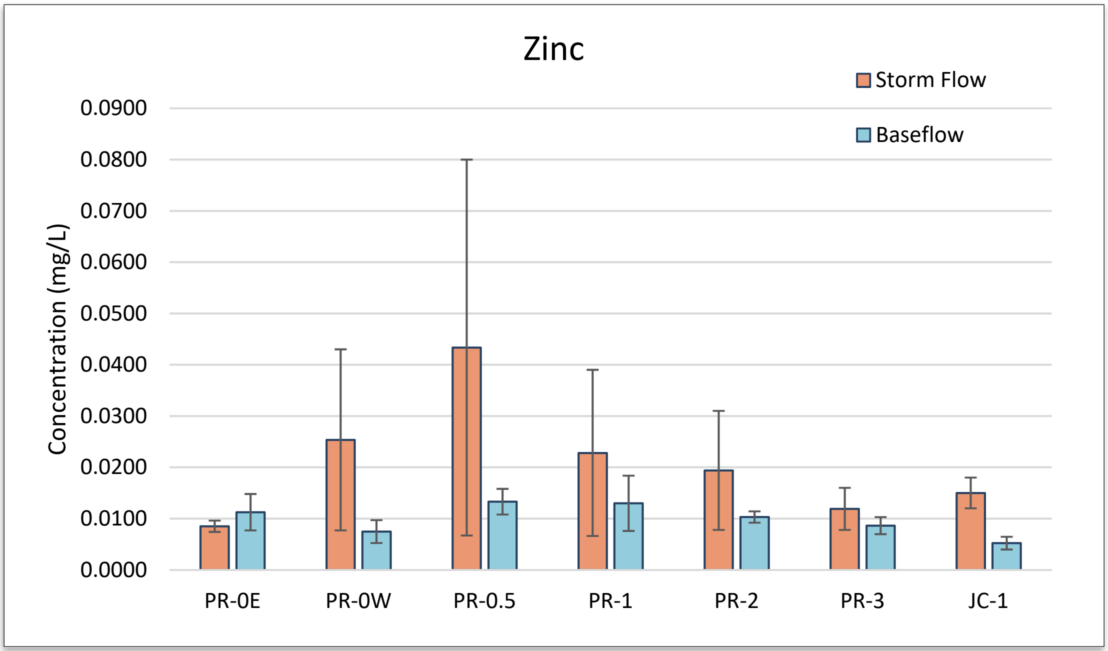

Figure ADD-7. Average zinc concentrations (mg/L) at each station. Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

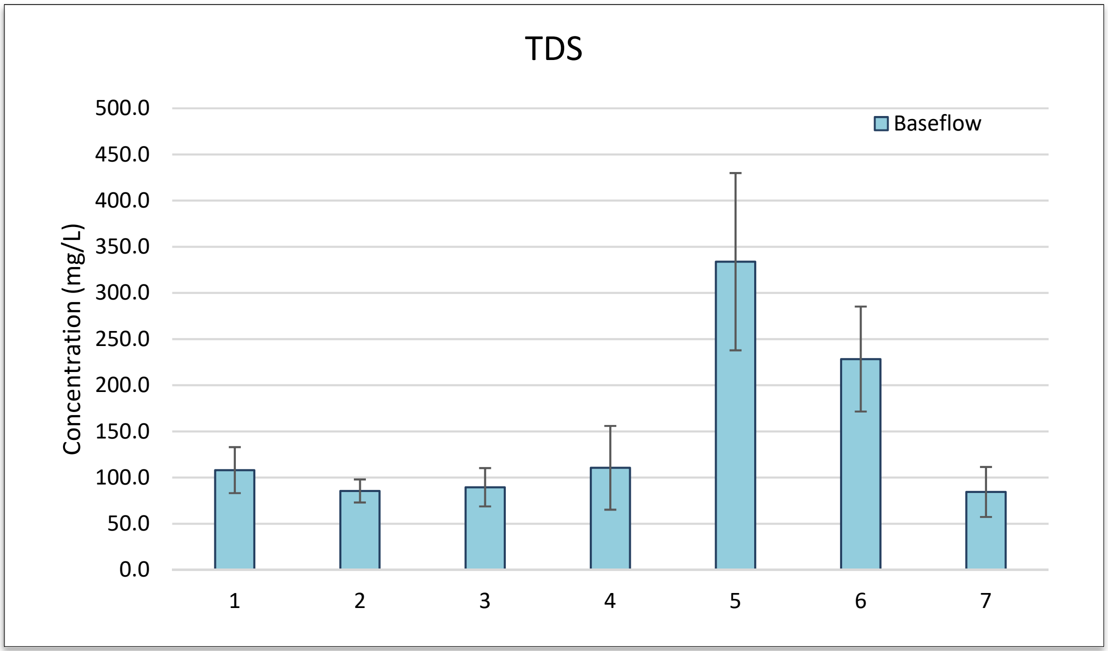

Figure ADD-8. TDS concentrations (mg/L) at each station. Average monthly data was used for baseflow samples (n=11).

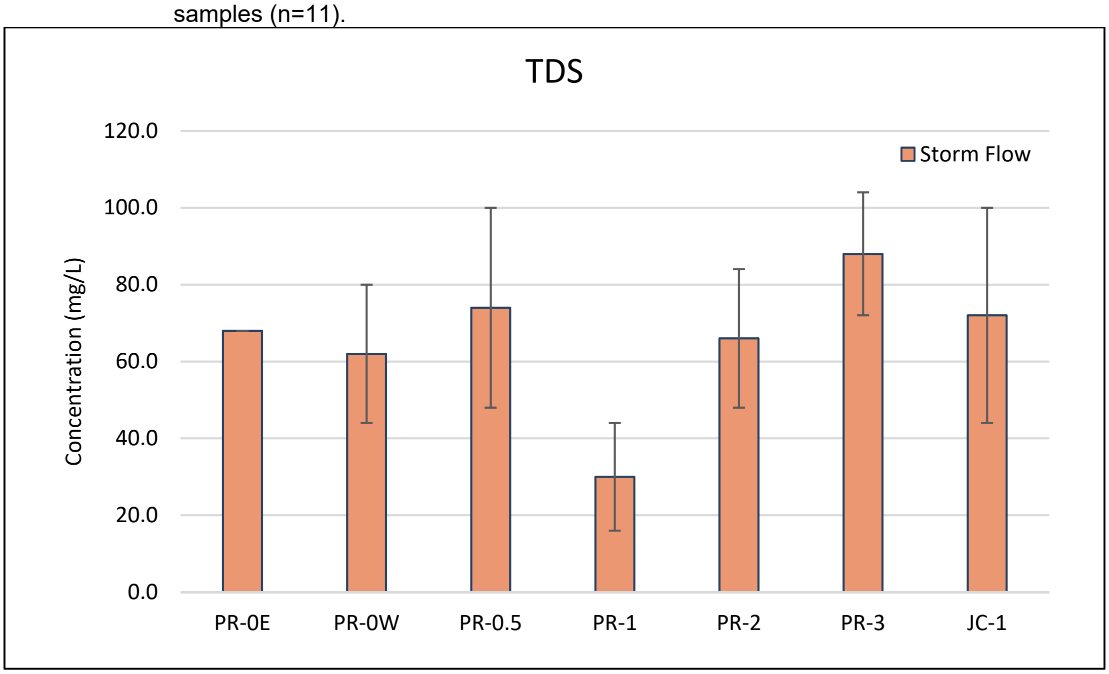

Figure ADD-9. TDS concentrations (mg/L) at each station. The two storm event samples were averaged for storm flow (n=2).

Loading of each constituent at each station was calculated and is provided in Appendix A. Figures ADD-8-11 depict loading for key constituents at each station. The increased flow during storm events results in significant increases in constituent loading at all stations. Notable are the high load of phosphorus and copper above the PS dischargers, but downstream of the two upper forks of the river (PR-0E and PR-0W) indicting a source in or near Waldron. In the case of metals this is also generally true for the concentration data (Figures ADD-5 and ADD-6).

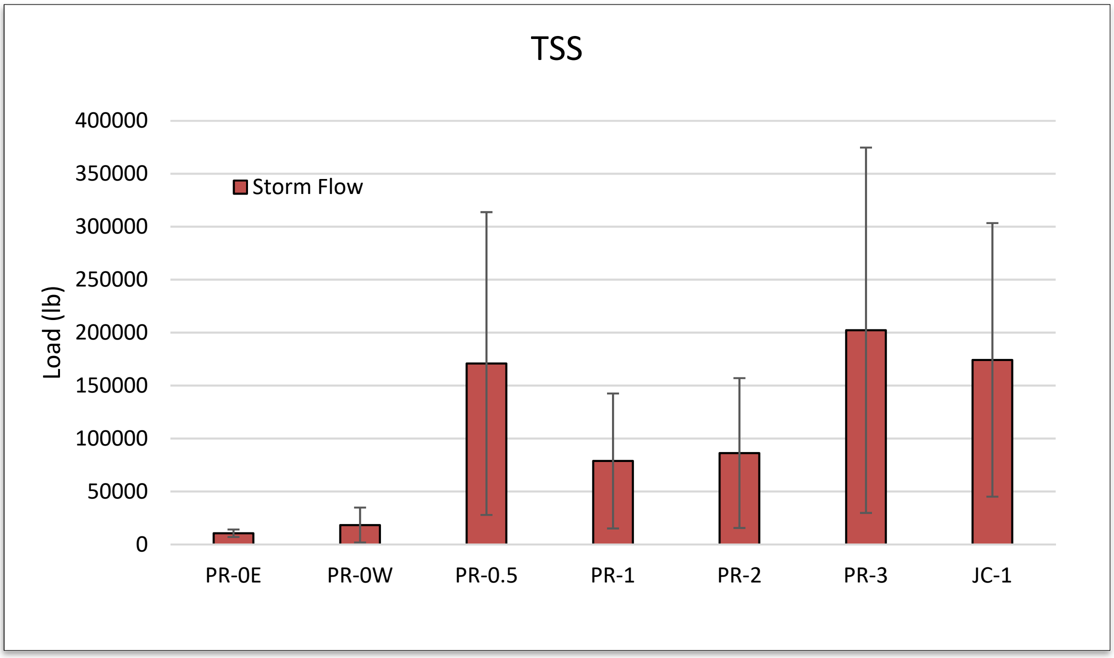

Figure ADD-10. Average storm flow load (lb) of TSS. The two storm event samples were average for storm flow (n=2).

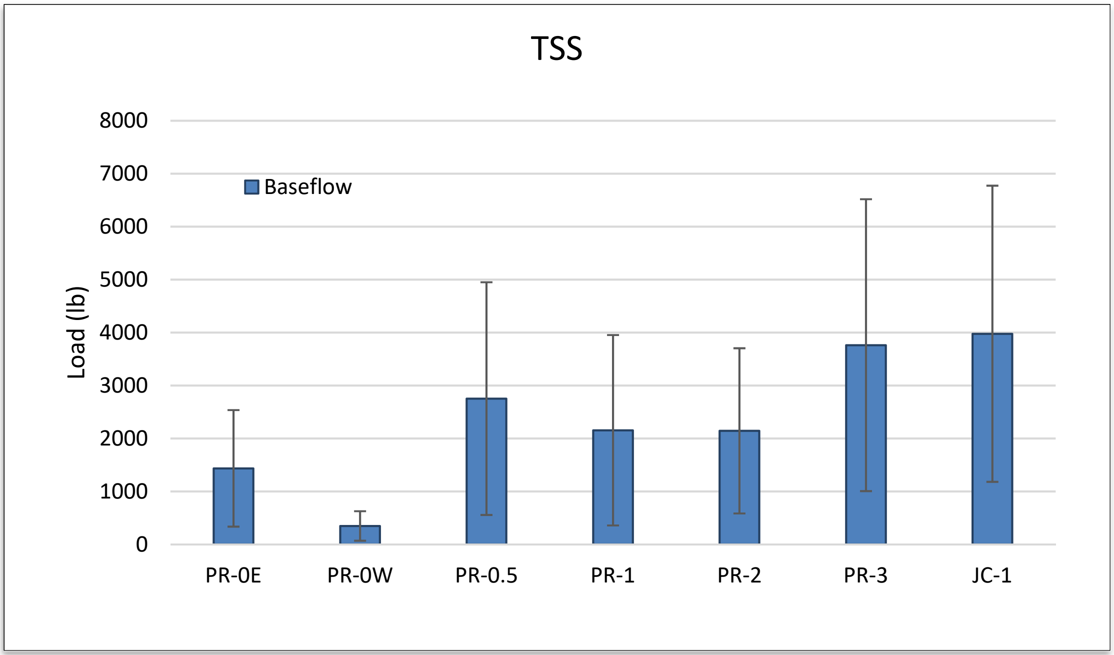

Figure ADD-11. Baseflow load (lb) of TSS. Average monthly data was used for the baseflow samples (n=11).

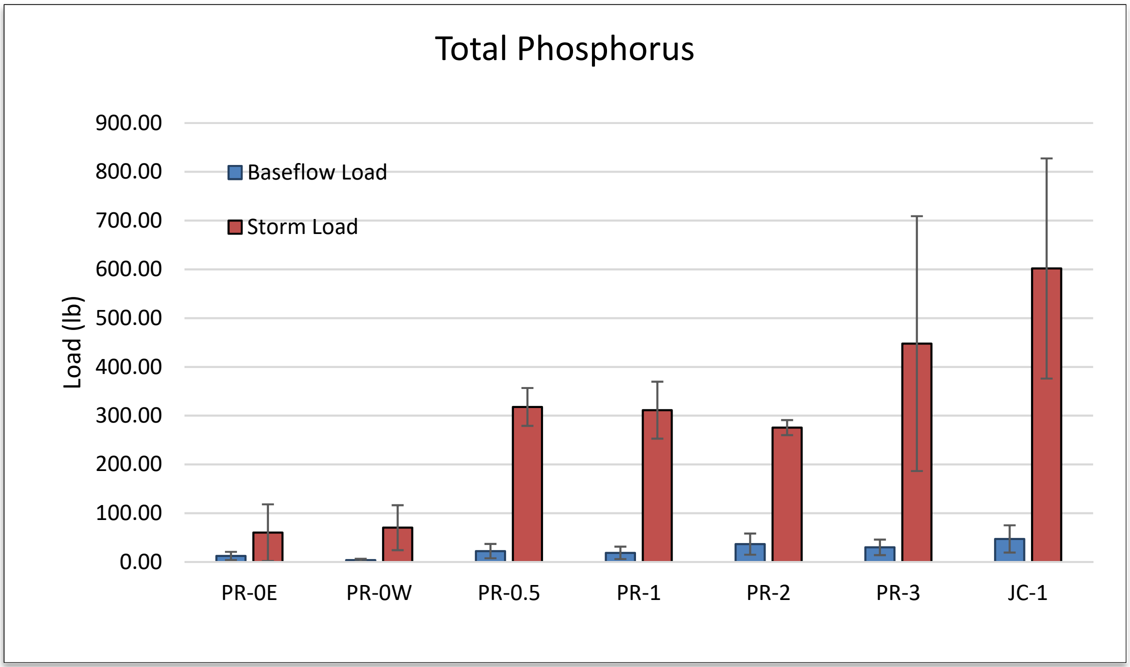

Figure ADD-12. Average load (lb) of total phosphorus. Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

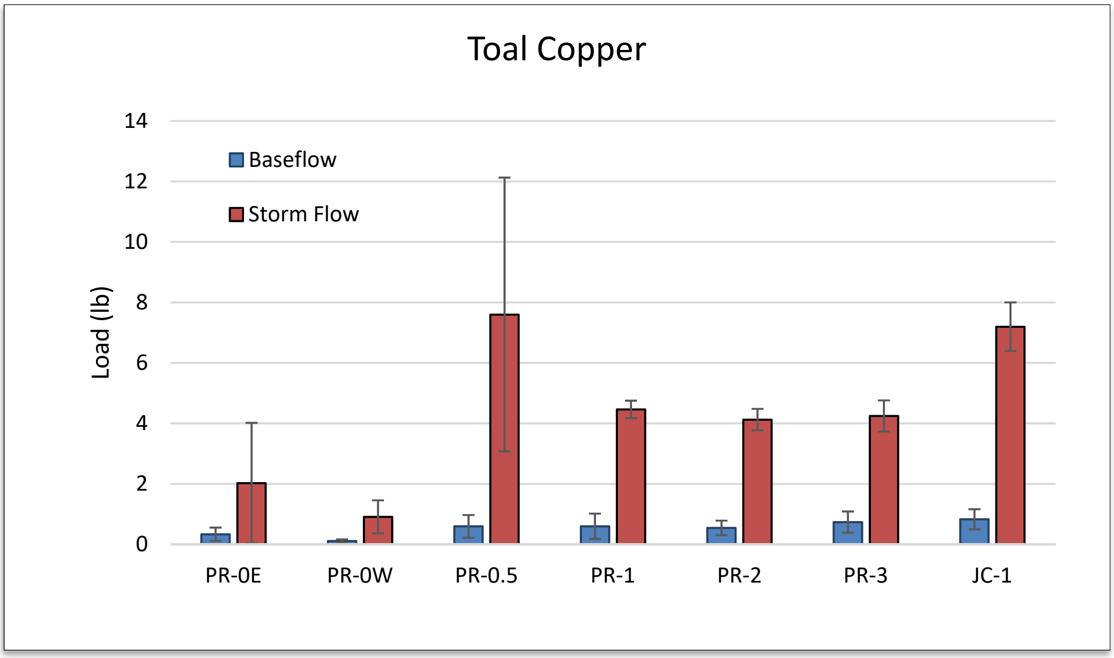

Figure ADD-13. Average load of total copper (lb). Average monthly data was used for the baseflow samples (n=11) and the two storm event samples were average for storm flow (n=2).

A statistical analysis was completed on the water quality data to determine difference between the downstream and upstream sites. The Dunnett's test method was used to compare minerals data at the downstream sites to the upstream Poteau River site, PR-1, and the reference stream Jones Creek, JC-1. Tables 1-4 below summarize the results of these statistical analyses for both concentration and loading data for TDS, sulfate and chloride.

Table ADD-3. Summary of the Dunnett's method analysis of TDS, chloride and sulfate concentrations at the sample sites compared to the control, PR-1.

Control: PR-1	TDS		Chloride		Sulfate	
Concentration analysis	Significant?	P-Value	Significant?	P-Value	Significant?	P-Value
Tyson WWTP	yes	<0.0001	yes	<0.0001	yes	<0.0001
PR-2	yes	0.0011	yes	0.0023	yes	0.0222
PR-3	no	0.4257	yes	0.0128	no	0.5316
City WWTP	no	0.4011	no	0.9998	no	0.9998
PR-0E	no	1.0000	no	0.9015	no	1.0000
PR-0.5	no	1.0000	no	0.8982	no	0.9762
JC-1	no	0.9997	no	0.8732	no	0.8078
PR-0W	no	0.9994	no	0.7459	no	0.5538

Table ADD-4. Summary of the Dunnett's method analysis of TDS, chloride and sulfate loads at the sample sites compared to the control, PR-1.

Control: PR-1	TDS		Chloride		Sulfate	
Loading analysis	Significant?	P-Value	Significant?	P-Value	Significant?	P-Value
Tyson WWTP	no	1.0000	no	1.0000	no	1.0000
PR-2	no	0.4043	no	0.1443	yes	0.0111
PR-3	no	0.3286	no	0.9184	no	0.7472
City WWTP	no	0.9916	no	0.9633	no	0.9857
PR-0E	no	0.9999	no	0.9992	no	0.9997
PR-0.5	no	0.9036	no	1.0000	no	1.0000
JC-1	no	0.4017	no	0.8749	no	0.9949
PR-0W	no	0.9980	no	0.9740	no	0.9986

Table ADD-5. Summary of the Dunnett's method analysis of TDS, chloride and sulfate concentrations at the sample sites compared to the control, JC-1.

Control: JC-1	TDS		Chloride		Sulfate	
Concentration analysis	Significant?	P-Value	Significant?	P-Value	Significant?	P-Value
Tyson WWTP	yes	<0.0001	yes	<0.0001	yes	<0.0001
PR-2	yes	0.0011	yes	<0.0001	yes	0.0001
PR-3	no	0.4257	yes	0.0316	yes	0.0171
City WWTP	no	0.4011	yes	0.0001	no	0.2518
PR-1	no	1.0000	no	0.7459	no	0.5538
PR-0E	no	1.0000	no	1.0000	no	0.6514
PR-0.5	no	0.9997	no	1.0000	no	0.9828
PR-0W	no	0.9994	no	1.0000	no	0.9999

Table ADD-6. Summary of the Dunnett's method analysis of TDS, chloride and sulfate loads at the sample sites compared to the control, JC-1.

Control: JC-1	TDS		Chloride		Sulfate	
Loading analysis	Significant?	P-Value	Significant?	P-Value	Significant?	P-Value
Tyson WWTP	no	0.4637	no	0.7992	no	0.9923
PR-2	no	1.0000	no	0.7385	no	0.0536
PR-3	no	1.0000	no	1.0000	no	0.9881
City WWTP	no	0.1241	no	0.3380	no	0.7333
PR-1	no	0.4017	no	0.8749	no	0.9949
PR-0E	no	0.2190	no	0.5752	no	0.9088
PR-0.5	no	0.9738	no	0.9740	no	0.9994
PR-0W	no	0.1605	no	0.3662	no	0.8626

For the baseflow concentration data, there were significant differences between the downstream sites, PR-2, PR-3 and Tyson WWWTP, and the upstream PR-1 for seven of the eight comparisons. However for the baseflow loading statistical analysis there were no significant differences between the upstream PR-1 and downstream sampling sites for seven of the eight comparisons. Using JC-1 as the control the TDS, chloride and sulfate concentrations were statistically different at the Tyson WWTP and PR-2 for all three constituents, and PR-3 for chloride and sulfate only. There were no statistical differences between the control site, JC-1, and the Poteau River downstream of the effluent in the loading analysis. Statistical difference were not found as frequently with the loading data potentially as a result of the greater variability within and between sites, which decreases statistical power.

Bioassessment

Macroinvertebrates and habitat (including pebble counts) were assessed in a sample reach approximately 300 meters long at each station during the spring 2015 (April 27-30) and the fall 2015 (October 19-21). Sample reaches were long enough to include a minimum of two riffles. A summary of the macroinvertebrate data and the habitat data (including pebble count charts) are provided in Appendix N. Habitat scores are summarized in Tables ADD-3 and ADD-4.

Table ADD-7. Spring 2015 habitat analysis scoring summary.

Spring 2015							
Parameters	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
1. Epifaunal Substrate	10	8	9	9	6	8	13
2. % Embeddedness	17	18	16	18	20	17	19
3. Velocity/Depth Regime	14	15	17	15	13	17	18
4. Channel Alteration	15	18	16	16	15	17	16
5. Sediment Deposition	14	18	15	14	14	15	12
6. Frequency of riffles	17	15	15	17	7	16	18
7. Channel Flow Status	14	15	16	15	17	17	18
8. Bank Stability	8.5	10.5	11.9	18.3	15.1	12.9	13.6
9. Vegetative Protection	6	8	7	7	7	7	8
10. Riparian Zone Width	9	9	14	12	14	8	16
Score	124.4	134.4	136.6	140.8	128.3	135.0	151.1
Average	12.4	13.4	13.7	14.1	12.8	13.5	15.1
Ranking	S	S	S	S	S	S	S
Scores: 16-20 = optimal, 11-15 = sub-optimal, 6-10 = marginal, 0-5 = poor							

Table ADD-8. Fall 2015 habitat analysis scoring summary.

Fall 2015							
Parameters	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
1. Epifaunal Substrate	5	6	8	8	6	7	13
2. % Embeddedness	19	14	16	19	15	19	18
3. Velocity/Depth Regime	5	5	7	8	13	14	8
4. Channel Alteration	12	15	15	15	16	15	16
5. Sediment Deposition	11	20	11	15	15	16	15
6. Frequency of riffles	19	19	19	19	19	19	19
7. Channel Flow Status	5	5	8	7	11	13	7
8. Bank Stability	7.0	15.0	13.0	14.0	15.0	12.0	17.0
9. Vegetative Protection	6	12	11	10	11	10	15
10. Riparian Zone Width	7	6	12	8	12	7	16
Score	96.0	117.0	120.0	123.0	133.0	132.0	144.0
Average	9.6	11.7	12.0	12.3	13.3	13.2	14.4
Ranking	M	S	S	S	S	S	S
Scores: 16-20 = optimal, 11-15 = sub-optimal, 6-10 = marginal, 0-5 = poor							

Habitat scores were in the sub-optimal category at all stations in both seasons, with the exception of PR-0E, which scored marginal in the Fall 2015 assessment. Pebble counts indicate that the median particle size at most stations is approximately 20 mm with a median range of about 12 mm to 100 mm.

Substrate (gravel) size can play a role in the macroinvertebrate taxa that inhabit riffles. Generally a mix of coarse and fine gravel and some cobbles provide the most diverse habitat for macroinvertebrates, but the substrate mix does not always correlate directly to species richness or diversity (Allen, 1995). In addition, it is common that the highest diversity and the highest richness are associated with riffles that contain some level of organic matter or are in the portion of riffle nearest the bank where some vegetation is integrated into the riffle habitat, as opposed to clean riffles that are mostly rock. Based on the results of the Pebble Counts, there is little difference between median particle size (D50) at PR-1 versus PR-2. Both sites have a D50 between 2mm and 6mm in the fall analysis and 11mm and 16mm in the spring analysis. There were no cobbles or boulders counted in the fall and only very small amounts in the spring. Both stations are dominated by coarse and fine gravels with approximately 20% bedrock. The most notable difference in Pebble size observed at all the stations monitored in 2015 was at JC-1, which had the highest D50 in both seasons assessed and was the only station with a significant number of cobbles and boulders. PR-0W displayed the next largest substrate size, due mostly to large amounts of bedrock. Substrate sizes smaller than gravel are generally considered to not offer good refugia for macroinvertebrates, though some Odonates, dipterans and other burrowing taxa will utilize it. There were no stations in the spring analysis with more than 20% substrate size smaller than gravel. However, in the fall all stations displayed 25%-40% small substrate, with the exception of JC-1, PR-3 and PR-0.5. These differences that exist between the spring and fall Pebble Counts are manifested mostly at extreme ends of the spectrum and are likely attributable to the randomized protocol employed. The revised report includes the Pebble Count charts in Appendix N, for your reference.

Macroinvertebrates were sampled with an aquatic dip net in all available habitats with a focus on riffle habitat. Complete lists of the macroinvertebrates collected is provided in Appendix P. A summary of the key macroinvertebrate community metrics is provided in Tables ADD-5 and ADD-6.

Table ADD-9. Summary of key macroinvertebrate metrics from the spring 2015 samples.

Metric	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
Species Richness:	15	24	18	24	19	24	20
Shannon-Wiener Diversity Index	1.31	2.13	2.03	1.75	1.58	1.93	1.60
Shredders (%)	0.0	0.2	0.0	0.3	0.1	0.0	0.5
Scrapers (%)	1.9	4.9	1.7	5.6	4.3	2.6	2.4
Filtering Collectors (%)	7.2	17.0	19.4	30.3	34.4	17.4	15.1
Gathering Collectors (%)	86.1	69.9	71.8	60.4	57.8	75.7	79.3
Predators (%)	4.7	7.9	7.1	3.4	3.4	4.3	2.7
Annelia (%)	6.1	7.4	3.4	0.9	6.7	11.5	8.5
Gastropoda (%)	0.0	0.2	0.0	0.3	0.0	0.0	0.0
Pelecypoda (%)	0.0	0.7	0.0	0.0	0.1	1.2	0.3
Crustacea (%)	1.4	2.5	2.0	0.5	0.0	0.3	0.0
Arachnoidea (%)	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Ephemeroptera (%)	3.3	11.9	15.6	4.9	2.4	11.1	4.8
Odonata (%)	0.3	1.5	1.7	0.3	0.0	0.5	0.0
Plecoptera (%)	1.4	4.4	2.4	1.7	0.4	0.4	1.6
Hemiptera (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megaloptera (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Trichoptera (%)	6.1	14.8	11.9	24.4	32.6	14.6	4.8
Coleoptera (%)	1.9	5.2	3.1	5.1	4.6	2.3	2.1
Diptera (%)	79.5	51.4	59.9	61.8	53.2	57.9	77.7
Chironomidae (%)	78.4	49.4	52.4	55.5	51.1	55.7	66.6
EPT (%)	10.8	31.1	29.9	31.1	35.4	26.2	11.1
Ephemeroptera Richness	3.0	3.0	4.0	6.0	4.0	5.0	5.0
Plecoptera Richness	1.0	2.0	2.0	1.0	2.0	2.0	2.0
Trichoptera Richness	1.0	1.0	2.0	3.0	1.0	3.0	3.0
EPT Richness	5.0	6.0	8.0	10.0	7.0	10.0	10.0
Biotic Index (B.I.)	7.5	7.1	6.9	7.0	7.2	7.3	7.1

Table ADD-10. Summary of key macroinvertebrate metrics from the fall 2015 samples.

Metric	PR-0E	PR-0W	PR-0.5	PR-1	PR-2	PR-3	JC-1
Species Richness:	22	17	29	19	21	32	25
Shannon-Wiener Diversity Index	1.89	1.55	2.40	2.28	2.05	2.74	2.10
Shredders (%)	0.7	0.3	0.0	0.4	0.7	0.8	0.3
Scrapers (%)	2.1	3.5	14.2	17.9	2.4	12.7	6.5
Filtering Collectors (%)	1.0	0.3	0.8	0.4	38.4	33.9	3.2
Gathering Collectors (%)	74.5	91.0	60.6	66.7	49.3	32.7	76.8
Predators (%)	21.7	4.8	24.4	14.6	9.2	19.9	13.2
Annelia (%)	26.9	4.8	2.0	0.0	0.0	0.0	1.5
Gastropoda (%)	0.3	0.7	0.8	0.0	0.3	2.0	0.3
Pelecypoda (%)	0.7	0.0	0.4	0.0	1.4	0.4	0.0
Crustacea (%)	1.4	2.1	7.1	6.9	0.3	0.4	0.0
Arachnoidea (%)	0.0	0.0	0.0	0.4	0.0	0.0	0.0
Ephemeroptera (%)	4.5	59.2	16.9	31.7	21.2	23.5	25.5
Odonata (%)	2.4	1.0	13.0	9.3	4.5	13.5	4.4
Plecoptera (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hemiptera (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lepidoptera (%)	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Megaloptera (%)	0.0	0.0	0.0	0.0	0.0	0.4	0.6
Trichoptera (%)	0.0	0.3	0.4	0.0	36.0	34.7	2.9
Coleoptera (%)	7.6	4.8	7.1	18.3	6.2	15.1	8.5
Diptera (%)	55.9	27.0	52.4	33.3	30.1	10.0	56.3
Chironomidae (%)	47.2	26.6	49.6	32.1	28.8	8.0	54.8
EPT (%)	4.5	59.5	17.3	31.7	57.2	58.2	28.4
Ephemeroptera Richness	4.0	3.0	5.0	4.0	4.0	5.0	5.0
Plecoptera Richness	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trichoptera Richness	0.0	1.0	1.0	0.0	3.0	5.0	3.0
EPT Richness	4.0	4.0	6.0	4.0	7.0	10.0	8.0
Biotic Index (B.I.)	7.3	7.5	7.0	7.1	6.8	6.2	7.4

Figures 14-21 provide a visual comparison of key community metrics at each station.

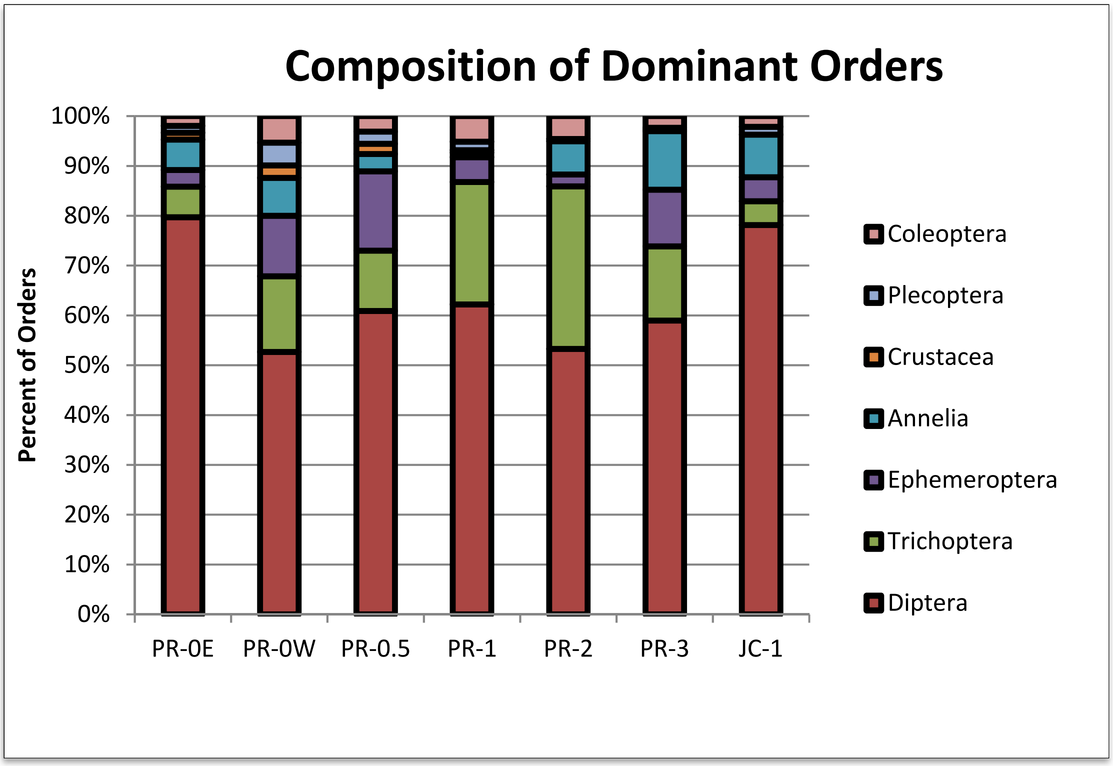

Figure ADD-14. Summary of spring macroinvertebrate sample dominant ordinal groups.

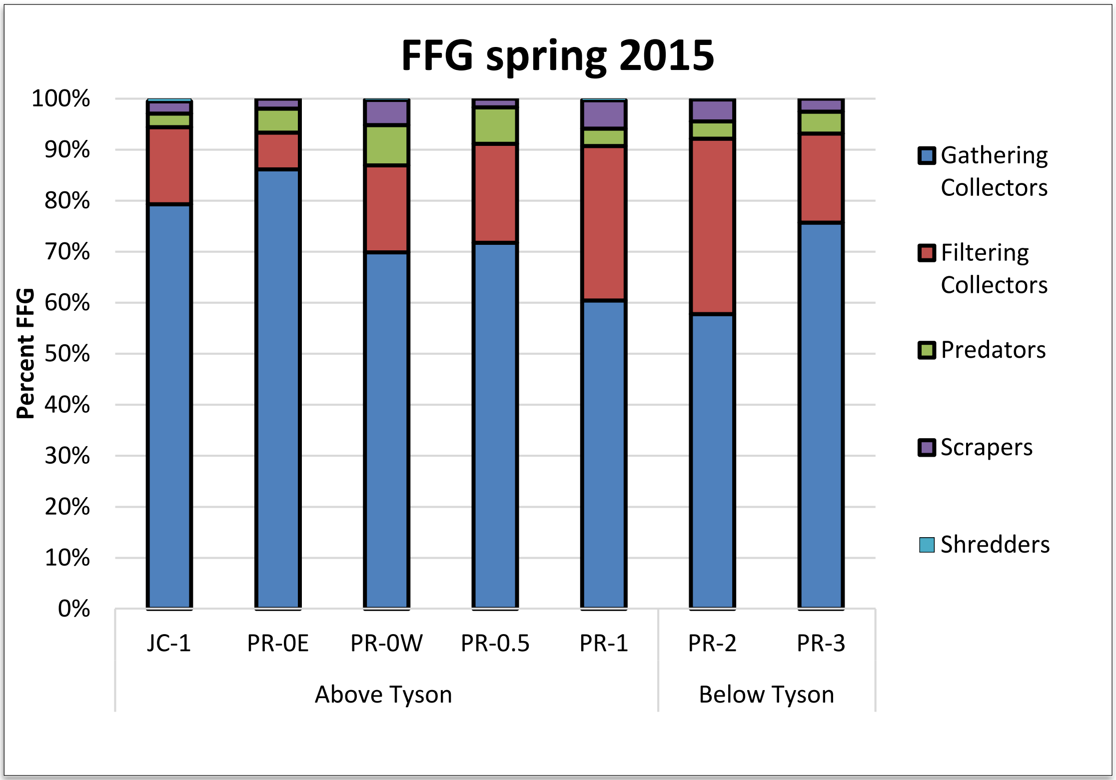

Figure ADD-15. Summary of spring macroinvertebrate sample functional feeding groups (trophic levels).

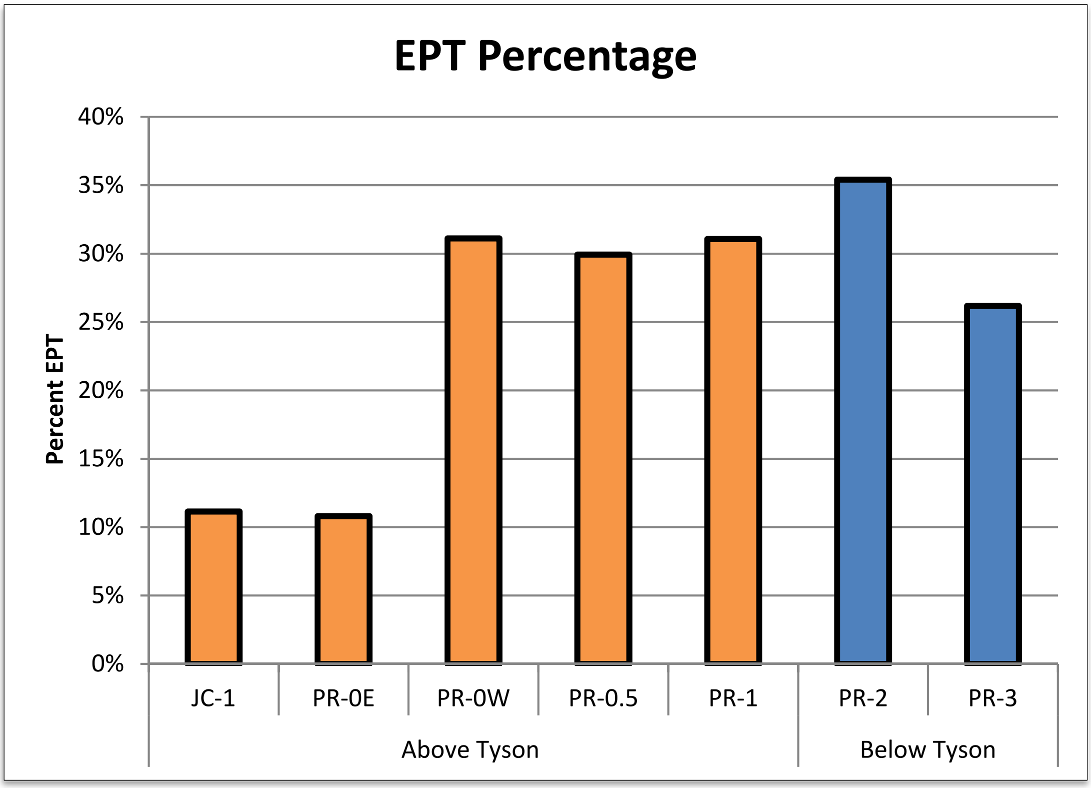

Figure ADD-16. Summary of spring macroinvertebrate sample EPT percent composition.

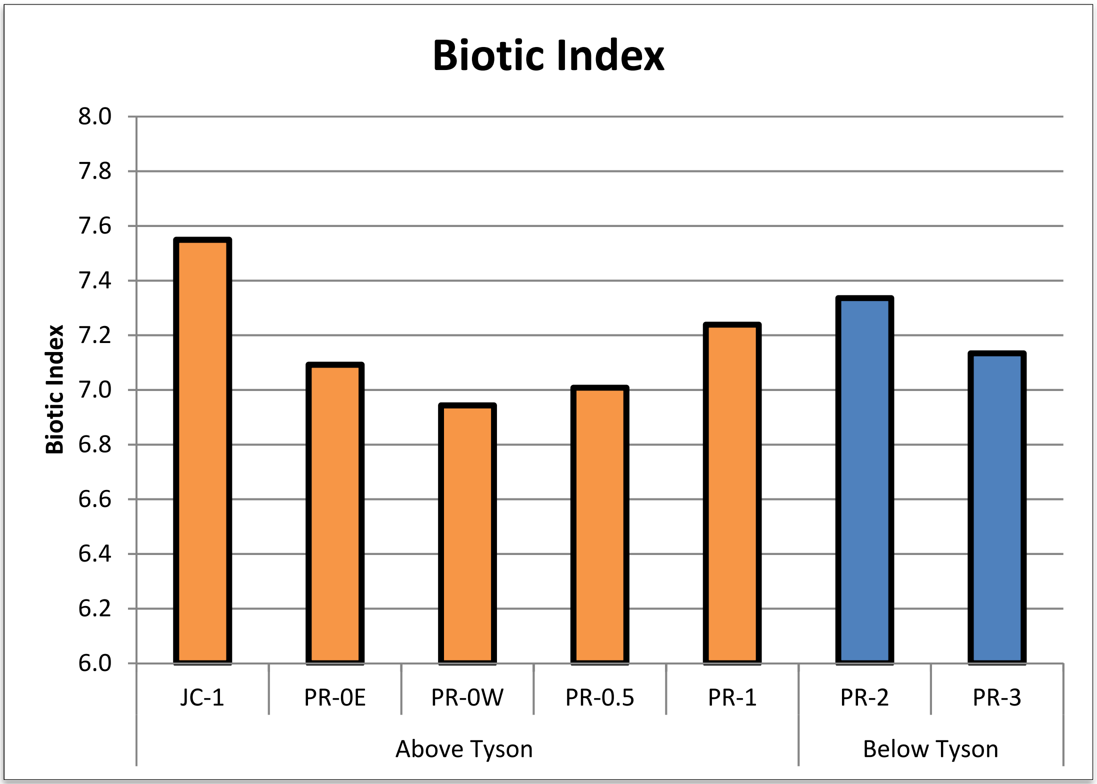

Figure ADD-17. Summary of spring macroinvertebrate sample biotic index (based on Hilsenhoff).

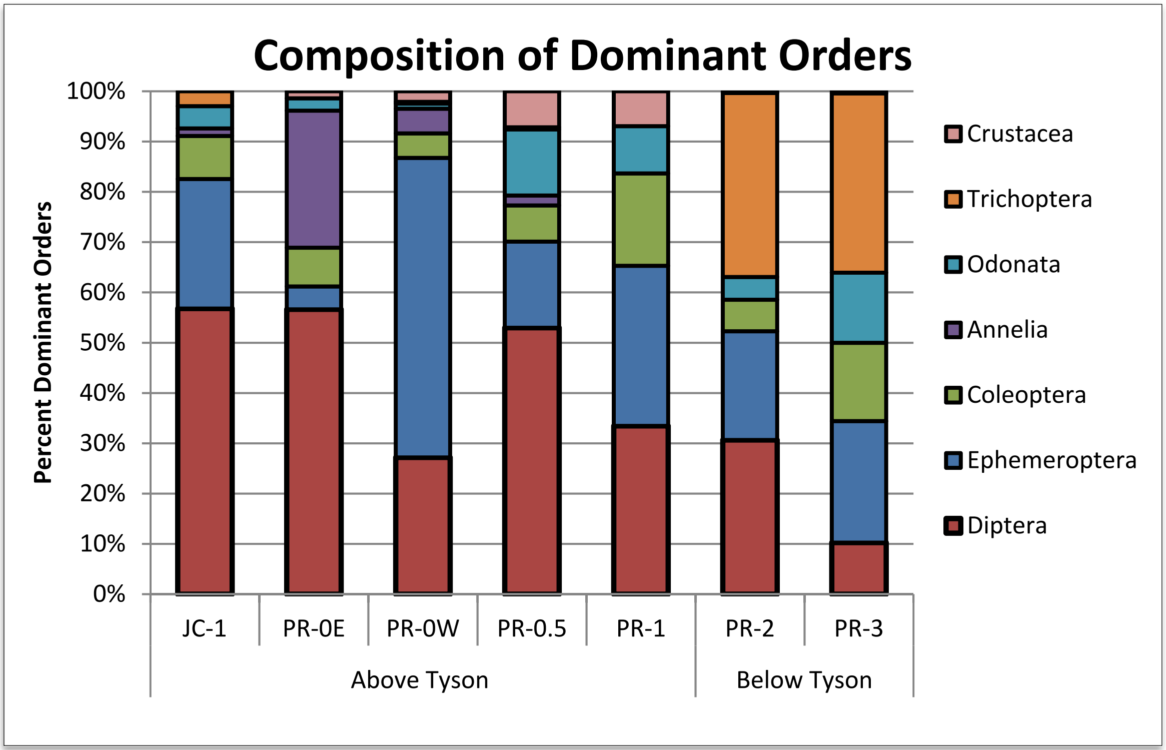

Figure ADD-18. Summary of Fall 2015 macroinvertebrate dominant ordinal groups.

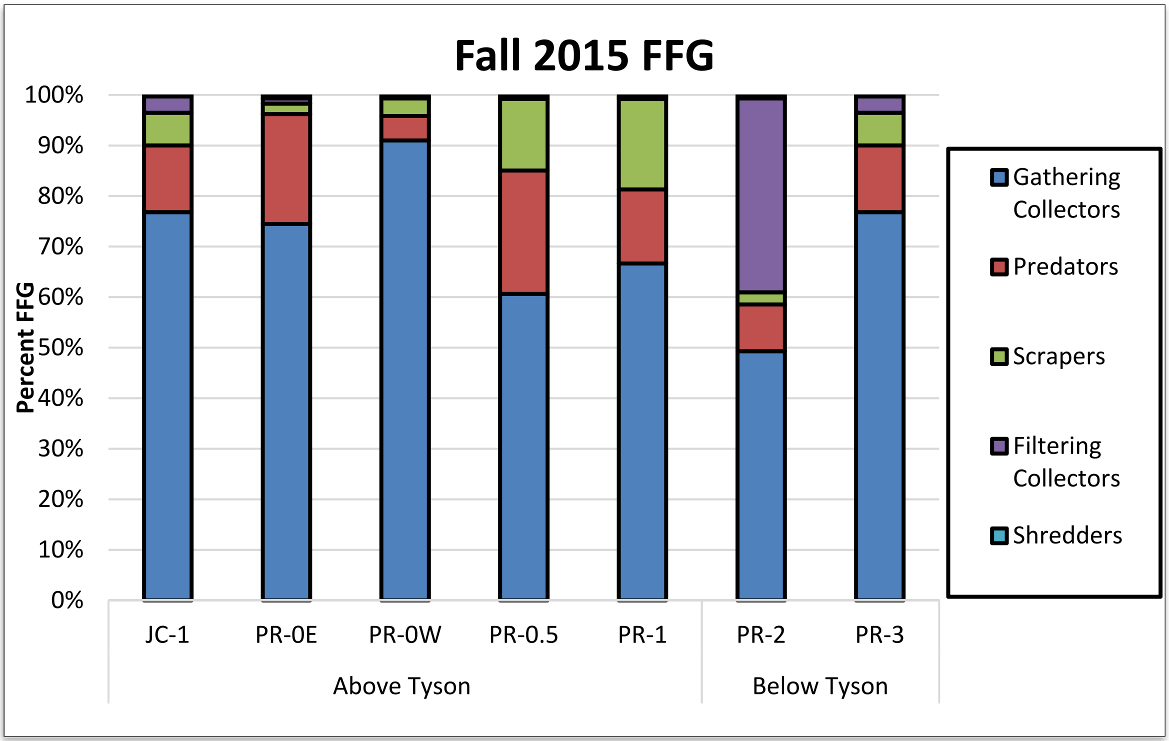

Figure ADD-19. Summary of Fall 2015 macroinvertebrate functional feeding group composition (trophic structure).

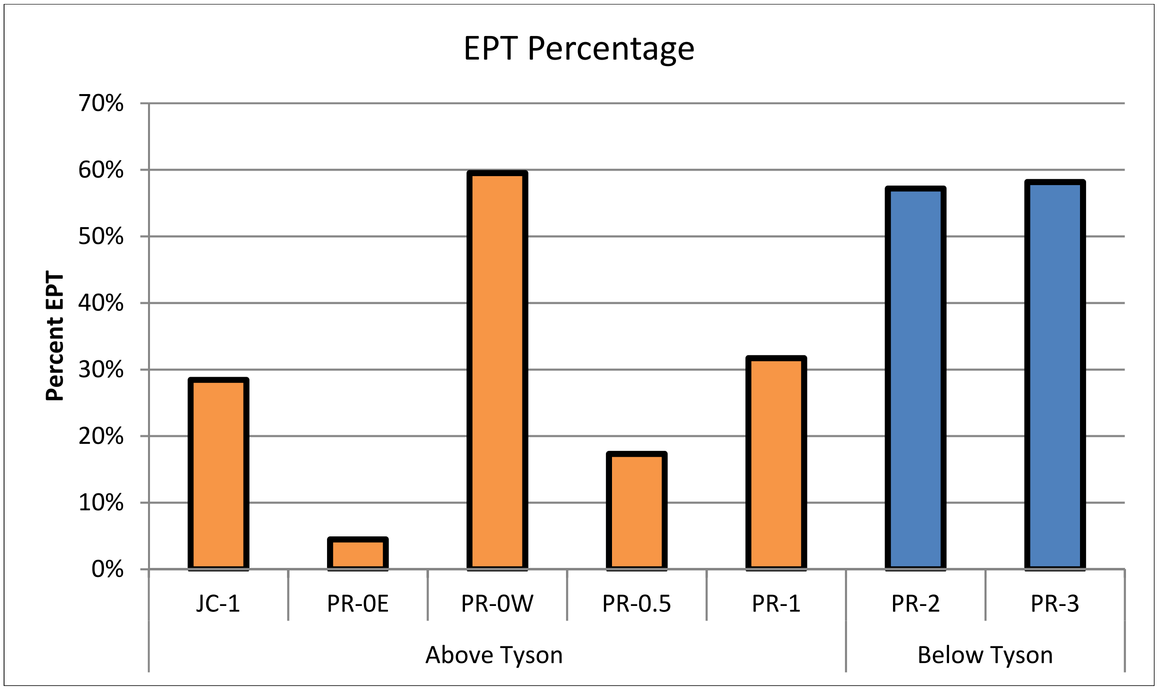

Figure ADD-20. Summary of Fall 2015 macroinvertebrate EPT percent composition.

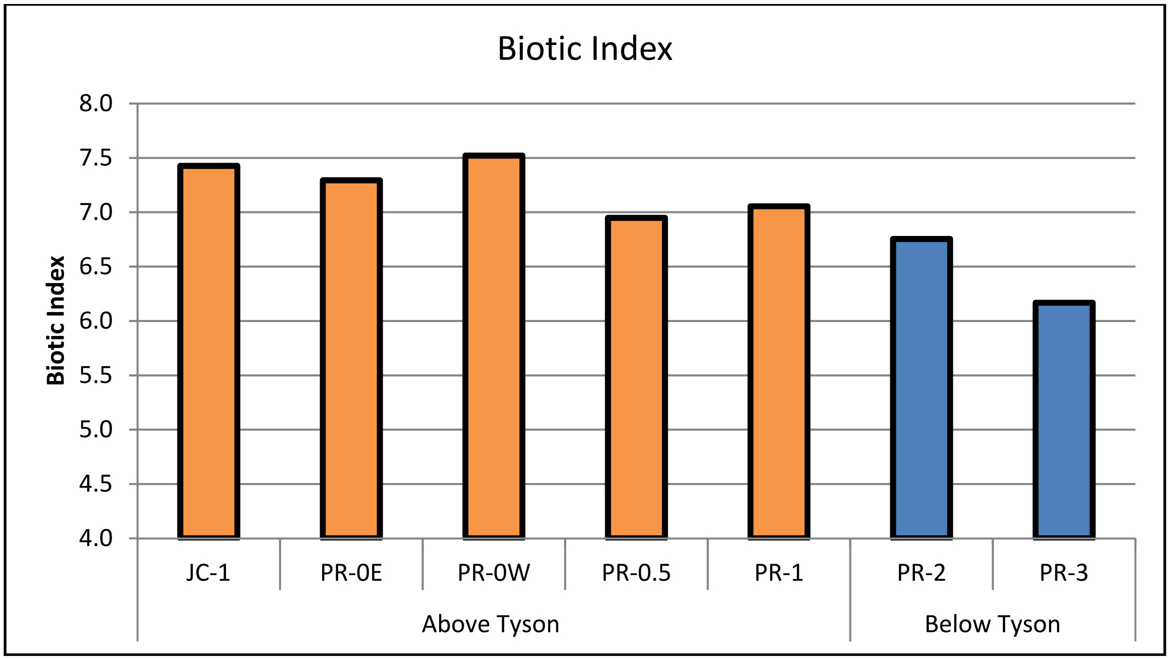

Figure ADD-21. Summary of Fall 2015 macroinvertebrate biotic index.

Calculation of Biological Condition Criteria

The ADEQ utilizes a Biological Condition Criteria which is based on EPA's Rapid Bioassessment Procedures (Plafkin, 1989). The criteria utilizes six macroinvertebrate metrics:

- Taxa richness
- EPT index
- Community loss index
- Hilsenhoff biotic index
- % contribution of dominant taxa
- Ration of EPT to Chironomidae abundance

Each metric is scored based on a comparison of the test site to a reference site, ultimately arriving at a percent similarity which is judged according to the ranking in Table ADD-11.

Table ADD-11. ADEQ Biological Condition Criteria (personal communication with ADEQ).

Attainment Status	%Comparable Estimate	Attribute
Comparable to Reference	≥83%	Expected to support the community structure present at the reference site.
Supporting	54% - 79%	Should support a diverse community similar to the reference site.
Partially Supporting	21% - 50%	Difference in the biological community may be due to poor habitat. Comparisons may be difficult.
Non-supporting	<17%	Should not be expected to support the community present at the reference site.

Comparisons were made between the two Poteau River stations downstream of the PS discharges (PR-2 and PR-3) to various reference stations. Figures ADD-20 and ADD-21 provide the results of these comparisons.

There were a total of six pairwise comparison included in the Biological Condition Criteria analysis. That is, macroinvertebrate community metrics from each of the two stations downstream of the PS dischargers were compared independently to each of the three reference stations that generally had the better metric scores (PR-0.5, PR-1 and JC-1). The resulting comparisons indicate that all comparisons scored greater than 54% similarity.

Table ADD 12. Summary of the six pairwise comparisons used to determine the ADEQ biological criteria for the spring of 2015.

Spring 2015										
Bioassessment Metric	PR-0E vs PR-2	PR-0W vs PR-2	PR-0.5 vs PR-2	PR-1 vs PR-2	JC-1 vs PR-2	PR-0E vs PR-3	PR-0W vs PR-3	PR-0.5 vs PR-3	PR-1 vs PR-3	JC-1 vs PR-3
Taxa Richness	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0
Hilsenhoff Biotic Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Ratio of EPT and Chironomid Abundances	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Percent Contribution of Dominant Taxa	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EPT Index	6.0	6.0	4.0	2.0	2.0	6.0	6.0	6.0	6.0	6.0
Community Loss Index	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0
Sum	30.0	26.0	28.0	22.0	26.0	30.0	28.0	30.0	30.0	30.0
% Comparison To Reference	100.0	81.3	93.3	73.3	86.7	100.0	87.5	100.0	100.0	100.0
	Comparable to References	Supporting	Comparable to References	Supporting	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References

Table ADD 13. Summary of the six pairwise comparisons used to determine the ADEQ biological criteria for the fall of 2015.

Fall of 2015										
Bioassessment Metric	PR-0E vs PR-2	PR-0W vs PR-2	PR-0.5 vs PR-2	PR-1 vs PR-2	JC-1 vs PR-2	PR-0E vs PR-3	PR-0W vs PR-3	PR-0.5 vs PR-3	PR-1 vs PR-3	JC-1 vs PR-3
Taxa Richness	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Hilsenhoff Biotic Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Ratio of EPT and Chironomid Abundances	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Percent Contribution of Dominant Taxa	2.0	2.0	2.0	2.0	2.0	6.0	6.0	6.0	6.0	6.0
EPT Index	6.0	6.0	6.0	2.0	4.0	6.0	6.0	6.0	6.0	6.0
Community Loss Index	4.0	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Sum	30.0	32.0	28.0	28.0	28.0	36.0	36.0	36.0	36.0	36.0
% Comparison To Reference	93.8	106.7	87.5	82.4	93.3	112.5	120.0	112.5	105.9	120.0
	Comparable to References	Comparable to References	Comparable to References	Supporting	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References

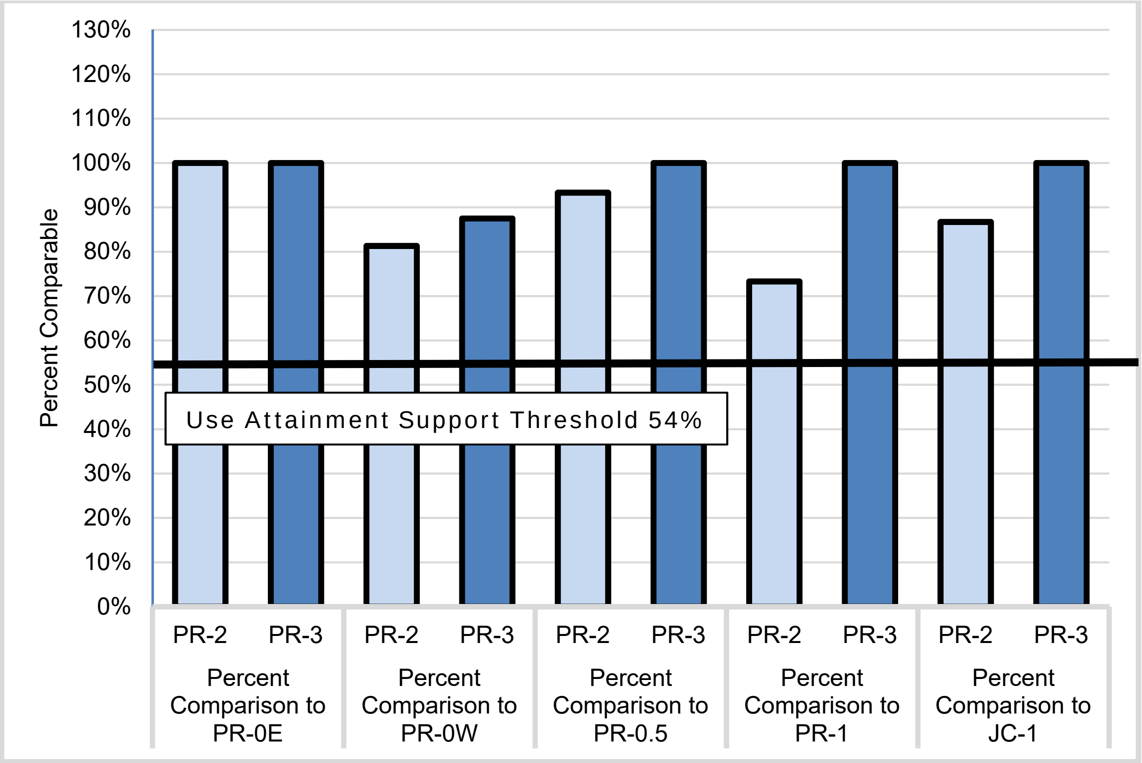

Figure ADD-22. Spring 2015 macroinvertebrate Use Support status based on Biological Condition Criteria. PR-2 is shown in light blue and PR-3 is represented in dark blue.

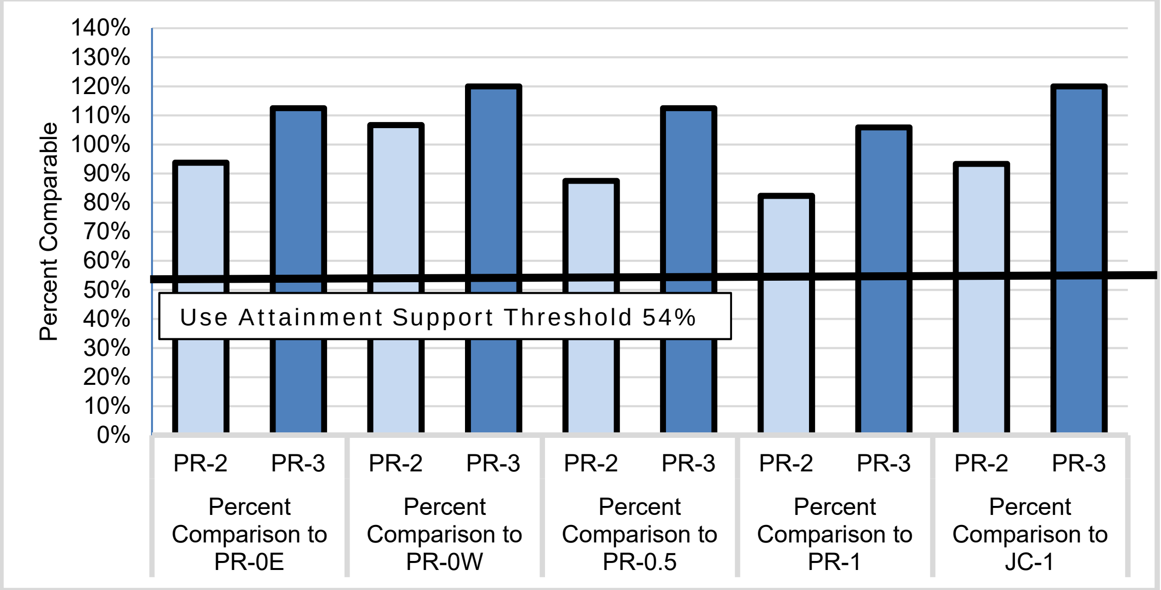

Figure ADD-23. Fall 2015 macroinvertebrate Use Support status based on Biological Condition Criteria. PR-2 is shown in light blue and PR-3 is represented in dark blue.

Conclusions and Recommendations

Based on the information provided in this report the following conclusions are provided:

- Concentrations of various constituents of concern, such as phosphorus and metals are as high or nearly as high above the PS discharges as they are below the discharges.
- Storm flow concentrations and loads of various key constituents, including phosphorus and metals are higher at stations above the PS discharges than they are below.
- TDS levels, during baseflow are highest downstream of the PS discharge, but during high flow events, TDS is similar at all stations.
- The water quality data indicates significant NPS influence in the river for many pollutants (Figure ADD-22 depicts possible NPS contributors to the issue).
- Habitat is sub-optimal at all stations, but sufficient to maintain biological integrity.
- Macroinvertebrate community composition is similar at all stations monitored in the Spring 2015
- Macroinvertebrate community composition shows some minor differences in the Fall 2015, however, differences represented in stations downstream of the discharge generally depict an improved community.
- Macroinvertebrates at each station downstream of the Tyson Discharge (PR-2 and PR-3) were compared to the three stations that generally had the best community metrics (PR-0.5, PR-1 and JC-1). All scores were greater than 54% similarity indicating use support.
- Macroinvertebrates at each station downstream of the Tyson Discharge (PR-2 and PR-3) are supporting the Aquatic Life (Fishery) use according to the ADEQ Assessment Criteria.
- Based on the “Supporting” Fishery Use determination it is evident that elevated concentrations of dissolved minerals downstream of the PS discharger’s are not adversely affecting the macroinvertebrate community.

Our recommendations, based on the finding of this study are that the Fisheries Use be designated as “Supporting” and that the revision of the minerals water quality criteria (WQC) proceed. Recommended mineral water quality changes and the data used in the calculations are provided in Appendix O.

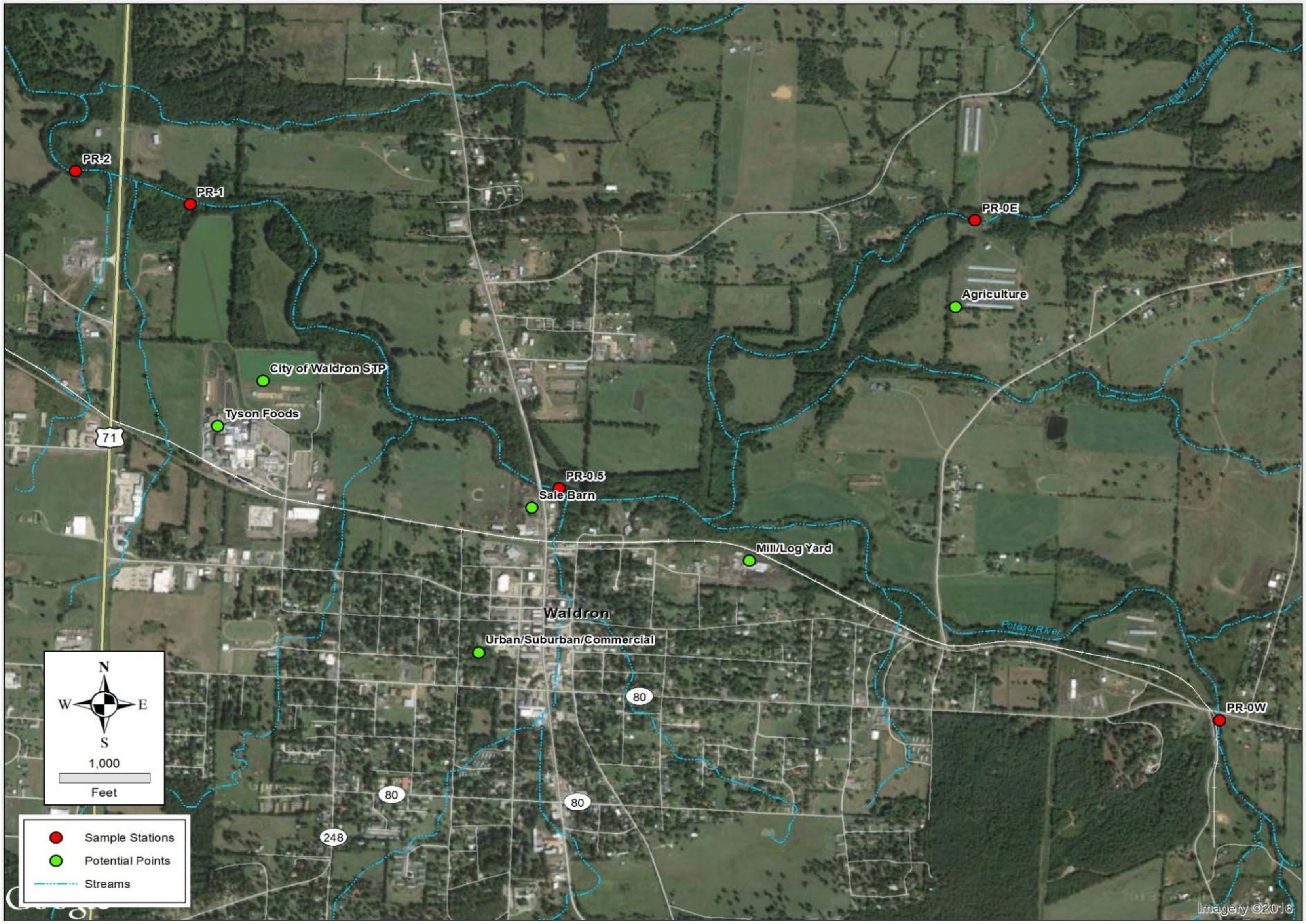

Figure ADD-24. Point source and non-point sources in the Poteau River watershed near Waldron, AR.

Appendix A

Timeline of Tasks/Actions Completed by Tyson Poultry to Achieve Study Objectives

Timeline - Tyson Waldron – Poteau River Study and Site Specific Criteria Development

General History

1994 – Study conducted on TDS, Sulfates, and Chlorides in the Poteau River relating to Tyson discharge. This was study related to evaluating the stream.

1995 – Rulemaking to add the new in-stream criteria to Regulation 2 went before the ADPCE Commission

December 2004 – New permit issued for Tyson Waldron includes limits for CU, ZN and TP. Minerals limits are not included in the permit and are not required to be monitored.

December 2007 – Tyson complies with limitations TP by adding Aluminum Sulfate as a precipitant in the clarifier.

Summer of 2010 – Tyson meets with ADEQ regarding potential limits for TDS, Sulfates, and Chlorides. ADEQ acknowledges that additional TDS and Sulfates are in the receiving stream as a result of treating for Phosphorus and can be attributed to the addition of the aluminum sulfate. ADEQ agrees to issue permit that allows for a new study to be conducted for the receiving stream.

October 2010 – Tyson issued new permit that has effluent limitations in it for the first time on TDS, Sulfates and Chlorides and compliance schedule for completing a stream study. The schedule allows for the study, report submittal, comment response, and third-party rulemaking process to take place within 3 years.

Beginning of Current Study Efforts

December 2010 – GBMc and Associates on behalf of Tyson Foods submitted a Quality Assurance Project Plan (QAPP)

March 2011 – Comments on QAPP received by ADEQ and revised QAPP re-submitted

March 2011 – Field Study commences

February 2012 – Field Study concludes

July 2012 – Final report submitted to ADEQ.

October 2012 – ADEQ, GBMc and Tyson meet to discuss final report submittal. Tyson requests written comments from ADEQ.

October 2012 – Comments received from ADEQ on report

January 2013 – ADEQ and Tyson meet to discuss Regulation 2 and how it could impact the Third Party rulemaking process. ADEQ agrees to not process a few of the Tyson NPDES permits until Regulation 2 is proposed. This would allow all citizens to understand the method that ADEQ is going to use when evaluating mineral in the permitting process.

March 2013 – HB 1929 (Act 954) passed by Arkansas Legislature. The Act affects how ADEQ is to implement dissolved minerals criteria.

April 2013 – Tyson responds to ADEQ's comments on the stream study. The response to comments reflects requirements listed in Act 954.

May 2013 – Rulemaking to amend the site specific criteria initiated with the ADPCE Commission

July 2013 – Public hearing on the Waldron Rulemaking took place in Waldron. No comments were received during the hearing.

July 2013 – TDS reduction measures were installed at Tyson Waldron. Based on internal process sampling Tyson believes that additional TDS could be removed from the process by collecting their spent marination within the processing plant. System for the capture of this material was installed.

July 2013 – HB 1929 (Act 954) becomes law

August 2013 – Comment period expires with rulemaking (no general public comments)

August 2013 – Tyson submits a permit modification requesting an additional 2 years to finalize the Third Party rulemaking process.

September 2013 – Tyson limitation for TDS, Sulfates and Chlorides become effective.

November 2013 – Tyson meets with ADEQ to discuss next steps on how to proceed with the Third Party rulemaking process. ADEQ recommends additional sampling during the Spring and Fall seasons in order to validate the recommendations established in the study submitted to the ADPCE Commission.

December 2013 – Act 954 repealed

December 2013 – Tyson meets with ADEQ in Waldron to discuss more measures to help complete the study. The upstream and downstream portions of the receiving stream were reviewed by representatives of ADEQ and Tyson to discuss the definitive options for validating the recommendations established in the Study.

January 31, 2014 - Submit study plan addendum to the Poteau River QAPP to ADEQ for review

March 17, 2014 - Receive ADEQ comments on the study plan addendum.

April 2014 – Tyson notified ADEQ that their additional study recommendations were acceptable, and based on acceptance of those recommendations the addendum to the QAPP was considered approved.

January 2015 – Water Quality Monitoring portion of Study Addendum began.

February 23, 2015 - Received additional ADEQ comments on the supplemental study (pebble counts, monthly water quality sampling for full year, additional biological).

March 17, 2015 - Provided letter accepting the additional study recommendations from ADEQ.

March 25, 2015 - Received additional ADEQ comments on the supplemental study (add quantitative habitat assessments for both seasons).

March 27, 2015 - Provided letter accepting the additional study recommendations from ADEQ.

April 2015 – Tyson met with EPA in Dallas and submitted Compliance Plan.

December 2015 – Field Study portion of Study Addendum completed.

February 19, 2016 – Tyson Foods gives a presentation to ADEQ with a study update and preliminary results. Additional macroinvertebrate study data was transmitted to ADEQ early that day, prior to the meeting.

March 11, 2016 – Data summaries from the Study Addendum were submitted to ADEQ in advance of a meeting at EPA.

April 1, 2016 – Poteau River Study Addendum report submitted to ADEQ via email.

June 9, 2016 – Meeting between Tyson and ADEQ to discuss Study Addendum.

June 10, 2016 – Submitted data requested by ADEQ in previous days meeting.

Appendix B

Data used to Develop the Proposed Criteria for Minerals

Table 1. Proposed new WQC for minerals in the Poteau River.

Stream	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
Poteau River (PR-2)	185	200	786
Unnamed Tributary (UT-2)	180	200	870

We recommend that the new instream criteria in the Poteau River extend from the confluence of the Unnamed Tributary (the receiving stream) downstream to the Highway 59 Bridge crossing (Walker Mountain Road) that is just downstream of the confluence of Shadley Creek and Cedar Creek, in Arkansas.

We recommend that the criteria for the Unnamed Tributary apply in the Unnamed Tributary from the City and Tyson Discharges downstream to the confluence with the Poteau River.

Table 2. Data Used for Criteria Calculation for the Unnamed Tributary

Date	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
03/04/11	160	120	590
04/19/11	110	130	550
05/26/11	160	160	640
06/16/11	160	200	710
07/06/11	180	110	980
08/02/11	180	200	750
09/07/11	180	180	780
10/19/11	180	110	730
11/14/11	150	130	730
12/8/2011	36	22	180
1/24/2012	170	140	560
2/21/2012	78	75	320
min	36	22	180
max	180	200	980
ave	145	131	627
95th	**180**	**200**	**870**

Table 3. Data Used for Calculation of Criteria for the Poteau River

Collected by	Date	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
PR-2 collected by GBMc	03/04/11	65.0	52.0	560.0
PR-2 collected by GBMc	04/19/11	35.0	48.0	230.0
PR-2 collected by GBMc	05/26/11	6.7	9.0	96.0
PR-2 collected by GBMc	06/16/11	160.0	220.0	660.0
PR-2 collected by GBMc	07/06/11	190.0	110.0	1000.0
PR-2 collected by GBMc	08/02/11	170.0	200.0	730.0
PR-2 collected by GBMc	09/07/11	190.0	200.0	870.0
PR-2 collected by GBMc	10/19/11	180.0	120.0	600.0
PR-2 collected by GBMc	11/14/11	100.0	92.0	460.0
PR-2 collected by GBMc	12/8/2011	10.0	8.8	74.0
PR-2 collected by GBMc	1/24/2012	40.0	39.0	160.0

Collected by	**Date**	**Chloride (mg/L)**	**Sulfate (mg/L)**	**TDS (mg/L)**
PR-2 collected by GBMc	2/21/2012	15.0	20.0	88.0
PR-2 collected by GBMc	01/27/15	42.0	33.0	144.0
PR-2 collected by GBMc	02/25/15	37.50	37.0	256.0
PR-2 collected by GBMc	03/25/15	32.00	14.0	52.0
PR-2 collected by GBMc	04/13/15	13.50	1.0	84.0
PR-2 collected by GBMc	04/28/15	15.50	13.0	12.0
PR-2 collected by GBMc	05/27/15	8.00	1.0	48.0
PR-2 collected by GBMc	06/25/15	8.50	5.0	20.0
PR-2 collected by GBMc	07/21/15	96.00	70.0	600.0
PR-2 collected by GBMc	08/27/15	144.00	70.0	808.0
PR-2 collected by GBMc	9/22/2015	149.50	70.0	752.0
PR-2 collected by GBMc	10/21/2015	146.00	70.0	672.0
PR-2 collected by GBMc	11/24/2015	70.50	68.0	348.0
PR-2 collected by GBMc	12/15/2015	8.00	7.0	8.0
PR-2 Collected by Tyson	2/3/2015	42.5	29.0	192.0
PR-2 Collected by Tyson	2/11/2015	80.5	42.0	284.0
PR-2 Collected by Tyson	2/19/2015	57.5	41.0	192.0
PR-2 Collected by Tyson	02/24/15	39.00	35.00	224.0
PR-2 Collected by Tyson	03/04/15	27.50	17.00	76.0
PR-2 Collected by Tyson	03/12/15	12.50	15.00	76.0
PR-2 Collected by Tyson	03/17/15	21.00	14.00	116.0
PR-2 Collected by Tyson	4/2/2015	28.0	21.0	12.0
PR-2 Collected by Tyson	4/7/2015	--	--	--
PR-2 Collected by Tyson	4/15/2015	17.5	11.0	20.0
PR-2 Collected by Tyson	4/23/2015	24.50	19.00	92.0
PR-2 Collected by Tyson	5/6/2015	48.0	37.0	180.0
PR-2 Collected by Tyson	5/14/2015	25.5	12.0	116.0
PR-2 Collected by Tyson	6/4/2015	13.5	9.0	64.0
PR-2 Collected by Tyson	06/09/15	16.50	13.00	48.0
PR-2 Collected by Tyson	6/17/2015	42.5	30.0	224.0
PR-2 Collected by Tyson	6/25/2015	54.0	50.0	304.0
PR-2 Collected by Tyson	6/30/2015	69.0	57.0	344.0
PR-2 Collected by Tyson	7/29/2015	120.5	80.0	644.0
PR-2 Collected by Tyson	8/6/2015	141.00	80	492.0
PR-2 Collected by Tyson	8/11/2015	144.00	60	652.0
PR-2 Collected by Tyson	8/19/2015	178.0	60.0	672.0
PR-2 Collected by Tyson	8/27/2015	129.0	80.0	664.0
PR-2 Collected by Tyson	8/27/2015	129.0	80.0	664.0
PR-2 Collected by Tyson	9/2/2015	142.0	80.0	600.0
PR-2 Collected by Tyson	9/9/2015	61.0	27.0	176.0
PR-2 Collected by Tyson	9/17/2015	141.5	70.0	644.0
PR-2 Collected by Tyson	9/22/2015	161.5	60.0	708.0
PR-2 Collected by Tyson	9/30/2015	136.5	70.0	636.0
PR-2 Collected by Tyson	10/8/2015	116.0	100.0	560.0
PR-2 Collected by Tyson	10/13/2015	136.0	60.0	540.0
PR-2 Collected by Tyson	10/13/2015	136.0	60.0	540.0

Collected by	**Date**	**Chloride (mg/L)**	**Sulfate (mg/L)**	**TDS (mg/L)**
PR-2 Collected by Tyson	10/21/2015	--	--	--
PR-2 Collected by Tyson	10/29/2015	132.0	50.0	588.0
PR-2 Collected by Tyson	11/3/2015	140.5	80.0	704.0
PR-2 Collected by Tyson	11/11/2015	98.5	70.0	416.0
PR-2 Collected by Tyson	11/19/2015	36.0	30.0	136.0
PR-2 Collected by Tyson	11/24/2015	153.0	110.0	724.0
PR-2 Collected by Tyson	12/2/2015	21.5	7.0	4.0
PR-2 Collected by Tyson	12/15/2015	--	--	--
PR-2 Collected by Tyson	12/22/2015	--	--	--
PR-2 Collected by Tyson	12/29/2015	--	--	--
ARK0055	01/18/11	129	67.4	439
ARK0055	02/15/11	66.9	89.8	316
ARK0055	03/15/11	66.1	62.1	266
ARK0055	04/26/11	3.65	6.99	71
ARK0055	05/03/11	2.9	5.5	47
ARK0055	06/21/11	182	308	903
ARK0055	07/26/11	148	168	656
ARK0055	08/23/11	175	197	732
ARK0055	09/27/11	194	176	680
ARK0055	10/25/11	150	103	564
ARK0055	11/29/11	4.08	6.54	42
ARK0055	12/12/11	3.39	5.68	44
ARK0055	01/03/12	7.78	11.5	10
ARK0055	02/07/12	3.82	7.33	41
ARK0055	03/06/12	75.6	76.3	311
ARK0055	04/03/12	43	61.9	201
ARK0055	05/15/12	148	172	594
ARK0055	06/19/12	185	188	750
ARK0055	07/17/12	207	215	795
ARK0055	08/21/12	204	206	865
ARK0055	09/18/12	49.5	61.4	301
ARK0055	10/16/12	44.3	46.9	267
ARK0055	11/06/12	183	92.3	636
ARK0055	12/03/12	190	144	732
ARK0055	01/22/13	28.3	36.1	161
ARK0055	02/26/13	4.66	8.13	58
ARK0055	03/12/13	3.86	7.09	52
ARK0055	04/09/13	3.25	6.88	47
ARK0055	05/14/13	41.1	52.9	230
ARK0055	06/18/13	33.8	46.8	433
ARK0055	07/16/13	135	158	587
ARK0055	08/13/13	4.05	6.33	90
ARK0055	09/10/13	163	213	845
ARK0055	10/14/13	124	54.3	471
ARK0055	11/05/13	56.3	28.8	255
ARK0055	12/10/13	6.75	10	72

Collected by	**Date**	**Chloride (mg/L)**	**Sulfate (mg/L)**	**TDS (mg/L)**
ARK0055	01/07/14	37.7	31.2	200
TARK0055	02/25/14	43.5	25.3	198
ARK0055	03/18/14	4.27	7.52	49
ARK0055	04/29/14	4.09	7.63	49
ARK0055	05/06/14	37.2	21.9	162
ARK0055	06/10/14	3.41	5.86	52
ARK0055	07/01/14	54.9	47.4	256
ARK0055	08/19/14	77.5	39.6	299
ARK0055	09/09/14	168	82.4	611
ARK0055	10/07/14	127	64.7	510
ARK0055	11/04/14	114	58.5	459
ARK0055	12/02/14	132	78.1	577
ARK0055	01/27/15	28.3	25.4	164
ARK0055	02/10/15	57.7	41.5	261
ARK0055	03/24/15	4.47	8.94	70
ARK0055	04/07/15	8.03	12.4	74
ARK0055	05/19/15	2.09	4.23	53
ARK0055	06/16/15	U	61.2	432
ARK0055	07/14/15	3.39	4.4	55
ARK0055	08/04/15	U	U	579
ARK0055	09/29/15	140	128	669
ARK0055	10/20/15	U	116	686
ARK0055	11/16/15	61.5	55.3	313
ARK0055	12/14/15	2.62	4.82	53
ARK0055	01/26/16	22.5	27.2	123
ARK0055	02/09/16	85.2	85.2	365
ARK0055	03/22/16	30.1	32.7	169
		Chloride (mg/L)	**Sulfate (mg/L)**	**TDS (mg/L)**
	average	76.4	60.7	349.7
	min	2.1	1.0	4.0
	max	207.0	308.0	1000.0
	95th %tile	**184.9**	**199.6**	**786.4**

Table 4. Data from USGS 07247000 Poteau River at Cauthron, AR

Date	Time	Chloride	Sulfate	TDS	TDS-calc
3/6/2008	12:00	2.88	5.83	36	36
4/22/2008	14:00	3.44	5.91	45	45
6/17/2008	15:00	3.23	5.74	40	81
8/20/2008	12:45	3.75	4.43	50	50
11/4/2008	12:15	10.3	8.7	66	1067
1/7/2009	11:00	8.2	9.58	62	1117
3/25/2009	14:20	5.07	7.89	67	1068
5/19/2009	14:30	2.91	5.48	42	1043
6/24/2009	11:30	13.8	17.6	95	2111
8/26/2009	11:30	14.2	11.4	110	1111
11/16/2009	12:15	3.35	4.73	40	1042.5
1/21/2010	10:30	5.8	8.27	55	2153.5
3/31/2010	13:30	4.67	8.24	37	1038
5/3/2010	11:45	4.68	7.51	59	1060
7/21/2010	9:45	19.4	17.9	107	2098
9/8/2010	11:00	48.9	25.4	192	1193
11/9/2010	11:50	5.74	5.5	42	1043
1/19/2011	12:15	9.3	11.6	74	2236
3/28/2011	11:15	19.4	18.9	100	1101
5/23/2011	10:50	4.12	6.68	49	1050
7/18/2011	11:30	11.1	15	71	2151
9/21/2011	9:35	28.3	20.7	120	1121
11/17/2011	10:20	3.73	6.53	47	1048
1/10/2012	10:45	7.22	9.77	54	2169
3/27/2012	10:55	2.66	5.53	40	1041
5/15/2012	10:50	10.1	12.2	86	1087
7/12/2012	9:30	20.6	13.7	113	2128
9/18/2012	11:00	44.1	43	211	1212
11/7/2012	11:45	6.66	9.43	67	1068
1/8/2013	10:45	12.9	13.5	95	2280
3/5/2013	10:45	5.46	8.18	39	1040
5/13/2013	11:00	5.76	8.36	55	1056
7/18/2013	9:30	4.64	4.83	59	2096
9/19/2013	10:15	6.23	6.86	57	1058
11/5/2013	10:45	9.3	7.03	59	1060
1/14/2014	10:30	3.71	5.96	50	2118
3/12/2014	11:15	7.11	9.43	41	1042

Date	Time	Chloride	Sulfate	TDS	TDS-calc
4/30/2014	10:30	4.46	7.07	61	1062
7/15/2014	10:30	4.61	5.17	45	2104
8/13/2014	10:00	3.88	4.9	58	1059
11/20/2014	11:00	17	10.6	85	1086
3/11/2015	15:30	3.73	6.82	43	2145
7/28/2015	8:00	6.36	6.04	67	1068
12/1/2015	13:15	2.46	4.29	33	1035.5
3/3/2016	9:40	4.19	8.65	58	2103.5

Table 5.

ALL DATA				
Min		2.5	4.3	33.0
Max		48.9	43.0	211.0
Avg		9.5	10.0	68.5
Median		5.8	8.2	58.0
n		45.0	45.0	45.0
95%tile		26.8	20.3	118.6

Table 6.

2011-2016 DATA				
Min		2.5	4.3	33.0
Max		44.1	43.0	211.0
Avg		9.6	10.4	69.2
Median		6.3	8.3	58.5
n		28.0	28.0	28.0
95%tile		25.6	20.1	117.6
75%tile		10.4	11.8	76.8

Appendix C

DMR records for Tyson Waldron

Tyson Waldron - DMR Minerals Data and Flow 2011-2018

Date	Chloride Daily Max (mg/L)	Chloride Monthly Average (mg/L)	TDS Monthly Average (mg/L)	TDS Daily Max (mg/L)	Sulfate Daily Max (mg/L)	Sulfate Monthly Average (mg/L)
01/31/2011	62.5	62.5	632	632	80	80
02/28/2011	72.5	72.5	696	696	200	200
03/31/2011	95	95	736	736	12	12
04/30/2011	214.5	214.5	960	960	280	280
05/31/2011	167.5	167.5	724	724	200	200
06/30/2011	222.5	222.5	848	848	300	300
07/31/2011	202.5	202.5	1140	1140	170	170
08/31/2011	204	204	804	804	240	240
09/30/2011	210	210	884	884	240	240
10/31/2011	212.5	212.5	948	948	2.9	2.9
11/30/2011	193.5	193.5	892	892	240	240
12/31/2011	152.5	152.5	840	840	210	210
01/31/2012	177.5	177.5	792	792	210	210
02/29/2012	143	143	676	676	150	150
03/31/2012	148.5	148.5	772	772	210	210
04/30/2012	192.5	192.5	804	804	290	290
05/31/2012	200	200	812	812	260	260
06/30/2012	238	238	940	940	310	310
07/31/2012	250	250	1020	1020	31	31
08/31/2012	213	213	992	992	280	280
09/30/2012	270	270	1140	1140	290	290
10/31/2012	245.5	245.5	1000	1000	260	260
11/30/2012	245	245	804	804	300	300
12/31/2012	223	223	812	812	190	190
01/31/2013	228	228	864	864	170	170
02/28/2013	233.5	233.5	1096	1096	250	250
03/31/2013	219.5	219.5	848	840	270	270
04/30/2013	220	220	804	804	190	190
05/31/2013	192.5	192.5	804	804	250	250
06/30/2013	175	175	776	776	340	340
07/31/2013	221.5	221.5	972	972	300	300
08/31/2013	202	202	948	948	230	230
9/30/2013	250.5	215.5	744	744	58	58
10/31/2013	169.5	169.5	612	612	50	50
11/30/2013	190	190	720	724	86	85
12/31/2013	182.5	182.5	652	668	112	85.3
01/31/2014	82.5	82.5	748	712	112	104
2/28/2014	260.5	252	794	808	102	91
03/31/2014	108	108	788	788	102	102
04/30/2014	120	120	696	696	116	116
05/31/2014	215	215	796	796	80	80
06/30/2014	192.5	192.5	812	812	114	114
07/31/2014	160	160	820	820	100	100
08/31/2014	195	195	684	684	80	80
09/30/2014	187.5	187.5	656	656	50	50
10/31/2014	165	165	680	680	88	88
11/30/2014	187.5	187.5	660	660	108	108
12/31/2014	95	95	796	796	122	122
01/31/2015	182	170.25	766	832	120	113
02/28/2015	203	188.83	736	772	116	110
03/31/2015	220	220	760	760	134	134
04/30/2015	194	194	752	752	146	146
05/31/2015	197.5	197.5	764	764	90	90
06/30/2015	218.5	218.5	772	772	80	80
07/31/2015	155.5	155.5	832	832	90	90
08/31/2015	166.5	166.5	348	348	80	80
09/30/2015	160	160	668	668	120	120
10/31/2015	156	156	644	644	90	90
11/30/2015	165	165	928	928	80	80
12/31/2015	138.5	138.5	700	700	110	110
01/31/2016	116	116	752	752	120	120
02/29/2016	145	145	716	716	120	120
03/31/2016	112.5	112.5	492	492	60	60
04/30/2016	160.5	142.75	581	642	45	45
05/31/2016	115.5	115.5	628	628	50	50
06/30/2016	123	123	612	612	55	55
07/31/2016	135.5	135.5	680	680	45	45
08/31/2016	147.5	147.5	648	692	65	65
09/30/2016	133.5	133.5	660	660	40	40
10/31/2016	165	148	625	684	45	45

Date	Flow Daily Max (MGD)	Flow Monthly Average (MGD)
01/31/2011	1.0428	0.8124
02/28/2011	1.1218	0.883
03/31/2011	1.0799	0.8533
04/30/2011	1.0703	0.8738
05/31/2011	1.1192	0.8933
06/30/2011	1.4406	0.7477
07/31/2011	1.2316	0.9418
08/31/2011	1.0684	0.8725
09/30/2011	1.1009	0.8309
10/31/2011	1.039	0.8316
11/30/2011	1.26	0.7297
12/31/2011	1.0989	0.801
01/31/2012	1.0771	0.7336
02/29/2012	1.046	0.8654
03/31/2012	1.2638	0.9734
04/30/2012	1.0449	0.882
05/31/2012	999310	798140
06/30/2012	0.9436	0.6977
07/31/2012	0.8721	0.6914
08/31/2012	0.8911	0.7214
09/30/2012	1.0282	0.7202
10/31/2012	1.0337	0.7117
11/30/2012	0.9201	0.655
12/31/2012	0.8868	0.6106
01/31/2013	0.87	0.6903
02/28/2013	0.9139	0.6841
03/31/2013	0.8793	0.7192
04/30/2013	0.9712	0.8444
05/31/2013	0.9981	0.7769
06/30/2013	1.1468	0.7593
07/31/2013	1.03	0.834
08/31/2013	10695	0.8535
9/30/2013	0.9456	0.8345
10/31/2013	10710	0.8445
11/30/2013	1.0394	0.8368
12/31/2013	1.012	0.719
01/31/2014	0.9471	0.7562
2/28/2014	1.0292	0.7896
03/31/2014	1.0264	0.822
04/30/2014	1.0312	0.8778
05/31/2014	1.1285	0.8887
06/30/2014	1.0112	0.9099
07/31/2014	1.1284	0.9069
08/31/2014	1.104	0.9954
09/30/2014	1.33	1.309
10/31/2014	1.1191	0.9653
11/30/2014	0.9779	0.8492
12/31/2014	1.0024	0.8792
01/31/2015	1.0615	0.8747
02/28/2015	1.1365	0.8541
03/31/2015	1.0887	0.929
04/30/2015	1.0737	0.9358
05/31/2015	1.2187	0.9689
06/30/2015	1.1297	0.9883
07/31/2015	1.1443	1.0327
08/31/2015	1.1395	0.9965
09/30/2015	1.1672	0.9246
10/31/2015	1.1661	0.9591
11/30/2015	1.2266	0.8921
12/31/2015	1.0396	0.8623
01/31/2016	1.2134	0.9522
02/29/2016	1.1458	0.9288
03/31/2016	1.2777	1.0385
04/30/2016	1.1762	1.0204
05/31/2016	1.149	1.0173
06/30/2016	1.0368	0.9046
07/31/2016	1.2356	1.0595
08/31/2016	1.3277	0.8392
09/30/2016	0.9475	0.7795
10/31/2016	0.9403	0.7779

Tyson Waldron - DMR Minerals Data and Flow 2011-2018

Date	Chloride Daily Max (mg/L)	Chloride Monthly Average (mg/L)	TDS Monthly Average (mg/L)	TDS Daily Max (mg/L)	Sulfate Daily Max (mg/L)	Sulfate Monthly Average (mg/L)
11/30/2016	141	141	643	674	55	55
12/31/2016	142	142	644	644	80	73.8
01/31/2017	156.5	149.3	658	710	78	68
02/28/2017	133.5	133.5	568	568	59	59
03/31/2017	123	123	588	588	59	59
04/30/2017	120	120	659	680	61	61
05/31/2017	124	124	622	622	60	60
06/30/2017	169	141.25	616	676	60	60
07/31/2017	140	140	653	730	63	63
08/31/2017	120.5	120.5	656.5	762	62	62
09/30/2017	133.5	133.5	576	576	55	55
10/31/2017	139	139	564	564	45	45
11/30/2017	122.5	122.5	508	508	68	68
12/31/2017	116.5	116.5	488	488	68	68
01/31/2018	127	127	660	660	63	63
02/28/2018	124.5	124.5	648	648	75	65
03/31/2018	86	86	488	488	66	66
04/30/2018	49	49	524	524	38	38
05/31/2018	44.5	44.5	618	664	56	56
06/30/2018	46.5	46.5	586	668	61	61
07/31/2018	135	135	620	620	52	52
08/31/2018	125	125	711	816	61	61
09/30/2018	79	79	628	628	53	53
10/31/2018	121.5	121.5	642	700	47	47

Date	Flow Daily Max (MGD)	Flow Monthly Average (MGD)
11/30/2016	1.0426	0.8848
12/31/2016	0.9691	0.8018
01/31/2017	1.0668	0.8419
02/28/2017	1.0234	0.9212
03/31/2017	1.0488	0.934
04/30/2017	1.0512	0.9301
05/31/2017	1.0087	0.9149
06/30/2017	1.0051	0.919
07/31/2017	1.1794	0.9525
08/31/2017	1.0531	0.968
09/30/2017	1.1848	0.929
10/31/2017	1.0782	0.9403
11/30/2017	1.0608	0.8995
12/31/2017	1.1236	0.9206
01/31/2018	1.1661	0.9446
02/28/2018	1.26	0.9772
03/31/2018	1.1319	0.9058
04/30/2018	0.9729	0.6958
05/31/2018	1.1581	0.9912
06/30/2018	1.1272	0.8779
07/31/2018	1.0863	0.9219
08/31/2018	1.2184	0.9592
09/30/2018	1.1028	0.9454
10/31/2018	0.987	0.8772

Table 7. **Summary of DMR Data 2010-2012**
NPDES ID AR008482
Outfall 001A Tyson Foods

Date	DO	pH		Solids, total dissolved			
	MIN	MIN	MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX
	mg/L	su	su	lb/day	lb/day	mg/L	mg/L
3/31/2010	7.5	6.69	7.02	--	--	--	--
4/30/2010	7.3	6.71	6.98	--	--	--	--
5/31/2010	7	6.73	7.15	--	--	--	--
6/30/2010	6.7	6.43	6.97	--	--	--	--
7/31/2010	6.4	6.2	7.2	--	--	--	--
8/31/2010	6.4	6.5	6.98	--	--	--	--
9/30/2010	6.3	6.3	6.79	--	--	--	--
10/31/2010	7.7	6.71	6.87	5529	5529	756	756
11/30/2010	8.1	6.7	6.97	6503.8	6503.8	852	852
12/31/2010	7.2	6.7	7.1	5232.8	5232.8	628	628
1/31/2011	8.1	6.7	6.91	4838.6	4838.6	632	632
2/28/2011	8.6	6.4	6.93	5045.39	5045.39	696	696
3/31/2011	7.1	6.4	6.94	6133.00	6133.00	736	736
4/30/2011	7.7	6.3	6.48	5979.98	5979.98	960	960
5/31/2011	7.9	6.0	6.36	6273.65	6273.65	724	724
6/30/2011	6.7	6.4	6.94	7295.81	7295.81	848	848
7/31/2011	7.1	6.4	6.59	10314.80	10314.80	1140	1140
8/31/2011	6.9	6.4	6.53	6917.00	6917.00	804	804
9/30/2011	7.7	6.4	6.68	6668.40	6668.40	884	884
10/31/2011	7.6	6.1	6.42	7055.59	7055.59	948	948
11/30/2011	7.9	6.4	6.76	5957.30	5957.30	892	892
12/31/2011	8.8	6.4	6.68	5935.14	5935.14	840	840
1/31/2012	9.4	6.0	6.8	4585.30	4585.30	792	792
Count	23	23	23	16	5	16	5
Min	6.3	6.0	6.4	4585.3	4838.6	628.0	628.0
Max	9.4	6.7	7.2	10314.8	6503.8	1140.0	852.0
Average	7.5	6.4	6.8	6266.6	5429.9	820.8	712.8

Table 8.

Solids, total suspended				Oil & Grease				Nitrogen, total (as N)			
MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX
lb/day	lb/day	mg/L	mg/L	lb/day	lb/day	mg/L	mg/L	lb/day	lb/day	mg/L	mg/L
10.16	10.16	2	2	10.63	15.96	1.46	2	18.32	18.32	3.61	3.61
17.76	17.76	2.2	2.2	13.92	27.4	1.91	3.86	46.92	46.92	5.81	5.81
15.56	15.56	2.4	2.4	13.15	21.69	1.86	2.67	26.07	26.07	4.02	4.02
31.5	31.5	4.2	4.2	13.09	19.27	1.62	2.57	23	23	3.07	3.07
25.49	25.49	3.6	3.6	16.26	26.26	2.13	3.58	61.01	61.01	8.62	8.62
15.23	15.23	2.8	2.8	21.39	55.33	3.35	9.79	28.64	28.64	5.26	5.26
46.17	46.17	5.2	5.2	17.31	28.10	2.01	3.05	316.76	316.76	35.68	35.68
11.7	11.7	1.6	1.6	23.81	55.63	3.03	6.96	39.64	39.64	5.42	5.42
13.74	13.74	1.8	1.8	20.00	20.00	2.62	2.62	133.79	133.79	17.53	17.53
8.33	8.33	1	1	11.50	11.50	1.38	1.38	33.04	33.04	3.97	3.97
10.72	10.72	1.4	1.4	19.45	19.45	2.54	2.54	93.7	93.7	12.24	12.24
24.65	24.65	3.4	3.4	16.09	16.09	2.22	2.22	39.04	39.04	5.39	5.39
29.90	29.90	3.6	3.6	27.66	27.66	3.33	3.33	42.18	42.18	5.08	5.08
26.16	26.16	4.2	4.2	10.84	10.84	1.74	1.74	334.03	334.03	53.62	53.62
12.13	12.13	1.4	1.4	16.46	16.46	1.9	1.9	46.6	46.6	5.38	5.38
15.49	15.49	1.8	1.8	14.37	14.37	1.67	1.67	63.25	63.25	7.35	7.35
39.81	39.81	4.4	4.4	18.55	18.55	2.05	2.05	611.5	611.5	67.58	67.58
13.77	13.77	1.6	1.6	17.04	17.04	1.98	1.98	107.13	107.13	12.45	12.45
10.56	10.56	1.4	1.4	17.65	17.65	2.34	2.34	138	138	18.3	18.3
35.72	35.72	4.8	4.8	13.99	13.99	1.88	1.88	162.17	162.17	21.79	21.79
13.36	13.36	2	2	13.36	13.36	2	2	111.26	111.26	16.66	16.66
12.72	12.72	1.8	1.8	11.31	11.31	1.6	1.6	215.93	215.93	30.56	30.56
11.85	11.85	1.8	1.8	10.54	10.54	10.54	10.54	161.35	161.35	2.17	2.17
16	12	23	12	23	12	23	12	23	12	23	12
8.3	8.3	1.0	1.0	10.5	11.5	1.4	1.4	18.3	18.3	2.2	3.1
39.8	46.2	5.2	5.2	27.7	55.6	10.5	9.8	611.5	316.8	67.6	35.7
18.2	19.3	2.6	2.6	16.0	26.4	2.5	3.6	124.1	71.7	15.3	9.2

Table 9.

Nitogen, ammonia total (as N)				Nitrite plus nitrate total 1 set. (as N)			
MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX
lb/day	lb/day	mg/L	mg/L	lb/day	lb/day	mg/L	mg/L
4.33	9.95	0.56	1.15	7.14	7.14	1.41	1.41
5.19	18.25	0.67	2.26	11.39	11.39	1.41	1.41
1.39	2.6	0.2	0.34	9.22	9.22	1.42	1.42
2.54	5.48	0.3	0.58	10.78	10.78	1.44	1.44
13.67	47.22	1.59	5.36	48.82	48.82	6.9	6.9
12.23	18.48	1.96	3.33	13.18	13.18	2.38	2.38
4.58	10.78	0.52	1.17	306.56	306.56	34.53	34.53
1.6	2.53	0.2	3	--	--	--	--
1.3	1.3	0.17	0.17	--	--	--	--
1.42	1.42	0.17	0.17	--	--	--	--
1.3	1.3	0.17	0.17	--	--	--	--
1.59	1.59	0.22	0.22	--	--	--	--
3.82	3.82	0.46	0.46	--	--	--	--
2.3	2.3	0.37	0.37	--	--	--	--
3.73	3.73	0.43	0.43	--	--	--	--
2.67	2.67	0.31	0.31	--	--	--	--
2.08	2.08	0.23	0.23	--	--	--	--
2.5	2.5	0.29	0.29	--	--	--	--
2.19	--	0.29	0.29	--	--	--	--
3.94	3.94	0.53	0.53	--	--	--	--
5.21	5.21	0.78	0.78	--	--	--	--
15.47	15.47	2.17	2.17	--	--	--	--
14.29	14.29	2.17	2.17	--	--	--	--
23	18	23	12	7	7	7	7
1.3	1.3	0.2	0.2	7.1	7.1	1.4	1.4
15.5	47.2	2.2	5.4	306.6	306.6	34.5	34.5
4.8	7.7	0.6	1.5	58.2	58.2	7.1	7.1

Table 10.

Phosphorus, total (as P)				Copper, total recoverable				
MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	
lb/day	lb/day	mg/L	mg/L	lb/day	lb/day	ug/L	ug/L	mg/L
3.29	3.98	0.49	0.57	0.078	0.078	10	10	0.010
2	2.23	0.29	0.35	0.0541	0.0541	10	10	0.010
2.45	4.06	0.32	0.50	0.0812	0.0812	10	10	0.010
8.32	14.1	1.10	1.88	0.0552	0.0552	10	10	0.010
1.92	2.27	0.27	0.32	0.1605	0.1605	20	20	0.020
3.14	3.65	0.49	0.67	0.054	0.054	10	10	0.010
14.85	23.97	1.66	2.70	0.049	0.049	10	10	0.010
7.26	8.19	0.98	1.12	0.039	0.039	10	10	0.010
8.695	15.25	0.96	1.64	0.031	0.031	10	10	0.010
3.145	4	0.39	0.48	0.062	0.062	10	10	0.010
1.83	1.97	0.22	0.28	0.186	0.186	33	33	0.033
3.72	3.67	0.50	0.52	0.0765	0.0765	10	10	0.010
10.75	16.86	1.50	2.44	0.083	0.083	10	10	0.010
5.72	7.47	0.86	1.20	0.0511	0.0511	10	10	0.010
4.75	5.2	0.59	0.60	0.0745	0.0745	0.01	0.01	0.000
6.66	8.09	0.75	0.94	0.0946	0.0946	11	11	0.011
6.01	10.66	0.74	1.32	0.1269	0.1269	14	14	0.014
9.18	9.98	1.12	1.16	0.138	0.138	16	16	0.016
12.89	14.48	1.71	1.92	0.07112	0.07112	10	10	0.010
7.85	10.93	1.00	1.44	0.0744	0.0744	10	10	0.010
12.44	14.72	1.48	1.52	0.1	0.1	10	10	0.010
9.16	12.66	1.15	1.50	0.072	0.072	10.3	10.3	0.010
7.57	9.88	1.15	1.50	0.0576	0.0576	10	10	0.010
23	23	23.00	23	23	12	23	12	
1.8	2.0	0.22	0.3	0.0	0.0	0.0	10.0	
14.9	24.0	1.71	2.7	0.2	0.2	33.0	33.0	
6.7	9.1	0.86	1.2	0.1	0.1	11.5	12.8	

Table 11.

Flow		Coliform, fecal general	BOD, carbonaceous, 05 day, 20C			
MO AVG	DAILY MAX	MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX
MGD	MGD	#/100mL	lb/day	lb/day	mg/L	mg/L
0.7928	1.291	0	8.33	8.33	1.64	1.64
0.8674	1.1829	0	7.51	7.51	0.93	0.93
0.9101	1.5423	8	15.3	15.3	2.36	2.36
0.863	1.1843	6	18.82	18.82	2.51	2.51
0.9207	1.4167	5	21.74	21.74	3.07	3.07
0.9167	1.3902	0	7.62	7.62	1.4	1.4
0.9667	1.23	0	9.59	9.59	1.08	1.08
0.8262	1.027	0	13.75	13.75	1.88	1.88
0.8987	1.244	1	7.63	7.63	1	1
0.8215	1.1084	3	18.66	18.66	2.24	2.24
0.8124	1.0428	9	21.21	21.21	2.77	2.77
0.883	1.1218	16	31.17	31.17	4.3	4.3
0.8533	1.0799	9	10.3	10.3	1.24	1.24
0.8738	1.0703	3	18.56	18.56	2.98	2.98
0.8933	1.1192	3	15.94	15.94	1.84	1.84
0.7477	1.4406	3	13.25	13.25	1.54	1.54
0.9418	1.2316	3	26.6	26.6	2.94	2.94
0.8725	1.0684	3	20.56	20.56	2.39	2.39
0.8309	1.1009	3	14.56	14.56	1.93	1.93
0.8316	1.039	3	22.32	22.32	3	3
0.7297	1.26	3	3.34	3.34	0.5	0.5
0.801	1.0989	3	13.07	13.07	1.85	1.85
0.7336	1.0771	3	10.34	10.34	1.57	1.57
23	23	23	23	12	23	12
0.7	1.0	0.0	3.3	7.5	0.5	0.9
1.0	1.5	16.0	31.2	31.2	4.3	4.3
0.9	1.2	3.8	15.2	15.1	2.0	2.1

Table 12.

Chloride (as Cl)				Sulfate (as SO4)				Zinc	
MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	MO AVG	DAILY MAX	Daily Max	Daily Max
lb/day	lb/day	mg/L	mg/L	lb/day	lb/day	mg/L	mg/L	ug/L	mg/L
--	--	--	--	--	--	--	--	25	0.025
--	--	--	--	--	--	--	--	27.8	0.028
--	--	--	--	--	--	--	--	20	0.020
--	--	--	--	--	--	--	--	65	0.065
--	--	--	--	--	--	--	--	2.49	0.002
--	--	--	--	--	--	--	--	20	0.020
--	--	--	--	--	--	--	--	29	0.029
1119	1119	153	153	1243	1243	170	170	25	0.025
1355	1355	177.5	177.5	1297.7	1297.7	170	170	80	0.080
370.8	370.8	44.5	44.5	749.92	749.92	90	90	31	0.031
478.5	478.5	62.5	62.5	612.5	612.5	80	80	10	0.010
525.56	525.56	72.5	72.5	1449.82	1449.82	200	200	67	0.067
789	789	95	95	99.67	99.67	12	12	48	0.048
1336.15	1336.15	214.5	214.5	1744.16	1744.16	280	280	103	0.103
1451.43	1451.43	167.5	167.5	1733.05	1733.05	200	200	.042	0.000
1914.29	1914.29	222.5	222.5	2581.06	2581.06	300	300	41	0.041
1832.2	1832.2	202.5	202.5	1538.2	1538.2	170	170	29	0.029
1755	1755	204	204	2064	2064	240	240	36	0.036
1584	1584	210	210	1810.4	1810.4	240	240	20	0.020
1581.56	1581.56	212.5	212.5	2158.35	2158.35	2.9	2.9	29	0.029
1292.3	1292.3	193.5	193.5	1602.8	1602.8	240	240	60	0.060
1077.51	1077.51	152.5	152.5	1483.78	1483.78	210	210	30.7	0.031
1027.6	1027.6	177.5	177.5	1215.8	1215.8	210	210	30	0.030
16	5	16	5	5	5	5	5		
370.8	370.8	44.5	44.5	612.5	612.5	80.0	80.0		
1914.3	1355.0	222.5	177.5	1449.8	1449.8	200.0	200.0		
1218.1	769.8	160.1	102.0	1070.6	1070.6	142.0	142.0		

Appendix D

WQ Data Summary and Analytical Report

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

March 11, 2011
Control No. 145871

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on March 7, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Five (5) water sample(s) received on March 7, 2011
Tyson - Waldron
4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
145871-1	PR-3 3/4/11 0920	04-Mar-2011 0920	
145871-2	W001 3/4/11 1130	04-Mar-2011 1130	
145871-3	UT-2 3/4/11 1210	04-Mar-2011 1210	
145871-4	PR-2 3/4/11 1320	04-Mar-2011 1320	
145871-5	PR-1 3/4/11 1405	04-Mar-2011 1405	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 145871-1
Sample Identification: PR-3 3/4/11 0920

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**42** Analyzed: 09-Mar-2011 1004 by 93	1	**mg/l** Batch: W35519	
Total Dissolved Solids SM 2540C	Prep: 08-Mar-2011 1403 by 285	**290** Analyzed: 10-Mar-2011 1124 by 285	10	**mg/l** Batch: W35509	
Calcium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**5.3** Analyzed: 08-Mar-2011 1537 by 270	0.1	**mg/l** Batch: S29614	D Dil: 5
Magnesium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**11** Analyzed: 08-Mar-2011 1537 by 270	0.03	**mg/l** Batch: S29614	D Dil: 5
Potassium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**9.7** Analyzed: 08-Mar-2011 1537 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Sodium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**28** Analyzed: 08-Mar-2011 1537 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Chloride EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**36** Analyzed: 07-Mar-2011 1633 by 07	0.2	**mg/l** Batch: S29620	
Sulfate EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**32** Analyzed: 07-Mar-2011 1633 by 07	0.2	**mg/l** Batch: S29620	

AIC No. 145871-2
Sample Identification: W001 3/4/11 1130

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**210** Analyzed: 09-Mar-2011 1004 by 93	1	**mg/l** Batch: W35519	
Total Dissolved Solids SM 2540C	Prep: 08-Mar-2011 1403 by 285	**940** Analyzed: 10-Mar-2011 1124 by 285	10	**mg/l** Batch: W35509	
Calcium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**4.6** Analyzed: 08-Mar-2011 1540 by 270	0.1	**mg/l** Batch: S29614	D Dil: 5
Magnesium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**62** Analyzed: 08-Mar-2011 1540 by 270	0.03	**mg/l** Batch: S29614	D Dil: 5
Potassium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**64** Analyzed: 08-Mar-2011 1540 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Sodium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**160** Analyzed: 08-Mar-2011 1540 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Chloride EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**200** Analyzed: 07-Mar-2011 1721 by 07	2	**mg/l** Batch: S29620	D Dil: 10
Sulfate EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**140** Analyzed: 07-Mar-2011 1721 by 07	2	**mg/l** Batch: S29620	D Dil: 10

AIC No. 145871-3
Sample Identification: UT-2 3/4/11 1210

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**160** Analyzed: 09-Mar-2011 1004 by 93	1	**mg/l** Batch: W35519	

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ANALYTICAL RESULTS

AIC No. 145871-3 (Continued)
Sample Identification: UT-2 3/4/11 1210

Analyte	Result	RL	Units	Qualifier
Total Dissolved Solids	**590**	10	**mg/l**	
SM 2540C Prep: 08-Mar-2011 1403 by 285	Analyzed: 10-Mar-2011 1124 by 285		Batch: W35509	
Calcium	**6.9**	0.1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1555 by 270		Batch: S29614	Dil: 5
Magnesium	**47**	0.03	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1555 by 270		Batch: S29614	Dil: 5
Potassium	**50**	1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1555 by 270		Batch: S29614	Dil: 5
Sodium	**140**	1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1555 by 270		Batch: S29614	Dil: 5
Chloride	**160**	2	**mg/l**	D
EPA 300.0 Prep: 07-Mar-2011 1338 by 07	Analyzed: 07-Mar-2011 1856 by 07		Batch: S29620	Dil: 10
Sulfate	**120**	2	**mg/l**	D
EPA 300.0 Prep: 07-Mar-2011 1338 by 07	Analyzed: 07-Mar-2011 1856 by 07		Batch: S29620	Dil: 10

AIC No. 145871-4
Sample Identification: PR-2 3/4/11 1320

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3	**70**	1	**mg/l**	
SM 2320B	Analyzed: 09-Mar-2011 1004 by 93		Batch: W35519	
Total Dissolved Solids	**560**	10	**mg/l**	
SM 2540C Prep: 08-Mar-2011 1403 by 285	Analyzed: 10-Mar-2011 1124 by 285		Batch: W35509	
Calcium	**5.6**	0.1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1558 by 270		Batch: S29614	Dil: 5
Magnesium	**18**	0.03	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1558 by 270		Batch: S29614	Dil: 5
Potassium	**18**	1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1558 by 270		Batch: S29614	Dil: 5
Sodium	**51**	1	**mg/l**	D
EPA 200.7 Prep: 07-Mar-2011 1454 by 271	Analyzed: 08-Mar-2011 1558 by 270		Batch: S29614	Dil: 5
Chloride	**65**	2	**mg/l**	D
EPA 300.0 Prep: 07-Mar-2011 1338 by 07	Analyzed: 07-Mar-2011 1920 by 07		Batch: S29620	Dil: 10
Sulfate	**52**	2	**mg/l**	D
EPA 300.0 Prep: 07-Mar-2011 1338 by 07	Analyzed: 07-Mar-2011 1920 by 07		Batch: S29620	Dil: 10

AIC No. 145871-5
Sample Identification: PR-1 3/4/11 1405

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3	**20**	1	**mg/l**	
SM 2320B	Analyzed: 09-Mar-2011 1004 by 93		Batch: W35519	

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ANALYTICAL RESULTS

AIC No. 145871-5 (Continued)
Sample Identification: PR-1 3/4/11 1405

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 08-Mar-2011 1403 by 285	**470** Analyzed: 10-Mar-2011 1124 by 285	10	**mg/l** Batch: W35509	
Calcium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**4.4** Analyzed: 08-Mar-2011 1601 by 270	0.1	**mg/l** Batch: S29614	D Dil: 5
Magnesium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**3.5** Analyzed: 08-Mar-2011 1601 by 270	0.03	**mg/l** Batch: S29614	D Dil: 5
Potassium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**2.6** Analyzed: 08-Mar-2011 1601 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Sodium EPA 200.7	Prep: 07-Mar-2011 1454 by 271	**9.7** Analyzed: 08-Mar-2011 1601 by 270	1	**mg/l** Batch: S29614	D Dil: 5
Chloride EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**12** Analyzed: 07-Mar-2011 2032 by 07	0.2	**mg/l** Batch: S29620	
Sulfate EPA 300.0	Prep: 07-Mar-2011 1338 by 07	**16** Analyzed: 07-Mar-2011 2032 by 07	0.2	**mg/l** Batch: S29620	

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		145808-1	17000 mg/l			08Mar11 1315 by 285	10Mar11 1124 by 285		
	Batch: W35509	Duplicate	18000 mg/l	1.72	10.0	08Mar11 1315 by 285	10Mar11 1124 by 285		
Total Dissolved Solids		145871-1	290 mg/l			08Mar11 1403 by 285	10Mar11 1124 by 285		
	Batch: W35509	Duplicate	280 mg/l	5.81	10.0	08Mar11 1403 by 285	10Mar11 1124 by 285		
Alkalinity as CaCO3		145871-1	42 mg/l				09Mar11 1004 by 93		
	Batch: W35519	Duplicate	43 mg/l	0.943	20.0		09Mar11 1005 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	104	85.0-115			S29614	07Mar11 0823 by 271	08Mar11 1515 by 270		
Magnesium	10 mg/l	104	85.0-115			S29614	07Mar11 0823 by 271	08Mar11 1515 by 270		
Potassium	10 mg/l	99.7	85.0-115			S29614	07Mar11 0823 by 271	08Mar11 1515 by 270		
Sodium	10 mg/l	106	85.0-115			S29614	07Mar11 0823 by 271	08Mar11 1515 by 270		
Chloride	20 mg/l	102	90.0-110			S29620	07Mar11 1339 by 07	07Mar11 1410 by 07		
Sulfate	20 mg/l	102	90.0-110			S29620	07Mar11 1339 by 07	07Mar11 1410 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	145838-1	10 mg/l	91.9	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1518 by 270		
	145838-1	10 mg/l	93.5	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1521 by 270		
	Relative Percent Difference:		0.473	20.0	S29614				
Magnesium	145838-1	10 mg/l	100	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1518 by 270		
	145838-1	10 mg/l	101	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1521 by 270		
	Relative Percent Difference:		0.648	20.0	S29614				
Potassium	145838-1	10 mg/l	90.8	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1518 by 270		
	145838-1	10 mg/l	92.5	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1521 by 270		
	Relative Percent Difference:		0.881	20.0	S29614				
Sodium	145838-1	10 mg/l	-	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1518 by 270		X
	145838-1	10 mg/l	-	75.0-125	S29614	07Mar11 0823 by 271	08Mar11 1521 by 270		X
	Relative Percent Difference:		0.472	20.0	S29614				
Chloride	145862-1	20 mg/l	99.7	80.0-120	S29620	07Mar11 1339 by 07	07Mar11 1434 by 07		
	145862-1	20 mg/l	99.8	80.0-120	S29620	07Mar11 1339 by 07	07Mar11 1458 by 07		
	Relative Percent Difference:		0.0499	10.0	S29620				
Sulfate	145862-1	20 mg/l	97.2	80.0-120	S29620	07Mar11 1339 by 07	07Mar11 1434 by 07		
	145862-1	20 mg/l	96.2	80.0-120	S29620	07Mar11 1339 by 07	07Mar11 1458 by 07		
	Relative Percent Difference:		0.911	10.0	S29620				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W35519-1		09Mar11 1005 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W35509-1	08Mar11 1315 by 285	10Mar11 1124 by 285	
Calcium	< 0.1 mg/l	0.1	0.1	S29614-1	07Mar11 0823 by 271	08Mar11 1512 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S29614-1	07Mar11 0823 by 271	08Mar11 1512 by 270	
Potassium	< 1 mg/l	1	1	S29614-1	07Mar11 0823 by 271	08Mar11 1512 by 270	
Sodium	< 1 mg/l	1	1	S29614-1	07Mar11 0823 by 271	08Mar11 1512 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S29620-1	07Mar11 1339 by 07	07Mar11 1347 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S29620-1	07Mar11 1339 by 07	07Mar11 1347 by 07	

145871

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

CLIENT INFORMATION		BILLING INFORMATION		SPECIAL INSTRUCTIONS/PRECAUTIONS:
Company:	Tyson-Waldron	Bill To:	GBMc	Email copy of report to jfluger@gbmcassoc.com
Project Name/No.:	4g	Company:		
Send Report To:	Josh Fluger, GBMc	Address:		
Address:	219 Brown LN			Parameters for Analysis/Methods
	Bryant, AR	Phone No.:		
Phone/Fax No.:	847-7077	Fax No.:		

Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Cl, SO4, TDS, Alkalinity	Ca, Mg, P, Na								
① PR-3		3/4/11	0920	W	2	Grab	X	X								
② WO01		"	1130	W	2	"	X	X								
③ UT-2		"	1210	W	2	"	X	X								
④ PR-2		"	1320	W	2	"	X	X								
⑤ PR-1		"	1405	W	2	"	X	X								
Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						I	I,N								

Sampler(s): JF/GLP

Shipment Method: GBMc Delivery

Turnaround Time Required: Normal

COC Completed by: Josh Fluger Date: 3/7/11 Time: 0900

COC Checked by: Date: 3/7/11 Time: 0940

Relinquished by: Josh Fluger Date: 3/7/11 Time: 0941

Received by: ______ Date: ______ Time: ______

Relinquished by: GD Date: 03/07/2011 Time: 10:55

Received in lab by: Date: 3-7-11 Time: 1055

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 03/07/11

AMERICAN
INTERPLEX
CORPORATION
LABORATORIES

April 29, 2011
Control No. 147144

GBMc & Associates, Inc.
ATTN: Mr. Greg Phillips
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on April 21, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Greg Phillips
gphillips@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Seven (7) water sample(s) received on April 21, 2011
1078-10-070/1078-10-075

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
147144-1	PR-1 4/19/11 1235	19-Apr-2011 1235	
147144-2	PR-2 4/19/11 1055	19-Apr-2011 1055	
147144-3	PR-3 4/19/11 0945	19-Apr-2011 0945	
147144-4	UT-2 4/19/11 1600	19-Apr-2011 1600	
147144-5	PR-1 (Dup) 4/19/11 1240	19-Apr-2011 1240	
147144-6	W001 4/19/11 1525	19-Apr-2011 1525	
147144-7	FB 4/19/11 1239	19-Apr-2011 1239	

Qualifiers:

D Result is from a secondary dilution factor

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 147144-1
Sample Identification: PR-1 4/19/11 1235

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**20** Analyzed: 26-Apr-2011 1117 by 93	1	**mg/l** Batch: W36018	
Total Dissolved Solids SM 2540C	Prep: 25-Apr-2011 1704 by 292	**100** Analyzed: 26-Apr-2011 1601 by 292	10	**mg/l** Batch: W36014	
Total Phosphorus SM 4500-P B,F	Prep: 25-Apr-2011 1459 by 290	**0.057** Analyzed: 26-Apr-2011 1458 by 258	0.02	**mg/l** Batch: W36010	
Calcium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**4.0** Analyzed: 25-Apr-2011 1542 by 297	0.1	**mg/l** Batch: S29974	
Magnesium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**3.1** Analyzed: 25-Apr-2011 1542 by 297	0.03	**mg/l** Batch: S29974	
Potassium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**2.3** Analyzed: 25-Apr-2011 1542 by 297	1	**mg/l** Batch: S29974	
Sodium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**7.6** Analyzed: 25-Apr-2011 1542 by 297	1	**mg/l** Batch: S29974	
Chloride EPA 300.0	Prep: 21-Apr-2011 1500 by 07	**6.4** Analyzed: 21-Apr-2011 2105 by 07	0.2	**mg/l** Batch: S29958	
Sulfate EPA 300.0	Prep: 21-Apr-2011 1500 by 07	**8.3** Analyzed: 21-Apr-2011 2105 by 07	0.2	**mg/l** Batch: S29958	
Hardness as CaCO3 SM2340 B	Prep: 25-Apr-2011 0915 by 271	**22** Analyzed: 25-Apr-2011 1541 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1623 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**0.0035** Analyzed: 25-Apr-2011 1623 by 297	0.002	**mg/l** Batch: S29974	

AIC No. 147144-2
Sample Identification: PR-2 4/19/11 1055

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**39** Analyzed: 26-Apr-2011 1117 by 93	1	**mg/l** Batch: W36018	
Total Dissolved Solids SM 2540C	Prep: 25-Apr-2011 1704 by 292	**230** Analyzed: 26-Apr-2011 1601 by 292	10	**mg/l** Batch: W36014	
Total Phosphorus SM 4500-P B,F	Prep: 25-Apr-2011 1459 by 290	**0.82** Analyzed: 26-Apr-2011 1526 by 258	0.1	**mg/l** Batch: W36010	D Dil: 5
Calcium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**4.9** Analyzed: 25-Apr-2011 1545 by 297	0.1	**mg/l** Batch: S29974	
Magnesium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**14** Analyzed: 25-Apr-2011 1545 by 297	0.03	**mg/l** Batch: S29974	
Potassium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**12** Analyzed: 25-Apr-2011 1545 by 297	1	**mg/l** Batch: S29974	

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ANALYTICAL RESULTS

AIC No. 147144-2 (Continued)
Sample Identification: PR-2 4/19/11 1055

Analyte		Result	RL	Units	Qualifier
Sodium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**30** Analyzed: 25-Apr-2011 1545 by 297	1	**mg/l** Batch: S29974	
Chloride EPA 300.0	Prep: 21-Apr-2011 1500 by 07	**35** Analyzed: 21-Apr-2011 2149 by 07	0.2	**mg/l** Batch: S29958	
Sulfate EPA 300.0	Prep: 21-Apr-2011 1500 by 07	**48** Analyzed: 21-Apr-2011 2149 by 07	0.2	**mg/l** Batch: S29958	
Hardness as CaCO3 SM2340 B	Prep: 25-Apr-2011 0915 by 271	**68** Analyzed: 25-Apr-2011 1543 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1626 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**0.0084** Analyzed: 25-Apr-2011 1626 by 297	0.002	**mg/l** Batch: S29974	

AIC No. 147144-3
Sample Identification: PR-3 4/19/11 0945

Analyte		Result	RL	Units	Qualifier
Total Phosphorus SM 4500-P B,F	Prep: 25-Apr-2011 1459 by 290	**0.23** Analyzed: 26-Apr-2011 1500 by 258	0.02	**mg/l** Batch: W36010	
Hardness as CaCO3 SM2340 B	Prep: 25-Apr-2011 0915 by 271	**33** Analyzed: 25-Apr-2011 1546 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1629 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**0.0039** Analyzed: 25-Apr-2011 1629 by 297	0.002	**mg/l** Batch: S29974	

AIC No. 147144-4
Sample Identification: UT-2 4/19/11 1600

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**98** Analyzed: 26-Apr-2011 1117 by 93	1	**mg/l** Batch: W36018	
Total Dissolved Solids SM 2540C	Prep: 25-Apr-2011 1704 by 292	**550** Analyzed: 26-Apr-2011 1601 by 292	10	**mg/l** Batch: W36014	
Total Phosphorus SM 4500-P B,F	Prep: 25-Apr-2011 1459 by 290	**3.6** Analyzed: 26-Apr-2011 1527 by 258	0.1	**mg/l** Batch: W36010	D Dil: 5
Calcium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**7.7** Analyzed: 25-Apr-2011 1551 by 297	0.1	**mg/l** Batch: S29974	
Magnesium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**40** Analyzed: 25-Apr-2011 1551 by 297	0.03	**mg/l** Batch: S29974	
Potassium EPA 200.7	Prep: 25-Apr-2011 0915 by 271	**37** Analyzed: 25-Apr-2011 1551 by 297	1	**mg/l** Batch: S29974	

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ANALYTICAL RESULTS

AIC No. 147144-4 (Continued)
Sample Identification: UT-2 4/19/11 1600

Analyte	Result	RL	Units	Qualifier
Sodium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**91** Analyzed: 25-Apr-2011 1551 by 297	1	**mg/l** Batch: S29974	
Chloride EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**110** Analyzed: 21-Apr-2011 2211 by 07	2	**mg/l** Batch: S29958	D Dil: 10
Sulfate EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**130** Analyzed: 21-Apr-2011 2211 by 07	2	**mg/l** Batch: S29958	D Dil: 10
Hardness as CaCO3 SM2340 B Prep: 25-Apr-2011 0915 by 271	**180** Analyzed: 25-Apr-2011 1549 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1632 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**0.034** Analyzed: 25-Apr-2011 1632 by 297	0.002	**mg/l** Batch: S29974	

AIC No. 147144-5
Sample Identification: PR-1 (Dup) 4/19/11 1240

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**20** Analyzed: 26-Apr-2011 1117 by 93	1	**mg/l** Batch: W36018	
Total Dissolved Solids SM 2540C Prep: 25-Apr-2011 1704 by 292	**120** Analyzed: 26-Apr-2011 1601 by 292	10	**mg/l** Batch: W36014	
Total Phosphorus SM 4500-P B,F Prep: 25-Apr-2011 1459 by 290	**0.055** Analyzed: 26-Apr-2011 1502 by 258	0.02	**mg/l** Batch: W36010	
Calcium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**3.9** Analyzed: 25-Apr-2011 1554 by 297	0.1	**mg/l** Batch: S29974	
Magnesium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**3.1** Analyzed: 25-Apr-2011 1554 by 297	0.03	**mg/l** Batch: S29974	
Potassium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**2.2** Analyzed: 25-Apr-2011 1554 by 297	1	**mg/l** Batch: S29974	
Sodium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**7.4** Analyzed: 25-Apr-2011 1554 by 297	1	**mg/l** Batch: S29974	
Chloride EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**6.4** Analyzed: 21-Apr-2011 2338 by 07	0.2	**mg/l** Batch: S29958	
Sulfate EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**8.3** Analyzed: 21-Apr-2011 2338 by 07	0.2	**mg/l** Batch: S29958	
Hardness as CaCO3 SM2340 B Prep: 25-Apr-2011 0915 by 271	**23** Analyzed: 25-Apr-2011 1553 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1636 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**0.0041** Analyzed: 25-Apr-2011 1636 by 297	0.002	**mg/l** Batch: S29974	

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ANALYTICAL RESULTS

AIC No. 147144-6
Sample Identification: W001 4/19/11 1525

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**150** Analyzed: 26-Apr-2011 1117 by 93	1	**mg/l** Batch: W36018	
Total Dissolved Solids SM 2540C Prep: 25-Apr-2011 1704 by 292	**820** Analyzed: 26-Apr-2011 1601 by 292	10	**mg/l** Batch: W36014	
Total Phosphorus SM 4500-P B,F Prep: 25-Apr-2011 1459 by 290	**6.3** Analyzed: 26-Apr-2011 1547 by 258	0.5	**mg/l** Batch: W36010	D Dil: 25
Calcium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**4.2** Analyzed: 25-Apr-2011 1557 by 297	0.1	**mg/l** Batch: S29974	
Magnesium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**67** Analyzed: 25-Apr-2011 1557 by 297	0.03	**mg/l** Batch: S29974	
Potassium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**60** Analyzed: 25-Apr-2011 1557 by 297	1	**mg/l** Batch: S29974	
Sodium EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**150** Analyzed: 25-Apr-2011 1557 by 297	10	**mg/l** Batch: S29974	D Dil: 10
Chloride EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**180** Analyzed: 22-Apr-2011 0021 by 07	2	**mg/l** Batch: S29958	D Dil: 10
Sulfate EPA 300.0 Prep: 21-Apr-2011 1500 by 07	**230** Analyzed: 22-Apr-2011 0021 by 07	2	**mg/l** Batch: S29958	D Dil: 10
Hardness as CaCO3 SM2340 B Prep: 25-Apr-2011 0915 by 271	**290** Analyzed: 25-Apr-2011 1553 by 297	1	**mg/l** Batch: S29974	
Dissolved Copper EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1639 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**0.030** Analyzed: 25-Apr-2011 1639 by 297	0.002	**mg/l** Batch: S29974	

AIC No. 147144-7
Sample Identification: FB 4/19/11 1239

Analyte	Result	RL	Units	Qualifier
Dissolved Copper EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**< 0.006** Analyzed: 25-Apr-2011 1655 by 297	0.006	**mg/l** Batch: S29974	
Dissolved Zinc EPA 200.7 Prep: 25-Apr-2011 0915 by 271	**0.0086** Analyzed: 25-Apr-2011 1655 by 297	0.002	**mg/l** Batch: S29974	

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Bryant, AR 72022

DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		147181-1	1100 mg/l			25Apr11 1704 by 292	26Apr11 1601 by 292		
	Batch: W36014	Duplicate	1100 mg/l	2.40	10.0	25Apr11 1705 by 292	26Apr11 1601 by 292		
Alkalinity as CaCO3		147091-6	2600 mg/l				26Apr11 1117 by 93		
	Batch: W36018	Duplicate	2600 mg/l	0.00	20.0		26Apr11 1118 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Phosphorus	0.5 mg/l	103	85.0-115			W36010	25Apr11 1459 by 290	26Apr11 1446 by 258		
Calcium	10 mg/l	107	85.0-115			S29974	25Apr11 0916 by 271	25Apr11 1534 by 297		
Magnesium	10 mg/l	107	85.0-115			S29974	25Apr11 0916 by 271	25Apr11 1534 by 297		
Potassium	10 mg/l	104	85.0-115			S29974	25Apr11 0916 by 271	25Apr11 1534 by 297		
Sodium	10 mg/l	107	85.0-115			S29974	25Apr11 0916 by 271	25Apr11 1534 by 297		
Chloride	20 mg/l	97.9	90.0-110			S29958	21Apr11 1420 by 07	21Apr11 1643 by 07		
Sulfate	20 mg/l	96.7	90.0-110			S29958	21Apr11 1420 by 07	21Apr11 1643 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Total Phosphorus	147081-1	0.5 mg/l	106	80.0-120	W36010	25Apr11 1459 by 290	26Apr11 1449 by 258		
	147081-1	0.5 mg/l	101	80.0-120	W36010	25Apr11 1459 by 290	26Apr11 1450 by 258		
	Relative Percent Difference:		4.14	10.0	W36010				
Calcium	147144-1	10 mg/l	106	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1537 by 297		
	147144-1	10 mg/l	103	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1539 by 297		
	Relative Percent Difference:		2.52	20.0	S29974				
Magnesium	147144-1	10 mg/l	106	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1537 by 297		
	147144-1	10 mg/l	103	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1539 by 297		
	Relative Percent Difference:		2.38	20.0	S29974				
Potassium	147144-1	10 mg/l	103	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1537 by 297		
	147144-1	10 mg/l	101	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1539 by 297		
	Relative Percent Difference:		1.72	20.0	S29974				
Sodium	147144-1	10 mg/l	104	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1537 by 297		
	147144-1	10 mg/l	99.9	75.0-125	S29974	25Apr11 0916 by 271	25Apr11 1539 by 297		
	Relative Percent Difference:		2.14	20.0	S29974				
Chloride	147111-1	20 mg/l	95.9	80.0-120	S29958	21Apr11 1420 by 07	21Apr11 1705 by 07		
	147111-1	20 mg/l	93.5	80.0-120	S29958	21Apr11 1420 by 07	21Apr11 1727 by 07		
	Relative Percent Difference:		2.43	10.0	S29958				
Sulfate	147111-1	20 mg/l	97.0	80.0-120	S29958	21Apr11 1420 by 07	21Apr11 1705 by 07		
	147111-1	20 mg/l	98.3	80.0-120	S29958	21Apr11 1420 by 07	21Apr11 1727 by 07		
	Relative Percent Difference:		1.09	10.0	S29958				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W36018-1		26Apr11 1118 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W36014-1	25Apr11 1705 by 292	26Apr11 1601 by 292	
Total Phosphorus	< 0.02 mg/l	0.02	0.02	W36010-1	25Apr11 1459 by 290	26Apr11 1445 by 258	
Calcium	< 0.1 mg/l	0.1	0.1	S29974-1	25Apr11 0916 by 271	25Apr11 1531 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S29974-1	25Apr11 0916 by 271	25Apr11 1531 by 297	
Potassium	< 1 mg/l	1	1	S29974-1	25Apr11 0916 by 271	25Apr11 1531 by 297	
Sodium	< 1 mg/l	1	1	S29974-1	25Apr11 0916 by 271	25Apr11 1531 by 297	
Chloride	< 0.2 mg/l	0.2	0.2	S29958-1	21Apr11 1420 by 07	21Apr11 1621 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S29958-1	21Apr11 1420 by 07	21Apr11 1621 by 07	

GBM^c & Associates
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Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

147144

Client/BILLING Information.	
Client:	Greg Phillips
Company:	GBMC & Associates
Address:	219 Brown Lane
	Bryant, AR 72022
Phone No.:	(501) 847-7077
Fax No.:	(501) 847-7943

SPECIAL INSTRUCTIONS/PRECAUTIONS:

Project Name / Number: 1078-10-070/1078-10-075

Parameters for Analysis/Methods:

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Hard, Total	Ca, Mg, K, Na	TP	CL TDS SO4 Alk.T	Dis. Cu, Zn ~~Metals~~					
1	PR-1		4/19/11	1235	W	5	Grab	X	X	X	X	X					
2	PR-2		4/19/11	1055	W	5	Grab	X	X	X	X	X					
3	PR-3		4/19/11	0945	W	3	Grab	X		X		X					
4	UT-2		4/19/11	1000	W	5	Grab	X	X	X	X	X					
5	PR-1 (Dup)		4/19/11	1240	W	5	Grab	X	X	X	X	X					
6	W001		4/19/11	1525	W	6	Grab	X	X	X	X	X					
7	FB		4/19/11	1239	W	1	Grab					X					
	Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						I,N	I,N	I,S	I	I					

Sampler(s): JJF/RAW

Shipment Method: GBMc Delivery

Turnaround Time Required: Normal

COC Completed by: Date: 4/21/11 Time: 0830

COC Checked by: Date: 4/21/11 Time: 0900

Relinquished by: Date: 4/21/11 Time: 1125

Received by: ______ Date: ______ Time: ______

Relinquished by: ______ Date: ______ Time: ______

Received in lab by: Date: 4-21-11 Time: 1125

LABORATORY USE ONLY: Samples Received On Ice? [✓ YES] or NO Sample Temperature: 2°C

V1.2 03/31/11

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

June 3, 2011
Control No. 148074

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on May 26, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:
Four (4) water sample(s) received on May 26, 2011
Tyson

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
148074-1	PR-2 5/26/11 1000	26-May-2011 1000	
148074-2	PR-1 5/26/11 1030	26-May-2011 1030	
148074-3	UT-2 5/26/11 1115	26-May-2011 1115	
148074-4	W001 5/26/11 1215	26-May-2011 1215	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 148074-1
Sample Identification: PR-2 5/26/11 1000

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**15** Analyzed: 31-May-2011 0942 by 258	1.0	**mg/l** Batch: W36362	
Total Dissolved Solids SM 2540C Prep: 31-May-2011 1652 by 292	**96** Analyzed: 01-Jun-2011 1422 by 292	10	**mg/l** Batch: W36373	
Calcium EPA 200.7 Prep: 27-May-2011 1021 by 297	**3.2** Analyzed: 02-Jun-2011 1312 by 297	0.1	**mg/l** Batch: S30191	
Magnesium EPA 200.7 Prep: 27-May-2011 1021 by 297	**2.7** Analyzed: 02-Jun-2011 1312 by 297	0.03	**mg/l** Batch: S30191	
Potassium EPA 200.7 Prep: 27-May-2011 1021 by 297	**3.2** Analyzed: 02-Jun-2011 1312 by 297	1	**mg/l** Batch: S30191	
Sodium EPA 200.7 Prep: 27-May-2011 1021 by 297	**5.2** Analyzed: 02-Jun-2011 1312 by 297	1	**mg/l** Batch: S30191	
Chloride EPA 300.0 Prep: 26-May-2011 1639 by 07	**6.7** Analyzed: 26-May-2011 2111 by 07	0.2	**mg/l** Batch: S30186	
Sulfate EPA 300.0 Prep: 26-May-2011 1639 by 07	**9.0** Analyzed: 26-May-2011 2111 by 07	0.2	**mg/l** Batch: S30186	

AIC No. 148074-2
Sample Identification: PR-1 5/26/11 1030

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**11** Analyzed: 31-May-2011 0942 by 258	1.0	**mg/l** Batch: W36362	
Total Dissolved Solids SM 2540C Prep: 31-May-2011 1652 by 292	**91** Analyzed: 01-Jun-2011 1422 by 292	10	**mg/l** Batch: W36373	
Calcium EPA 200.7 Prep: 27-May-2011 1021 by 297	**3.1** Analyzed: 02-Jun-2011 1316 by 297	0.1	**mg/l** Batch: S30191	
Magnesium EPA 200.7 Prep: 27-May-2011 1021 by 297	**2.1** Analyzed: 02-Jun-2011 1316 by 297	0.03	**mg/l** Batch: S30191	
Potassium EPA 200.7 Prep: 27-May-2011 1021 by 297	**2.4** Analyzed: 02-Jun-2011 1316 by 297	1	**mg/l** Batch: S30191	
Sodium EPA 200.7 Prep: 27-May-2011 1021 by 297	**3.2** Analyzed: 02-Jun-2011 1316 by 297	1	**mg/l** Batch: S30191	
Chloride EPA 300.0 Prep: 26-May-2011 1639 by 07	**2.8** Analyzed: 26-May-2011 2133 by 07	0.2	**mg/l** Batch: S30186	
Sulfate EPA 300.0 Prep: 26-May-2011 1639 by 07	**4.7** Analyzed: 26-May-2011 2133 by 07	0.2	**mg/l** Batch: S30186	

AIC No. 148074-3
Sample Identification: UT-2 5/26/11 1115

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**110** Analyzed: 31-May-2011 0942 by 258	1.0	**mg/l** Batch: W36362	

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ANALYTICAL RESULTS

AIC No. 148074-3 (Continued)
Sample Identification: UT-2 5/26/11 1115

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 31-May-2011 1652 by 292	**640** Analyzed: 01-Jun-2011 1422 by 292	10	**mg/l** Batch: W36373	
Calcium EPA 200.7	Prep: 27-May-2011 1021 by 297	**7.6** Analyzed: 02-Jun-2011 1319 by 297	1	**mg/l** Batch: S30191	D Dil: 10
Magnesium EPA 200.7	Prep: 27-May-2011 1021 by 297	**43** Analyzed: 02-Jun-2011 1319 by 297	0.3	**mg/l** Batch: S30191	D Dil: 10
Potassium EPA 200.7	Prep: 27-May-2011 1021 by 297	**46** Analyzed: 02-Jun-2011 1319 by 297	10	**mg/l** Batch: S30191	D Dil: 10
Sodium EPA 200.7	Prep: 27-May-2011 1021 by 297	**130** Analyzed: 02-Jun-2011 1319 by 297	10	**mg/l** Batch: S30191	D Dil: 10
Chloride EPA 300.0	Prep: 26-May-2011 1639 by 07	**160** Analyzed: 26-May-2011 2155 by 07	2	**mg/l** Batch: S30186	D Dil: 10
Sulfate EPA 300.0	Prep: 26-May-2011 1639 by 07	**160** Analyzed: 26-May-2011 2155 by 07	2	**mg/l** Batch: S30186	D Dil: 10

AIC No. 148074-4
Sample Identification: W001 5/26/11 1215

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**130** Analyzed: 31-May-2011 0942 by 258	1.0	**mg/l** Batch: W36362	
Total Dissolved Solids SM 2540C	Prep: 31-May-2011 1652 by 292	**860** Analyzed: 01-Jun-2011 1422 by 292	10	**mg/l** Batch: W36373	
Calcium EPA 200.7	Prep: 27-May-2011 1021 by 297	**6.3** Analyzed: 02-Jun-2011 1323 by 297	1	**mg/l** Batch: S30191	D Dil: 10
Magnesium EPA 200.7	Prep: 27-May-2011 1021 by 297	**58** Analyzed: 02-Jun-2011 1323 by 297	0.3	**mg/l** Batch: S30191	D Dil: 10
Potassium EPA 200.7	Prep: 27-May-2011 1021 by 297	**62** Analyzed: 02-Jun-2011 1323 by 297	10	**mg/l** Batch: S30191	D Dil: 10
Sodium EPA 200.7	Prep: 27-May-2011 1021 by 297	**170** Analyzed: 02-Jun-2011 1323 by 297	10	**mg/l** Batch: S30191	D Dil: 10
Chloride EPA 300.0	Prep: 26-May-2011 1639 by 07	**210** Analyzed: 26-May-2011 2217 by 07	2	**mg/l** Batch: S30186	D Dil: 10
Sulfate EPA 300.0	Prep: 26-May-2011 1639 by 07	**200** Analyzed: 26-May-2011 2217 by 07	2	**mg/l** Batch: S30186	D Dil: 10

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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Alkalinity as CaCO3	148074-1	15 mg/l				31May11 0942 by 258		
Batch: W36362	Duplicate	14 mg/l	2.74	20.0		31May11 0942 by 258		
Total Dissolved Solids	148045-1	220 mg/l			31May11 1652 by 292	01Jun11 1422 by 292		
Batch: W36373	Duplicate	230 mg/l	4.14	10.0	31May11 1652 by 292	01Jun11 1422 by 292		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	106	85.0-115			S30191	27May11 1022 by 297	02Jun11 1257 by 297		
Magnesium	10 mg/l	104	85.0-115			S30191	27May11 1022 by 297	02Jun11 1257 by 297		
Potassium	10 mg/l	106	85.0-115			S30191	27May11 1022 by 297	02Jun11 1257 by 297		
Sodium	10 mg/l	107	85.0-115			S30191	27May11 1022 by 297	02Jun11 1257 by 297		
Chloride	20 mg/l	104	90.0-110			S30186	26May11 1051 by 07	26May11 1123 by 07		
Sulfate	20 mg/l	105	90.0-110			S30186	26May11 1051 by 07	26May11 1123 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	148075-1	10 mg/l	-	75.0-125	S30191	27May11 1022 by 297	02Jun11 1300 by 297	10	X
	148075-1	10 mg/l	-	75.0-125	S30191	27May11 1022 by 297	02Jun11 1304 by 297	10	X
	Relative Percent Difference:		0.542	20.0	S30191				D
Magnesium	148075-1	10 mg/l	108	75.0-125	S30191	27May11 1022 by 297	02Jun11 1300 by 297	10	D
	148075-1	10 mg/l	109	75.0-125	S30191	27May11 1022 by 297	02Jun11 1304 by 297	10	D
	Relative Percent Difference:		0.734	20.0	S30191				D
Potassium	148075-1	10 mg/l	99.3	75.0-125	S30191	27May11 1022 by 297	02Jun11 1300 by 297	10	D
	148075-1	10 mg/l	106	75.0-125	S30191	27May11 1022 by 297	02Jun11 1304 by 297	10	D
	Relative Percent Difference:		1.07	20.0	S30191				D
Chloride	148045-1	20 mg/l	99.9	80.0-120	S30186	26May11 1051 by 07	26May11 1145 by 07		
	148045-1	20 mg/l	99.8	80.0-120	S30186	26May11 1051 by 07	26May11 1206 by 07		
	Relative Percent Difference:		0.00911	10.0	S30186				
Sulfate	148045-1	20 mg/l	105	80.0-120	S30186	26May11 1051 by 07	26May11 1145 by 07		
	148045-1	20 mg/l	106	80.0-120	S30186	26May11 1051 by 07	26May11 1206 by 07		
	Relative Percent Difference:		0.153	10.0	S30186				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1.0 mg/l	1.0	1	W36362-1		31May11 0942 by 258	
Total Dissolved Solids	< 10 mg/l	10	10	W36373-1	31May11 1652 by 292	01Jun11 1422 by 292	
Calcium	< 0.1 mg/l	0.1	0.1	S30191-1	27May11 1022 by 297	02Jun11 1253 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S30191-1	27May11 1022 by 297	02Jun11 1253 by 297	
Potassium	< 1 mg/l	1	1	S30191-1	27May11 1022 by 297	02Jun11 1253 by 297	
Sodium	< 1 mg/l	1	1	S30191-1	27May11 1022 by 297	02Jun11 1253 by 297	
Chloride	< 0.2 mg/l	0.2	0.2	S30186-1	26May11 1051 by 07	26May11 1100 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S30186-1	26May11 1051 by 07	26May11 1100 by 07	

148074

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

CLIENT INFORMATION		BILLING INFORMATION		SPECIAL INSTRUCTIONS/PRECAUTIONS:
Company:	Tyson	Bill To:	GBMc	Email report to jfluger@gbmcassoc.com
Project Name/No.:	49	Company:		
Send Report To:	Josh Fluger	Address:		
Address:	219 Brown Ln			Parameters for Analysis/Methods
	Bryant, AR	Phone No:		
Phone/Fax No.:		Fax No.:		

Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4, T. Alkalinity								
① PR-2		5/26/11	1000	W	2	Grab	X	X								
② PR-1		5/26/11	1030	W	2	↓	X	X								
③ UT-2		5/26/11	1115	W	2		X	X								
④ W001		5/26/11	1215	W	2		X	X								
Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						I,N	I								

Sampler(s): JSF/RHW
Shipment Method: Delivery
Turnaround Time Required: Normal

COC Completed by: Josh Fluger Date: 5/26/11 Time: 1415
COC Checked by: [illegible] Date: 5/26/11 Time: 1536

Relinquished by: Josh Fluger Date: 5/26/11 Time: 1540
Received by: Date: Time:

Relinquished by: Date: Time:
Received in lab by: [illegible] Date: 5-26-11 Time: 1540

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 05/16/11

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

June 23, 2011
Control No. 148604

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on June 17, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey By SB
John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Five (5) water sample(s) received on June 17, 2011
Tyson
4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
148604-1	PR-2 6/16/11 1005	16-Jun-2011 1005	
148604-2	PR-1 6/16/11 1030	16-Jun-2011 1030	
148604-3	UT-2 6/16/11 1100	16-Jun-2011 1100	
148604-4	W001 6/16/11 1205	16-Jun-2011 1205	
148604-5	W001 D 6/16/11 1206	16-Jun-2011 1206	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 148604-1
Sample Identification: PR-2 6/16/11 1005

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**90** Analyzed: 21-Jun-2011 1115 by 93	1	**mg/l** Batch: W36556	
Total Dissolved Solids SM 2540C	Prep: 20-Jun-2011 1700 by 292	**660** Analyzed: 21-Jun-2011 1435 by 292	10	**mg/l** Batch: W36550	
Calcium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**9.0** Analyzed: 20-Jun-2011 1745 by 297	0.1	**mg/l** Batch: S30308	
Magnesium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**43** Analyzed: 20-Jun-2011 1745 by 297	0.03	**mg/l** Batch: S30308	
Potassium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**50** Analyzed: 20-Jun-2011 1745 by 297	1	**mg/l** Batch: S30308	
Sodium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**140** Analyzed: 21-Jun-2011 1006 by 270	10	**mg/l** Batch: S30308	D Dil: 10
Chloride EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**160** Analyzed: 17-Jun-2011 1758 by 07	2	**mg/l** Batch: S30310	D Dil: 10
Sulfate EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**220** Analyzed: 17-Jun-2011 1758 by 07	2	**mg/l** Batch: S30310	D Dil: 10

AIC No. 148604-2
Sample Identification: PR-1 6/16/11 1030

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**36** Analyzed: 21-Jun-2011 1115 by 93	1	**mg/l** Batch: W36556	
Total Dissolved Solids SM 2540C	Prep: 20-Jun-2011 1700 by 292	**74** Analyzed: 21-Jun-2011 1435 by 292	10	**mg/l** Batch: W36550	
Calcium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**6.1** Analyzed: 20-Jun-2011 1747 by 297	0.1	**mg/l** Batch: S30308	
Magnesium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**4.7** Analyzed: 20-Jun-2011 1747 by 297	0.03	**mg/l** Batch: S30308	
Potassium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**3.2** Analyzed: 20-Jun-2011 1747 by 297	1	**mg/l** Batch: S30308	
Sodium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**9.0** Analyzed: 20-Jun-2011 1747 by 297	1	**mg/l** Batch: S30308	
Chloride EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**7.1** Analyzed: 17-Jun-2011 1824 by 07	0.2	**mg/l** Batch: S30310	
Sulfate EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**11** Analyzed: 17-Jun-2011 1824 by 07	0.2	**mg/l** Batch: S30310	

AIC No. 148604-3
Sample Identification: UT-2 6/16/11 1100

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**100** Analyzed: 21-Jun-2011 1115 by 93	1	**mg/l** Batch: W36556	

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ANALYTICAL RESULTS

AIC No. 148604-3 (Continued)
Sample Identification: UT-2 6/16/11 1100

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 20-Jun-2011 1700 by 292	**710** Analyzed: 21-Jun-2011 1435 by 292	10	**mg/l** Batch: W36550	
Calcium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**8.6** Analyzed: 20-Jun-2011 1750 by 297	0.1	**mg/l** Batch: S30308	
Magnesium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**40** Analyzed: 20-Jun-2011 1750 by 297	0.03	**mg/l** Batch: S30308	
Potassium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**49** Analyzed: 20-Jun-2011 1750 by 297	1	**mg/l** Batch: S30308	
Sodium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**140** Analyzed: 21-Jun-2011 1008 by 270	10	**mg/l** Batch: S30308	D Dil: 10
Chloride EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**160** Analyzed: 17-Jun-2011 1849 by 07	2	**mg/l** Batch: S30310	D Dil: 10
Sulfate EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**200** Analyzed: 17-Jun-2011 1849 by 07	2	**mg/l** Batch: S30310	D Dil: 10

AIC No. 148604-4
Sample Identification: W001 6/16/11 1205

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**100** Analyzed: 21-Jun-2011 1115 by 93	1	**mg/l** Batch: W36556	
Total Dissolved Solids SM 2540C	Prep: 20-Jun-2011 1700 by 292	**950** Analyzed: 21-Jun-2011 1435 by 292	10	**mg/l** Batch: W36550	
Calcium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**6.5** Analyzed: 20-Jun-2011 1753 by 297	0.1	**mg/l** Batch: S30308	
Magnesium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**59** Analyzed: 20-Jun-2011 1753 by 297	0.03	**mg/l** Batch: S30308	
Potassium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**66** Analyzed: 20-Jun-2011 1753 by 297	1	**mg/l** Batch: S30308	
Sodium EPA 200.7	Prep: 17-Jun-2011 1043 by 271	**170** Analyzed: 21-Jun-2011 1011 by 270	10	**mg/l** Batch: S30308	D Dil: 10
Chloride EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**220** Analyzed: 17-Jun-2011 1915 by 07	2	**mg/l** Batch: S30310	D Dil: 10
Sulfate EPA 300.0	Prep: 17-Jun-2011 1200 by 07	**320** Analyzed: 17-Jun-2011 1915 by 07	2	**mg/l** Batch: S30310	D Dil: 10

AIC No. 148604-5
Sample Identification: W001 D 6/16/11 1206

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**110** Analyzed: 21-Jun-2011 1115 by 93	1	**mg/l** Batch: W36556	

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Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 148604-5 (Continued)
Sample Identification: W001 D 6/16/11 1206

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**930**	10	**mg/l**	
SM 2540C	Prep: 20-Jun-2011 1700 by 292	Analyzed: 21-Jun-2011 1435 by 292		Batch: W36550	
Calcium		**6.6**	0.1	**mg/l**	
EPA 200.7	Prep: 17-Jun-2011 1043 by 271	Analyzed: 20-Jun-2011 1756 by 297		Batch: S30308	
Magnesium		**60**	0.03	**mg/l**	
EPA 200.7	Prep: 17-Jun-2011 1043 by 271	Analyzed: 20-Jun-2011 1756 by 297		Batch: S30308	
Potassium		**68**	1	**mg/l**	
EPA 200.7	Prep: 17-Jun-2011 1043 by 271	Analyzed: 20-Jun-2011 1756 by 297		Batch: S30308	
Sodium		**180**	10	**mg/l**	D
EPA 200.7	Prep: 17-Jun-2011 1043 by 271	Analyzed: 21-Jun-2011 1014 by 270		Batch: S30308	Dil: 10
Chloride		**220**	2	**mg/l**	D
EPA 300.0	Prep: 17-Jun-2011 1200 by 07	Analyzed: 17-Jun-2011 1941 by 07		Batch: S30310	Dil: 10
Sulfate		**320**	2	**mg/l**	D
EPA 300.0	Prep: 17-Jun-2011 1200 by 07	Analyzed: 17-Jun-2011 1941 by 07		Batch: S30310	Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		148567-1	250 mg/l			20Jun11 1700 by 292	21Jun11 1435 by 292		
	Batch: W36550	Duplicate	240 mg/l	4.50	10.0	20Jun11 1700 by 292	21Jun11 1435 by 292		
Alkalinity as CaCO3		148604-1	90 mg/l				21Jun11 1115 by 93		
	Batch: W36556	Duplicate	89 mg/l	0.782	20.0		21Jun11 1445 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	100	85.0-115			S30308	17Jun11 0851 by 271	20Jun11 1718 by 297		
Magnesium	10 mg/l	101	85.0-115			S30308	17Jun11 0851 by 271	20Jun11 1718 by 297		
Potassium	10 mg/l	101	85.0-115			S30308	17Jun11 0851 by 271	20Jun11 1718 by 297		
Sodium	10 mg/l	102	85.0-115			S30308	17Jun11 0851 by 271	20Jun11 1718 by 297		
Chloride	20 mg/l	101	90.0-110			S30310	17Jun11 1203 by 07	17Jun11 1523 by 07		
Sulfate	20 mg/l	102	90.0-110			S30310	17Jun11 1203 by 07	17Jun11 1523 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	148576-1	10 mg/l	-	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1720 by 297		X
	148576-1	10 mg/l	-	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1723 by 297		X
	Relative Percent Difference:		1.30	20.0	S30308				
Magnesium	148576-1	10 mg/l	97.4	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1720 by 297		
	148576-1	10 mg/l	103	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1723 by 297		
	Relative Percent Difference:		2.18	20.0	S30308				
Potassium	148576-1	10 mg/l	104	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1720 by 297		
	148576-1	10 mg/l	107	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1723 by 297		
	Relative Percent Difference:		2.08	20.0	S30308				
Sodium	148576-1	10 mg/l	97.3	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1720 by 297		
	148576-1	10 mg/l	101	75.0-125	S30308	17Jun11 0851 by 271	20Jun11 1723 by 297		
	Relative Percent Difference:		1.40	20.0	S30308				
Chloride	148612-1	20 mg/l	93.1	80.0-120	S30310	17Jun11 1203 by 07	17Jun11 1640 by 07		
	148612-1	20 mg/l	92.4	80.0-120	S30310	17Jun11 1203 by 07	17Jun11 1706 by 07		
	Relative Percent Difference:		0.727	10.0	S30310				
Sulfate	148612-1	20 mg/l	97.9	80.0-120	S30310	17Jun11 1203 by 07	17Jun11 1640 by 07		
	148612-1	20 mg/l	96.3	80.0-120	S30310	17Jun11 1203 by 07	17Jun11 1706 by 07		
	Relative Percent Difference:		1.09	10.0	S30310				

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Bryant, AR 72022

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W36556-1		21Jun11 1115 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W36550-1	20Jun11 1700 by 292	21Jun11 1435 by 292	
Calcium	< 0.1 mg/l	0.1	0.1	S30308-1	17Jun11 0851 by 271	20Jun11 1715 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S30308-1	17Jun11 0851 by 271	20Jun11 1715 by 297	
Potassium	< 1 mg/l	1	1	S30308-1	17Jun11 0851 by 271	20Jun11 1715 by 297	
Sodium	< 1 mg/l	1	1	S30308-1	17Jun11 0851 by 271	20Jun11 1715 by 297	
Chloride	< 0.2 mg/l	0.2	0 2	S30310-1	17Jun11 1203 by 07	17Jun11 1457 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S30310-1	17Jun11 1203 by 07	17Jun11 1457 by 07	

148604

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022

(501) 847-7077 Fax (501) 847-7943

Chain of Custody

CLIENT INFORMATION

Company: Tyson
Project Name/No.: Hg
Send Report To: JOSH FLUGER
Address: 219 Brown LN
jfluger@gbmcassoc.com
Phone/Fax No.:

BILLING INFORMATION

Bill To: GBMc
Company:
Address:
Phone No:
Fax No.:

SPECIAL INSTRUCTIONS/PRECAUTIONS:
email report to Josh Fluger

Parameters for Analysis/Methods

Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4, T. Alk								
① PR-2		6/16/11	1005	W	2	Grab	X	X								
② PR-1		6/16/11	1030	W	2		X	X								
③ UT-2		6/16/11	1100	W	2		X	X								
④ W001		6/16/11	1205	W	2		X	X								
⑤ W001D		6/16/11	1206	W	2		X	X								

Preservative (Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)

Sampler(s): JJF/RHW
Shipment Method: Delivery
Turnaround Time Required: Normal

COC Completed by: Josh Fluger Date: 6/17/11 Time: 0800
COC Checked by: Date: 6/17/11 Time: 0830
Relinquished by: Josh Fluger Date: 6/17/11 Time: 0831
Received by: Date: Time:
Relinquished by: Date: Time:
Received in lab by: Date: 6-17-11 Time: 0915

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO
Sample Temperature: 2°C

V1.2 05/16/11

AMERICAN INTERPLEX CORPORATION
LABORATORIES

July 14, 2011
Control No. 149203

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on July 8, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

By SB

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Four (4) water sample(s) received on July 8, 2011
Tyson
4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
149203-1	PR-2 7/6/11 1100	06-Jul-2011 1100	
149203-2	PR-1 7/6/11 1130	06-Jul-2011 1130	
149203-3	UT-2 7/6/11 1220	06-Jul-2011 1220	
149203-4	W001 7/6/11 1300	06-Jul-2011 1300	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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219 Brown Lane
Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 149203-1
Sample Identification: PR-2 7/6/11 1100

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**110** Analyzed: 11-Jul-2011 1442 by 93	1	**mg/l** Batch: W36738	
Total Dissolved Solids SM 2540C	Prep: 12-Jul-2011 1629 by 292	**1000** Analyzed: 14-Jul-2011 0808 by 292	10	**mg/l** Batch: W36748	
Calcium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**11** Analyzed: 10-Jul-2011 1133 by 270	0.1	**mg/l** Batch: S30421	
Magnesium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**74** Analyzed: 10-Jul-2011 1133 by 270	0.03	**mg/l** Batch: S30421	
Potassium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**53** Analyzed: 10-Jul-2011 1133 by 270	1	**mg/l** Batch: S30421	
Sodium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**160** Analyzed: 11-Jul-2011 1632 by 297	10	**mg/l** Batch: S30421	D Dil: 10
Chloride EPA 300.0	Prep: 08-Jul-2011 1725 by 270	**190** Analyzed: 10-Jul-2011 1739 by 07	2	**mg/l** Batch: S30422	D Dil: 10
Sulfate EPA 300.0	Prep: 08-Jul-2011 1725 by 270	**110** Analyzed: 10-Jul-2011 1739 by 07	2	**mg/l** Batch: S30422	D Dil: 10

AIC No. 149203-2
Sample Identification: PR-1 7/6/11 1130

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**52** Analyzed: 11-Jul-2011 1442 by 93	1	**mg/l** Batch: W36738	
Total Dissolved Solids SM 2540C	Prep: 12-Jul-2011 1629 by 292	**300** Analyzed: 14-Jul-2011 0808 by 292	10	**mg/l** Batch: W36748	
Calcium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**9.2** Analyzed: 10-Jul-2011 1137 by 270	0.1	**mg/l** Batch: S30421	
Magnesium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**18** Analyzed: 10-Jul-2011 1137 by 270	0.03	**mg/l** Batch: S30421	
Potassium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**14** Analyzed: 10-Jul-2011 1137 by 270	1	**mg/l** Batch: S30421	
Sodium EPA 200.7	Prep: 08-Jul-2011 1215 by 270	**41** Analyzed: 10-Jul-2011 1137 by 270	1	**mg/l** Batch: S30421	
Chloride EPA 300.0	Prep: 08-Jul-2011 1725 by 270	**47** Analyzed: 10-Jul-2011 1805 by 07	2	**mg/l** Batch: S30422	D Dil: 10
Sulfate EPA 300.0	Prep: 08-Jul-2011 1725 by 270	**32** Analyzed: 10-Jul-2011 1805 by 07	2	**mg/l** Batch: S30422	D Dil: 10

AIC No. 149203-3
Sample Identification: UT-2 7/6/11 1220

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**110** Analyzed: 11-Jul-2011 1442 by 93	1	**mg/l** Batch: W36738	

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ANALYTICAL RESULTS

AIC No. 149203-3 (Continued)
Sample Identification: UT-2 7/6/11 1220

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**980**	10	**mg/l**	
SM 2540C	Prep: 12-Jul-2011 1629 by 292	Analyzed: 14-Jul-2011 0808 by 292		Batch: W36748	
Calcium		**12**	0.1	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1140 by 270		Batch: S30421	
Magnesium		**68**	0.03	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1140 by 270		Batch: S30421	
Potassium		**49**	1	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1140 by 270		Batch: S30421	
Sodium		**150**	10	**mg/l**	D
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 11-Jul-2011 1635 by 297		Batch: S30421	Dil: 10
Chloride		**180**	2	**mg/l**	D
EPA 300.0	Prep: 08-Jul-2011 1725 by 270	Analyzed: 10-Jul-2011 1831 by 07		Batch: S30422	Dil: 10
Sulfate		**110**	2	**mg/l**	D
EPA 300.0	Prep: 08-Jul-2011 1725 by 270	Analyzed: 10-Jul-2011 1831 by 07		Batch: S30422	Dil: 10

AIC No. 149203-4
Sample Identification: W001 7/6/11 1300

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3		**120**	1	**mg/l**	
SM 2320B		Analyzed: 11-Jul-2011 1442 by 93		Batch: W36738	
Total Dissolved Solids		**1200**	10	**mg/l**	
SM 2540C	Prep: 12-Jul-2011 1629 by 292	Analyzed: 14-Jul-2011 0808 by 292		Batch: W36748	
Calcium		**11**	0.1	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1143 by 270		Batch: S30421	
Magnesium		**82**	0.03	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1143 by 270		Batch: S30421	
Potassium		**58**	1	**mg/l**	
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 10-Jul-2011 1143 by 270		Batch: S30421	
Sodium		**160**	10	**mg/l**	D
EPA 200.7	Prep: 08-Jul-2011 1215 by 270	Analyzed: 11-Jul-2011 1638 by 297		Batch: S30421	Dil: 10
Chloride		**210**	2	**mg/l**	D
EPA 300.0	Prep: 08-Jul-2011 1725 by 270	Analyzed: 10-Jul-2011 1857 by 07		Batch: S30422	Dil: 10
Sulfate		**120**	2	**mg/l**	D
EPA 300.0	Prep: 08-Jul-2011 1725 by 270	Analyzed: 10-Jul-2011 1857 by 07		Batch: S30422	Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Alkalinity as CaCO3		149117-7	3200 mg/l				11Jul11 1442 by 93		
	Batch: W36738	Duplicate	3200 mg/l	0.927	20.0		11Jul11 1443 by 93		
Total Dissolved Solids		149194-1	350 mg/l			12Jul11 1629 by 292	14Jul11 0808 by 292		
	Batch: W36748	Duplicate	360 mg/l	4.08	10.0	12Jul11 1630 by 292	14Jul11 0808 by 292		
Total Dissolved Solids		149194-2	260 mg/l			12Jul11 1629 by 292	14Jul11 0808 by 292		
	Batch: W36748	Duplicate	270 mg/l	3.20	10.0	12Jul11 1630 by 292	14Jul11 0852 by 292		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	107	85.0-115			S30421	08Jul11 1216 by 270	10Jul11 1057 by 270		
Magnesium	10 mg/l	108	85.0-115			S30421	08Jul11 1216 by 270	10Jul11 1057 by 270		
Potassium	10 mg/l	109	85.0-115			S30421	08Jul11 1216 by 270	10Jul11 1057 by 270		
Sodium	10 mg/l	108	85.0-115			S30421	08Jul11 1216 by 270	10Jul11 1057 by 270		
Chloride	20 mg/l	100	90.0-110			S30422	08Jul11 1726 by 270	10Jul11 1203 by 07		
Sulfate	20 mg/l	99.3	90.0-110			S30422	08Jul11 1726 by 270	10Jul11 1203 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	149194-1	10 mg/l	-	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1100 by 270		X
	149194-1	10 mg/l	-	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1103 by 270		X
	Relative Percent Difference:		0.109	20.0	S30421				
Magnesium	149194-1	10 mg/l	109	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1100 by 270		
	149194-1	10 mg/l	109	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1103 by 270		
	Relative Percent Difference:		0.0333	20.0	S30421				
Potassium	149194-1	10 mg/l	104	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1100 by 270		
	149194-1	10 mg/l	105	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1103 by 270		
	Relative Percent Difference:		0.435	20.0	S30421				
Sodium	149194-1	10 mg/l	101	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1100 by 270		
	149194-1	10 mg/l	100	75.0-125	S30421	08Jul11 1216 by 270	10Jul11 1103 by 270		
	Relative Percent Difference:		0.264	20.0	S30421				
Chloride	149194-1	20 mg/l	98.8	80.0-120	S30422	08Jul11 1726 by 270	10Jul11 1229 by 07		
	149194-1	20 mg/l	94.9	80.0-120	S30422	08Jul11 1726 by 270	10Jul11 1255 by 07		
	Relative Percent Difference:		2.98	10.0	S30422				
Sulfate	149194-1	20 mg/l	99.4	80.0-120	S30422	08Jul11 1726 by 270	10Jul11 1229 by 07		
	149194-1	20 mg/l	96.5	80.0-120	S30422	08Jul11 1726 by 270	10Jul11 1255 by 07		
	Relative Percent Difference:		2.82	10.0	S30422				

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Bryant, AR 72022

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W36738-1		11Jul11 1443 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W36748-1	12Jul11 1630 by 292	14Jul11 0808 by 292	
Calcium	< 0.1 mg/l	0.1	0.1	S30421-1	08Jul11 1216 by 270	10Jul11 1055 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S30421-1	08Jul11 1216 by 270	10Jul11 1055 by 270	
Potassium	< 1 mg/l	1	1	S30421-1	08Jul11 1216 by 270	10Jul11 1055 by 270	
Sodium	< 1 mg/l	1	1	S30421-1	08Jul11 1216 by 270	10Jul11 1055 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S30422-1	08Jul11 1726 by 270	10Jul11 1137 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S30422-1	08Jul11 1726 by 270	10Jul11 1137 by 07	

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

149203

Chain of Custody

CLIENT INFORMATION		BILLING INFORMATION		SPECIAL INSTRUCTIONS/PRECAUTIONS:
Company:	Tyson	Bill To:	GBMc	email report to Josh Flugen
Project Name/No.:	4a	Company:		w/GBMc
Send Report To:	Josh Flugen	Address:		
Address:	219 Brown Ln			Parameters for Analysis/Methods
		Phone No:		
Phone/Fax No.:		Fax No.:		

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4	T. Alkalinity							
①	PR-2		7/6/11	1100	W	2	Grab	X	X	X							
②	PR-1		7/6/11	1130	W	2	Grab	X	X	X							
③	UT-2		7/6/11	1220	W	2	Grab	X	X	X							
④	W001		7/6/11	1300	W	2	Grab	X	X	X							
	Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						I, N	I	I							

Sampler(s): JJF/JBB
Shipment Method: Delivery
Turnaround Time Required: Normal

COC Completed by: Date: 7/8/11 Time: 0830
COC Checked by: Date: 7/8/11 Time: 0845

Relinquished by: Date: 7/8/11 Time: 0846
Received by: ____ Date: ____ Time: ____

Relinquished by: ____ Date: ____ Time: ____
Received in lab by: Date: 7-8-11 Time: 0940

LABORATORY USE ONLY: Samples Received On Ice? [✓ YES] or NO
Sample Temperature: 2°C

V1.2 05/16/11

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

August 11, 2011
Control No. 149972
Page 1 of 7

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on August 4, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:
Six (6) water sample(s) received on August 4, 2011
Waldron 4g

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
149972-1	PR-1 8/2/11 1500	02-Aug-2011 1500	
149972-2	PR-2 8/2/11 1430	02-Aug-2011 1430	
149972-3	UT-2 8/2/11 1005	02-Aug-2011 1005	
149972-4	UT-2D 8/2/11 1006	02-Aug-2011 1006	
149972-5	W001 8/2/11 1130	02-Aug-2011 1130	
149972-6	PR-3 8/2/11 1545	02-Aug-2011 1545	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 149972-1
Sample Identification: PR-1 8/2/11 1500

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**100** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	
Total Dissolved Solids SM 2540C	Prep: 08-Aug-2011 1445 by 258	**810** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Calcium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**17** Analyzed: 05-Aug-2011 2342 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**47** Analyzed: 05-Aug-2011 2342 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**40** Analyzed: 05-Aug-2011 2342 by 270	1	**mg/l** Batch: S30615	
Sodium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**120** Analyzed: 05-Aug-2011 2342 by 270	1	**mg/l** Batch: S30615	
Chloride EPA 300.0	Prep: 04-Aug-2011 1429 by 07	**160** Analyzed: 04-Aug-2011 2148 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0	Prep: 04-Aug-2011 1429 by 07	**180** Analyzed: 04-Aug-2011 2148 by 07	2	**mg/l** Batch: S30604	D Dil: 10

AIC No. 149972-2
Sample Identification: PR-2 8/2/11 1430

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**120** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	
Total Dissolved Solids SM 2540C	Prep: 08-Aug-2011 1445 by 258	**730** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Sodium EPA 200.7	Prep: 05-Aug-2011 1040 by 271	**140** Analyzed: 08-Aug-2011 1555 by 297	5	**mg/l** Batch: S30615	D Dil: 5
Calcium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**9.1** Analyzed: 05-Aug-2011 2349 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**57** Analyzed: 05-Aug-2011 2349 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.8	Prep: 05-Aug-2011 1040 by 271	**51** Analyzed: 05-Aug-2011 2349 by 270	1	**mg/l** Batch: S30615	
Chloride EPA 300.0	Prep: 04-Aug-2011 1429 by 07	**170** Analyzed: 04-Aug-2011 2213 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0	Prep: 04-Aug-2011 1429 by 07	**200** Analyzed: 04-Aug-2011 2213 by 07	2	**mg/l** Batch: S30604	D Dil: 10

AIC No. 149972-3
Sample Identification: UT-2 8/2/11 1005

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**130** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	

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ANALYTICAL RESULTS

AIC No. 149972-3 (Continued)
Sample Identification: UT-2 8/2/11 1005

Analyte	Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C Prep: 08-Aug-2011 1445 by 258	**750** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Calcium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**9.7** Analyzed: 08-Aug-2011 1928 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**56** Analyzed: 08-Aug-2011 1928 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**48** Analyzed: 08-Aug-2011 1928 by 270	1	**mg/l** Batch: S30615	
Sodium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**140** Analyzed: 10-Aug-2011 1559 by 270	10	**mg/l** Batch: S30615	D Dil: 10
Chloride EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**180** Analyzed: 04-Aug-2011 2238 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**200** Analyzed: 04-Aug-2011 2238 by 07	2	**mg/l** Batch: S30604	D Dil: 10

AIC No. 149972-4
Sample Identification: UT-2D 8/2/11 1006

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**120** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	
Total Dissolved Solids SM 2540C Prep: 08-Aug-2011 1445 by 258	**740** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Calcium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**10** Analyzed: 08-Aug-2011 1932 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**55** Analyzed: 08-Aug-2011 1932 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**48** Analyzed: 08-Aug-2011 1932 by 270	1	**mg/l** Batch: S30615	
Sodium EPA 200.7 Prep: 05-Aug-2011 1040 by 271	**140** Analyzed: 08-Aug-2011 1559 by 297	5	**mg/l** Batch: S30615	D Dil: 5
Chloride EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**180** Analyzed: 04-Aug-2011 2303 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**200** Analyzed: 04-Aug-2011 2303 by 07	2	**mg/l** Batch: S30604	D Dil: 10

AIC No. 149972-5
Sample Identification: W001 8/2/11 1130

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**140** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	

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ANALYTICAL RESULTS

AIC No. 149972-5 (Continued)
Sample Identification: W001 8/2/11 1130

Analyte	Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C Prep: 08-Aug-2011 1445 by 258	**920** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Calcium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**6.8** Analyzed: 06-Aug-2011 0027 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**72** Analyzed: 06-Aug-2011 0027 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**62** Analyzed: 06-Aug-2011 0027 by 270	1	**mg/l** Batch: S30615	
Sodium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**180** Analyzed: 09-Aug-2011 1131 by 270	10	**mg/l** Batch: S30615	D Dil: 10
Chloride EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**210** Analyzed: 04-Aug-2011 2327 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**250** Analyzed: 04-Aug-2011 2327 by 07	2	**mg/l** Batch: S30604	D Dil: 10

AIC No. 149972-6
Sample Identification: PR-3 8/2/11 1545

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**110** Analyzed: 08-Aug-2011 0937 by 93	1	**mg/l** Batch: W37024	
Total Dissolved Solids SM 2540C Prep: 08-Aug-2011 1445 by 258	**600** Analyzed: 09-Aug-2011 1355 by 258	10	**mg/l** Batch: W37028	
Calcium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**14** Analyzed: 06-Aug-2011 0035 by 270	0.1	**mg/l** Batch: S30615	
Magnesium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**45** Analyzed: 06-Aug-2011 0035 by 270	0.03	**mg/l** Batch: S30615	
Potassium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**41** Analyzed: 06-Aug-2011 0035 by 270	1	**mg/l** Batch: S30615	
Sodium EPA 200.8 Prep: 05-Aug-2011 1040 by 271	**110** Analyzed: 06-Aug-2011 0035 by 270	1	**mg/l** Batch: S30615	
Chloride EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**140** Analyzed: 05-Aug-2011 0042 by 07	2	**mg/l** Batch: S30604	D Dil: 10
Sulfate EPA 300.0 Prep: 04-Aug-2011 1429 by 07	**160** Analyzed: 05-Aug-2011 0042 by 07	2	**mg/l** Batch: S30604	D Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Alkalinity as CaCO3		149972-1	100 mg/l				08Aug11 0937 by 93		
	Batch: W37024	Duplicate	100 mg/l	1.92	20.0		08Aug11 1805 by 93		
Total Dissolved Solids		149972-1	810 mg/l			08Aug11 1445 by 258	09Aug11 1355 by 258		
	Batch: W37028	Duplicate	810 mg/l	0.123	10.0	08Aug11 1445 by 258	09Aug11 1355 by 258		
Total Dissolved Solids		150002-1	1900 mg/l			08Aug11 1445 by 258	09Aug11 1355 by 258		
	Batch: W37028	Duplicate	1900 mg/l	3.72	10.0	08Aug11 1445 by 258	09Aug11 1355 by 258		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	5 mg/l	95.7	85.0-115			S30615	05Aug11 1041 by 271	05Aug11 2118 by 270		
Magnesium	5 mg/l	99.7	85.0-115			S30615	05Aug11 1041 by 271	05Aug11 2118 by 270		
Potassium	5 mg/l	102	85.0-115			S30615	05Aug11 1041 by 271	05Aug11 2118 by 270		
Sodium	5 mg/l	102	85.0-115			S30615	05Aug11 1041 by 271	05Aug11 2118 by 270		
Chloride	20 mg/l	97.1	90.0-110			S30604	04Aug11 1429 by 07	04Aug11 1511 by 07		
Sulfate	20 mg/l	98.9	90.0-110			S30604	04Aug11 1429 by 07	04Aug11 1511 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	150011-1	5 mg/l	-	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2126 by 270		X
	150011-1	5 mg/l	-	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2133 by 270		X
	Relative Percent Difference:		0.130	20.0	S30615				
Magnesium	150011-1	5 mg/l	101	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2126 by 270		
	150011-1	5 mg/l	99.9	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2133 by 270		
	Relative Percent Difference:		0.559	20.0	S30615				
Potassium	150011-1	5 mg/l	99.8	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2126 by 270		
	150011-1	5 mg/l	101	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2133 by 270		
	Relative Percent Difference:		1.26	20.0	S30615				
Sodium	150011-1	5 mg/l	-	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2126 by 270		X
	150011-1	5 mg/l	-	75.0-125	S30615	05Aug11 1041 by 271	05Aug11 2133 by 270		X
	Relative Percent Difference:		1.38	20.0	S30615				
Chloride	149962-1	20 mg/l	98.2	80.0-120	S30604	04Aug11 1429 by 07	04Aug11 1536 by 07		
	149962-1	20 mg/l	98.1	80.0-120	S30604	04Aug11 1429 by 07	04Aug11 1600 by 07		
	Relative Percent Difference:		0.116	10.0	S30604				
Sulfate	149962-1	20 mg/l	102	80.0-120	S30604	04Aug11 1429 by 07	04Aug11 1536 by 07		
	149962-1	20 mg/l	103	80.0-120	S30604	04Aug11 1429 by 07	04Aug11 1600 by 07		
	Relative Percent Difference:		0.694	10.0	S30604				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W37024-1		08Aug11 0937 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W37028-1	08Aug11 1445 by 258	09Aug11 1355 by 258	
Calcium	< 0.1 mg/l	0.1	0.1	S30615-1	05Aug11 1041 by 271	05Aug11 2110 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S30615-1	05Aug11 1041 by 271	05Aug11 2110 by 270	
Potassium	< 1 mg/l	1	1	S30615-1	05Aug11 1041 by 271	05Aug11 2110 by 270	
Sodium	< 1 mg/l	1	1	S30615-1	05Aug11 1041 by 271	05Aug11 2110 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S30604-1	04Aug11 1429 by 07	04Aug11 1446 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S30604-1	04Aug11 1429 by 07	04Aug11 1446 by 07	

GBM^c & Associates

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Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

149972

Client/BILLING Information		**SPECIAL INSTRUCTIONS/PRECAUTIONS:**
Client:	Josh Fluger	Email report to jfluger@gbmcassoc.com
Company:	GBM^c & Associates	
Address:	219 Brown Lane	
	Bryant, AR 72022	**Project Name / Number:**
Phone No.:	501-847-7077	Waldron 4S
Fax No.:	501-847-7943	

Parameters for Analysis/Methods

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4, T. Alkalinity								
1	PR-1		8/2/11	1500	W	2	G	X	X								
2	PR-2			1430	W	2	G	X	X								
3	UT-2			1005	W	2	G	X	X								
4	UT-2D			1006	W	2	G	X	X								
5	W001			1130	W	2	G	X	X								
6														Received PR-3			
	Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						I,N	I								

Sampler(s): JBB/JJF

Shipment Method: Hand Delivery

Turnaround Time Required: standard

COC Completed by: Date: 8/4/11 Time: 0925

COC Checked by: Date: 8/4/11 Time: 1010

Relinquished by: Date: 8/4/11 Time: 1051

Received by: Date: Time:

Relinquished by: Date: Time:

Received in lab by: Date: 8-4-11 Time: 1051

LABORATORY USE ONLY: **Samples Received On Ice?:** [✓ **YES**] or **NO** **Sample Temperature:** 2°C

V1.2 08/04/11

AMERICAN INTERPLEX
CORPORATION
LABORATORIES

September 14, 2011
Control No. 150940

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on September 9, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

Steve Bradford

Steve Bradford
Deputy Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Four (4) water sample(s) received on September 9, 2011
Tyson
4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
150940-1	PR-1 9/7/11 1155	07-Sep-2011 1155	
150940-2	PR-2 9/7/11 1125	07-Sep-2011 1125	
150940-3	UT-2 9/7/11 1050	07-Sep-2011 1050	
150940-4	W001 9/7/11 1015	07-Sep-2011 1015	

Qualifiers:

D Result is from a secondary dilution factor

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 150940-1
Sample Identification: PR-1 9/7/11 1155

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**55** Analyzed: 13-Sep-2011 0835 by 93	1	**mg/l** Batch: W37369	
Total Dissolved Solids SM 2540C	Prep: 12-Sep-2011 0931 by 290	**260** Analyzed: 13-Sep-2011 1649 by 290	10	**mg/l** Batch: W37358	
Calcium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**11** Analyzed: 12-Sep-2011 1435 by 270	0.1	**mg/l** Batch: S30841	
Magnesium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**15** Analyzed: 12-Sep-2011 1435 by 270	0.03	**mg/l** Batch: S30841	
Potassium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**12** Analyzed: 12-Sep-2011 1435 by 270	1	**mg/l** Batch: S30841	
Sodium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**38** Analyzed: 12-Sep-2011 1435 by 270	1	**mg/l** Batch: S30841	
Chloride EPA 300.0	Prep: 09-Sep-2011 1621 by 07	**57** Analyzed: 10-Sep-2011 1350 by 07	2	**mg/l** Batch: S30839	D Dil: 10
Sulfate EPA 300.0	Prep: 09-Sep-2011 1621 by 07	**51** Analyzed: 10-Sep-2011 1350 by 07	2	**mg/l** Batch: S30839	D Dil: 10

AIC No. 150940-2
Sample Identification: PR-2 9/7/11 1125

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**130** Analyzed: 13-Sep-2011 0835 by 93	1	**mg/l** Batch: W37369	
Total Dissolved Solids SM 2540C	Prep: 12-Sep-2011 0931 by 290	**870** Analyzed: 13-Sep-2011 1649 by 290	10	**mg/l** Batch: W37358	
Calcium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**9.5** Analyzed: 12-Sep-2011 1509 by 270	0.1	**mg/l** Batch: S30841	
Magnesium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**59** Analyzed: 12-Sep-2011 1509 by 270	0.03	**mg/l** Batch: S30841	
Potassium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**48** Analyzed: 12-Sep-2011 1509 by 270	1	**mg/l** Batch: S30841	
Sodium EPA 200.7	Prep: 10-Sep-2011 1239 by 271	**150** Analyzed: 13-Sep-2011 1421 by 270	10	**mg/l** Batch: S30841	D Dil: 10
Chloride EPA 300.0	Prep: 09-Sep-2011 1621 by 07	**190** Analyzed: 10-Sep-2011 1442 by 07	2	**mg/l** Batch: S30839	D Dil: 10
Sulfate EPA 300.0	Prep: 09-Sep-2011 1621 by 07	**200** Analyzed: 10-Sep-2011 1442 by 07	2	**mg/l** Batch: S30839	D Dil: 10

AIC No. 150940-3
Sample Identification: UT-2 9/7/11 1050

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**120** Analyzed: 13-Sep-2011 0835 by 93	1	**mg/l** Batch: W37369	

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ANALYTICAL RESULTS

AIC No. 150940-3 (Continued)
Sample Identification: UT-2 9/7/11 1050

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**780**	10	**mg/l**	
SM 2540C	Prep: 12-Sep-2011 0931 by 290	Analyzed: 13-Sep-2011 1649 by 290		Batch: W37358	
Calcium		**10**	0.1	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1512 by 270		Batch: S30841	
Magnesium		**57**	0.03	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1512 by 270		Batch: S30841	
Potassium		**46**	1	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1512 by 270		Batch: S30841	
Sodium		**140**	10	**mg/l**	D
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 13-Sep-2011 1424 by 270		Batch: S30841	Dil: 10
Chloride		**180**	2	**mg/l**	D
EPA 300.0	Prep: 09-Sep-2011 1621 by 07	Analyzed: 10-Sep-2011 1508 by 07		Batch: S30839	Dil: 10
Sulfate		**180**	2	**mg/l**	D
EPA 300.0	Prep: 09-Sep-2011 1621 by 07	Analyzed: 10-Sep-2011 1508 by 07		Batch: S30839	Dil: 10

AIC No. 150940-4
Sample Identification: W001 9/7/11 1015

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3		**160**	1	**mg/l**	
SM 2320B		Analyzed: 13-Sep-2011 0835 by 93		Batch: W37369	
Total Dissolved Solids		**1000**	20	**mg/l**	
SM 2540C	Prep: 12-Sep-2011 0931 by 290	Analyzed: 13-Sep-2011 1649 by 290		Batch: W37358	
Calcium		**7.0**	0.1	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1515 by 270		Batch: S30841	
Magnesium		**81**	0.03	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1515 by 270		Batch: S30841	
Potassium		**62**	1	**mg/l**	
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 12-Sep-2011 1515 by 270		Batch: S30841	
Sodium		**190**	10	**mg/l**	D
EPA 200.7	Prep: 10-Sep-2011 1239 by 271	Analyzed: 13-Sep-2011 1427 by 270		Batch: S30841	Dil: 10
Chloride		**230**	2	**mg/l**	D
EPA 300.0	Prep: 09-Sep-2011 1621 by 07	Analyzed: 10-Sep-2011 1533 by 07		Batch: S30839	Dil: 10
Sulfate		**250**	2	**mg/l**	D
EPA 300.0	Prep: 09-Sep-2011 1621 by 07	Analyzed: 10-Sep-2011 1533 by 07		Batch: S30839	Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		150812-1	940 mg/l			12Sep11 0931 by 290	13Sep11 1649 by 290		
	Batch: W37358	Duplicate	970 mg/l	2.87	10.0	12Sep11 0931 by 290	13Sep11 1649 by 290		
Total Dissolved Solids		150831-1	1200 mg/l			12Sep11 0931 by 290	13Sep11 1649 by 290		
	Batch: W37358	Duplicate	1100 mg/l	8.32	10.0	12Sep11 0931 by 290	13Sep11 1649 by 290		
Alkalinity as CaCO3		150885-1	130 mg/l				13Sep11 0835 by 93		
	Batch: W37369	Duplicate	130 mg/l	0.784	20.0		13Sep11 0835 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	104	85.0-115			S30841	10Sep11 1239 by 271	12Sep11 1427 by 270		
Magnesium	10 mg/l	104	85.0-115			S30841	10Sep11 1239 by 271	12Sep11 1427 by 270		
Potassium	10 mg/l	108	85.0-115			S30841	10Sep11 1239 by 271	12Sep11 1427 by 270		
Sodium	10 mg/l	106	85.0-115			S30841	10Sep11 1239 by 271	12Sep11 1427 by 270		
Chloride	20 mg/l	101	90.0-110			S30839	09Sep11 1621 by 07	10Sep11 1141 by 07		
Sulfate	20 mg/l	103	90.0-110			S30839	09Sep11 1621 by 07	10Sep11 1141 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	150940-1	10 mg/l	106	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1429 by 270		
	150940-1	10 mg/l	105	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1432 by 270		
	Relative Percent Difference:		0.594	20.0	S30841				
Magnesium	150940-1	10 mg/l	103	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1429 by 270		
	150940-1	10 mg/l	98.8	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1432 by 270		
	Relative Percent Difference:		1.73	20.0	S30841				
Potassium	150940-1	10 mg/l	109	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1429 by 270		
	150940-1	10 mg/l	108	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1432 by 270		
	Relative Percent Difference:		0.612	20.0	S30841				
Sodium	150940-1	10 mg/l	113	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1429 by 270		
	150940-1	10 mg/l	104	75.0-125	S30841	10Sep11 1239 by 271	12Sep11 1432 by 270		
	Relative Percent Difference:		1.83	20.0	S30841				
Chloride	150940-1	20 mg/l	104	80.0-120	S30839	09Sep11 1621 by 07	10Sep11 1258 by 07		
	150940-1	20 mg/l	103	80.0-120	S30839	09Sep11 1621 by 07	10Sep11 1324 by 07		
	Relative Percent Difference:		0.911	10.0	S30839				
Sulfate	150940-1	20 mg/l	104	80.0-120	S30839	09Sep11 1621 by 07	10Sep11 1258 by 07		
	150940-1	20 mg/l	103	80.0-120	S30839	09Sep11 1621 by 07	10Sep11 1324 by 07		
	Relative Percent Difference:		1.05	10.0	S30839				

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219 Brown Lane
Bryant, AR 72022

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W37369-1		13Sep11 0835 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W37358-1	12Sep11 0931 by 290	13Sep11 1649 by 290	
Calcium	< 0.1 mg/l	0.1	0.1	S30841-1	10Sep11 1239 by 271	12Sep11 1424 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S30841-1	10Sep11 1239 by 271	12Sep11 1424 by 270	
Potassium	< 1 mg/l	1	1	S30841-1	10Sep11 1239 by 271	12Sep11 1424 by 270	
Sodium	< 1 mg/l	1	1	S30841-1	10Sep11 1239 by 271	12Sep11 1424 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S30839-1	09Sep11 1621 by 07	10Sep11 1115 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S30839-1	09Sep11 1621 by 07	10Sep11 1115 by 07	

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

150940

CLIENT INFORMATION		BILLING INFORMATION		SPECIAL INSTRUCTIONS/PRECAUTIONS:
Company:	Tyson	Bill To:	GBMc	Email report to jfluger@
Project Name/No.:	49	Company:		gbmcassoc.com
Send Report To:	Josh Fluger	Address:		
Address:				Parameters for Analysis/Methods
		Phone No:		
Phone/Fax No.:		Fax No.:		

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4	T. Alkalinity
1	PR-1		9/7/11	1155	W	2	Grab	X	X	X
2	PR-2		↓	1125	W	2	↓	X	X	X
3	UT-2			1050	W	2		X	X	X
4	W001		↓	1015	W	2	↓	X	X	X
Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)							N, I	I	I

Sampler(s): JJF/JBB
Shipment Method: Delivery
Turnaround Time Required: Normal

COC Completed by: Josh Fluger Date: 9/9/11 Time: 0940
COC Checked by: Date: 9/9/11 Time: 0945
Relinquished by: Josh Fluger Date: 9/9/11 Time: 0946
Received by: Date: Time:
Relinquished by: Date: Time:
Received in lab by: Jennifer Bradford Date: 9/9/11 Time: 920

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 07/01/11

AMERICAN INTERPLEX
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LABORATORIES

November 7, 2011
Control No. 152036

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on October 20, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Five (5) water sample(s) received on October 20, 2011
Tyson
4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
152036-1	PR-1 10/19/11 1335	19-Oct-2011 1335	
152036-2	PR-2 10/19/11 1300	19-Oct-2011 1300	
152036-3	UT-2 10/19/11 1235	19-Oct-2011 1235	
152036-4	W001 10/19/11 1210	19-Oct-2011 1210	
152036-5	W001D 10/19/11 1210	19-Oct-2011 1210	

Qualifiers:

D	Result is from a secondary dilution factor
X	Spiking level is invalid due to the high concentration of analyte in the spiked sample

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 152036-1
Sample Identification: PR-1 10/19/11 1335

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**42** Analyzed: 26-Oct-2011 0907 by 93	1	**mg/l** Batch: W37810	
Total Dissolved Solids SM 2540C	Prep: 21-Oct-2011 1218 by 290	**76** Analyzed: 01-Nov-2011 1115 by 290	10	**mg/l** Batch: W37765	
Calcium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**11** Analyzed: 25-Oct-2011 1416 by 297	0.1	**mg/l** Batch: S31093	
Magnesium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**6.3** Analyzed: 25-Oct-2011 1416 by 297	0.03	**mg/l** Batch: S31093	
Potassium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**6.0** Analyzed: 25-Oct-2011 1416 by 297	1	**mg/l** Batch: S31093	
Sodium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**11** Analyzed: 25-Oct-2011 1416 by 297	1	**mg/l** Batch: S31093	
Chloride EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**16** Analyzed: 20-Oct-2011 2313 by 07	0.2	**mg/l** Batch: S31090	
Sulfate EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**17** Analyzed: 20-Oct-2011 2313 by 07	0.2	**mg/l** Batch: S31090	

AIC No. 152036-2
Sample Identification: PR-2 10/19/11 1300

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**120** Analyzed: 26-Oct-2011 0907 by 93	1	**mg/l** Batch: W37810	
Total Dissolved Solids SM 2540C	Prep: 21-Oct-2011 1218 by 290	**600** Analyzed: 24-Oct-2011 1510 by 290	10	**mg/l** Batch: W37765	
Calcium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**7.8** Analyzed: 25-Oct-2011 1419 by 297	0.1	**mg/l** Batch: S31093	
Magnesium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**36** Analyzed: 25-Oct-2011 1419 by 297	0.03	**mg/l** Batch: S31093	
Potassium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**43** Analyzed: 25-Oct-2011 1419 by 297	1	**mg/l** Batch: S31093	
Sodium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**140** Analyzed: 25-Oct-2011 1801 by 297	10	**mg/l** Batch: S31093	D Dil: 10
Chloride EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**180** Analyzed: 20-Oct-2011 2129 by 07	2	**mg/l** Batch: S31090	D Dil: 10
Sulfate EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**120** Analyzed: 20-Oct-2011 2129 by 07	2	**mg/l** Batch: S31090	D Dil: 10

AIC No. 152036-3
Sample Identification: UT-2 10/19/11 1235

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**120** Analyzed: 26-Oct-2011 0907 by 93	1	**mg/l** Batch: W37810	

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ANALYTICAL RESULTS

AIC No. 152036-3 (Continued)
Sample Identification: UT-2 10/19/11 1235

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 21-Oct-2011 1218 by 290	**730** Analyzed: 24-Oct-2011 1510 by 290	10	**mg/l** Batch: W37765	
Calcium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**8.6** Analyzed: 25-Oct-2011 1423 by 297	0.1	**mg/l** Batch: S31093	
Magnesium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**35** Analyzed: 25-Oct-2011 1423 by 297	0.03	**mg/l** Batch: S31093	
Potassium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**44** Analyzed: 25-Oct-2011 1423 by 297	1	**mg/l** Batch: S31093	
Sodium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**140** Analyzed: 25-Oct-2011 1804 by 297	10	**mg/l** Batch: S31093	D Dil: 10
Chloride EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**180** Analyzed: 20-Oct-2011 2155 by 07	2	**mg/l** Batch: S31090	D Dil: 10
Sulfate EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**110** Analyzed: 20-Oct-2011 2155 by 07	2	**mg/l** Batch: S31090	D Dil: 10

AIC No. 152036-4
Sample Identification: W001 10/19/11 1210

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**140** Analyzed: 26-Oct-2011 0907 by 93	1	**mg/l** Batch: W37810	
Total Dissolved Solids SM 2540C	Prep: 21-Oct-2011 1218 by 290	**690** Analyzed: 01-Nov-2011 1115 by 290	10	**mg/l** Batch: W37765	
Calcium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**6.1** Analyzed: 25-Oct-2011 1427 by 297	0.1	**mg/l** Batch: S31093	
Magnesium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**43** Analyzed: 25-Oct-2011 1427 by 297	0.03	**mg/l** Batch: S31093	
Potassium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**52** Analyzed: 25-Oct-2011 1427 by 297	1	**mg/l** Batch: S31093	
Sodium EPA 200.7	Prep: 21-Oct-2011 0926 by 271	**170** Analyzed: 25-Oct-2011 1806 by 297	10	**mg/l** Batch: S31093	D Dil: 10
Chloride EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**210** Analyzed: 20-Oct-2011 2221 by 07	2	**mg/l** Batch: S31090	D Dil: 10
Sulfate EPA 300.0	Prep: 20-Oct-2011 1407 by 07	**150** Analyzed: 20-Oct-2011 2221 by 07	2	**mg/l** Batch: S31090	D Dil: 10

AIC No. 152036-5
Sample Identification: W001D 10/19/11 1210

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**140** Analyzed: 26-Oct-2011 0907 by 93	1	**mg/l** Batch: W37810	

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ANALYTICAL RESULTS

AIC No. 152036-5 (Continued)
Sample Identification: W001D 10/19/11 1210

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**680**	10	**mg/l**	
SM 2540C	Prep: 21-Oct-2011 1218 by 290	Analyzed: 01-Nov-2011 1115 by 290		Batch: W37765	
Calcium		**6.1**	0.1	**mg/l**	
EPA 200.7	Prep: 21-Oct-2011 0926 by 271	Analyzed: 25-Oct-2011 1431 by 297		Batch: S31093	
Magnesium		**44**	0.03	**mg/l**	
EPA 200.7	Prep: 21-Oct-2011 0926 by 271	Analyzed: 25-Oct-2011 1431 by 297		Batch: S31093	
Potassium		**52**	1	**mg/l**	
EPA 200.7	Prep: 21-Oct-2011 0926 by 271	Analyzed: 25-Oct-2011 1431 by 297		Batch: S31093	
Sodium		**160**	10	**mg/l**	D
EPA 200.7	Prep: 21-Oct-2011 0926 by 271	Analyzed: 25-Oct-2011 1809 by 297		Batch: S31093	Dil: 10
Chloride		**210**	2	**mg/l**	D
EPA 300.0	Prep: 20-Oct-2011 1407 by 07	Analyzed: 20-Oct-2011 2247 by 07		Batch: S31090	Dil: 10
Sulfate		**150**	2	**mg/l**	D
EPA 300.0	Prep: 20-Oct-2011 1407 by 07	Analyzed: 20-Oct-2011 2247 by 07		Batch: S31090	Dil: 10

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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids	151889-1	980 mg/l			21Oct11 1218 by 290	24Oct11 1510 by 290		
Batch: W37765	Duplicate	1000 mg/l	1.61	10.0	21Oct11 1218 by 290	24Oct11 1510 by 290		
Total Dissolved Solids	151921-1	1900 mg/l			21Oct11 1218 by 290	24Oct11 1510 by 290		
Batch: W37765	Duplicate	1900 mg/l	1.00	10.0	21Oct11 1218 by 290	24Oct11 1510 by 290		
Alkalinity as CaCO3	152036-1	42 mg/l				26Oct11 0907 by 93		
Batch: W37810	Duplicate	43 mg/l	1.18	20.0		26Oct11 1550 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	97.9	85.0-115			S31093	21Oct11 0925 by 271	25Oct11 1322 by 297		
Magnesium	10 mg/l	97.2	85.0-115			S31093	21Oct11 0925 by 271	25Oct11 1322 by 297		
Potassium	10 mg/l	99.8	85.0-115			S31093	21Oct11 0925 by 271	25Oct11 1322 by 297		
Sodium	10 mg/l	99.9	85.0-115			S31093	21Oct11 0925 by 271	25Oct11 1322 by 297		
Chloride	20 mg/l	97.6	90.0-110			S31090	20Oct11 1235 by 07	20Oct11 1528 by 07		
Sulfate	20 mg/l	98.4	90.0-110			S31090	20Oct11 1235 by 07	20Oct11 1528 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	152045-1	10 mg/l	-	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1325 by 297		X
	152045-1	10 mg/l	-	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1329 by 297		X
	Relative Percent Difference:		0.00	20.0	S31093				
Magnesium	152045-1	10 mg/l	91.2	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1325 by 297		
	152045-1	10 mg/l	98.6	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1329 by 297		
	Relative Percent Difference:		7.82	20.0	S31093				
Potassium	152045-1	10 mg/l	91.2	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1325 by 297		
	152045-1	10 mg/l	116	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1329 by 297		
	Relative Percent Difference:		5.21	20.0	S31093				
Sodium	152045-1	10 mg/l	-	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1325 by 297		X
	152045-1	10 mg/l	-	75.0-125	S31093	21Oct11 0925 by 271	25Oct11 1329 by 297		X
	Relative Percent Difference:		0.00	20.0	S31093				
Chloride	152002-1	20 mg/l	97.8	80.0-120	S31090	20Oct11 1235 by 07	20Oct11 1553 by 07		
	152002-1	20 mg/l	99.4	80.0-120	S31090	20Oct11 1235 by 07	20Oct11 1619 by 07		
	Relative Percent Difference:		1.08	10.0	S31090				
Sulfate	152002-1	20 mg/l	99.7	80.0-120	S31090	20Oct11 1235 by 07	20Oct11 1553 by 07		
	152002-1	20 mg/l	102	80.0-120	S31090	20Oct11 1235 by 07	20Oct11 1619 by 07		
	Relative Percent Difference:		1.58	10.0	S31090				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W37810-1		26Oct11 0907 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W37765-1	21Oct11 1218 by 290	24Oct11 1510 by 290	
Calcium	< 0.1 mg/l	0.1	0.1	S31093-1	21Oct11 0925 by 271	25Oct11 1319 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S31093-1	21Oct11 0925 by 271	25Oct11 1319 by 297	
Potassium	< 1 mg/l	1	1	S31093-1	21Oct11 0925 by 271	25Oct11 1319 by 297	
Sodium	< 1 mg/l	1	1	S31093-1	21Oct11 0925 by 271	25Oct11 1319 by 297	
Chloride	< 0.2 mg/l	0.2	0.2	S31090-1	20Oct11 1235 by 07	20Oct11 1502 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31090-1	20Oct11 1235 by 07	20Oct11 1502 by 07	

GBMc & Associates
Strategic Environmental Services
219 Brown Ln.
Bryant, AR 72022
(501) 847-7077 Fax (501) 847-7943

Chain of Custody

152036

CLIENT INFORMATION		BILLING INFORMATION		SPECIAL INSTRUCTIONS/PRECAUTIONS:
Company:	Tyson	Bill To:	GBMc	
Project Name/No.:	49	Company:		
Send Report To:	Josh Fluger	Address:		
Address:	email			Parameters for Analysis/Methods
	jfluger@gbmcassoc.com	Phone No:		
Phone/Fax No.:		Fax No.:		

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4, T. ALK								
1	PR-1		10/19/11	1335	W	2	Grab	X	X								
2	PR-2		10/19/11	1300	W	2	↓	X	X								
3	UT-2		10/19/11	1235	W	2	↓	X	X								
4	WO01		10/19/11	1210	W	2	↓	X	X								
5	WO01D		10/19/11	1210	W	2	↓	X	X								

Preservative (Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)

Sampler(s): JF/MHW
Shipment Method: Delivery
Turnaround Time Required: Normal

COC Completed by: Date: 10/20/11 Time: 1030
COC Checked by: GD Smith Date: 10/20/2011 Time: 1140

Relinquished by: Date: 10/20/11 Time: 1141
Received by: GD Smith Date: 10/20/2011 Time: 1142

Relinquished by: GD Smith Date: 10/20/2011 Time: 1256
Received in lab by: Date: 10-20-11 Time: 1256

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 07/01/11

AMERICAN
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LABORATORIES

November 23, 2011
Control No. 152757

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on November 15, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

Steve Bradford

Steve Bradford
Deputy Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Four (4) water sample(s) received on November 15, 2011
Tyson 4g 1078

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
152757-1	PR-1 11/14/11 1255	14-Nov-2011 1255	
152757-2	PR-2 11/14/11 1225	14-Nov-2011 1225	
152757-3	UT-2 11/14/11 1320	14-Nov-2011 1320	
152757-4	W001 11/14/11 1345	14-Nov-2011 1345	

Qualifiers:

D Result is from a secondary dilution factor

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 152757-1
Sample Identification: PR-1 11/14/11 1255

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**16** Analyzed: 17-Nov-2011 0842 by 93	1	**mg/l** Batch: W38088	
Total Dissolved Solids SM 2540C	Prep: 17-Nov-2011 1102 by 290	**82** Analyzed: 23-Nov-2011 1620 by 258	10	**mg/l** Batch: W38093	
Calcium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**5.3** Analyzed: 17-Nov-2011 1142 by 297	0.1	**mg/l** Batch: S31250	
Magnesium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**3.5** Analyzed: 17-Nov-2011 1142 by 297	0.03	**mg/l** Batch: S31250	
Potassium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**3.2** Analyzed: 17-Nov-2011 1142 by 297	1	**mg/l** Batch: S31250	
Sodium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**5.6** Analyzed: 17-Nov-2011 1142 by 297	1	**mg/l** Batch: S31250	
Chloride EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**5.2** Analyzed: 15-Nov-2011 1534 by 07	0.2	**mg/l** Batch: S31244	
Sulfate EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**14** Analyzed: 15-Nov-2011 1534 by 07	0.2	**mg/l** Batch: S31244	

AIC No. 152757-2
Sample Identification: PR-2 11/14/11 1225

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**100** Analyzed: 17-Nov-2011 0842 by 93	1	**mg/l** Batch: W38088	
Total Dissolved Solids SM 2540C	Prep: 21-Nov-2011 0914 by 290	**460** Analyzed: 23-Nov-2011 1000 by 258	10	**mg/l** Batch: W38119	
Calcium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**8.3** Analyzed: 17-Nov-2011 1146 by 297	0.1	**mg/l** Batch: S31250	
Magnesium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**36** Analyzed: 17-Nov-2011 1146 by 297	0.03	**mg/l** Batch: S31250	
Potassium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**30** Analyzed: 17-Nov-2011 1146 by 297	1	**mg/l** Batch: S31250	
Sodium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**86** Analyzed: 17-Nov-2011 1146 by 297	1	**mg/l** Batch: S31250	
Chloride EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**100** Analyzed: 15-Nov-2011 1417 by 07	2	**mg/l** Batch: S31244	D Dil: 10
Sulfate EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**92** Analyzed: 15-Nov-2011 1417 by 07	2	**mg/l** Batch: S31244	D Dil: 10

AIC No. 152757-3
Sample Identification: UT-2 11/14/11 1320

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**140** Analyzed: 17-Nov-2011 0842 by 93	1	**mg/l** Batch: W38088	

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ANALYTICAL RESULTS

AIC No. 152757-3 (Continued)
Sample Identification: UT-2 11/14/11 1320

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 21-Nov-2011 0914 by 290	**730** Analyzed: 23-Nov-2011 1000 by 258	10	**mg/l** Batch: W38119	
Calcium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**10** Analyzed: 17-Nov-2011 1150 by 297	0.1	**mg/l** Batch: S31250	
Magnesium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**50** Analyzed: 17-Nov-2011 1150 by 297	0.03	**mg/l** Batch: S31250	
Potassium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**41** Analyzed: 17-Nov-2011 1150 by 297	1	**mg/l** Batch: S31250	
Sodium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**130** Analyzed: 17-Nov-2011 1457 by 270	5	**mg/l** Batch: S31250	D Dil: 5
Chloride EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**150** Analyzed: 15-Nov-2011 1442 by 07	2	**mg/l** Batch: S31244	D Dil: 10
Sulfate EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**130** Analyzed: 15-Nov-2011 1442 by 07	2	**mg/l** Batch: S31244	D Dil: 10

AIC No. 152757-4
Sample Identification: W001 11/14/11 1345

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**180** Analyzed: 17-Nov-2011 0842 by 93	1	**mg/l** Batch: W38088	
Total Dissolved Solids SM 2540C	Prep: 21-Nov-2011 0914 by 290	**880** Analyzed: 22-Nov-2011 1306 by 258	20	**mg/l** Batch: W38119	
Calcium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**9.1** Analyzed: 17-Nov-2011 1154 by 297	0.1	**mg/l** Batch: S31250	
Magnesium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**65** Analyzed: 17-Nov-2011 1154 by 297	0.03	**mg/l** Batch: S31250	
Potassium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**53** Analyzed: 17-Nov-2011 1154 by 297	1	**mg/l** Batch: S31250	
Sodium EPA 200.7	Prep: 16-Nov-2011 1152 by 297	**160** Analyzed: 17-Nov-2011 1501 by 270	5	**mg/l** Batch: S31250	D Dil: 5
Chloride EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**220** Analyzed: 15-Nov-2011 1508 by 07	2	**mg/l** Batch: S31244	D Dil: 10
Sulfate EPA 300.0	Prep: 15-Nov-2011 1335 by 07	**200** Analyzed: 15-Nov-2011 1508 by 07	2	**mg/l** Batch: S31244	D Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Alkalinity as CaCO3		152757-1	16 mg/l				17Nov11 0842 by 93		
	Batch: W38088	Duplicate	16 mg/l	0.00	20.0		17Nov11 0843 by 93		
Total Dissolved Solids		152739-1	1500 mg/l			17Nov11 1102 by 290	18Nov11 1606 by 290		
	Batch: W38093	Duplicate	1500 mg/l	0.271	10.0	17Nov11 1102 by 290	18Nov11 1606 by 290		
Total Dissolved Solids		152906-1	1400 mg/l			21Nov11 0858 by 290	21Nov11 1400 by 258		
	Batch: W38119	Duplicate	1400 mg/l	1.95	10.0	21Nov11 0858 by 290	21Nov11 1400 by 258		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	103	85.0-115			S31250	16Nov11 1152 by 297	17Nov11 1135 by 297		
Magnesium	10 mg/l	102	85.0-115			S31250	16Nov11 1152 by 297	17Nov11 1135 by 297		
Potassium	10 mg/l	105	85.0-115			S31250	16Nov11 1152 by 297	17Nov11 1135 by 297		
Sodium	10 mg/l	103	85.0-115			S31250	16Nov11 1152 by 297	17Nov11 1135 by 297		
Chloride	20 mg/l	106	90.0-110			S31244	15Nov11 1336 by 07	15Nov11 1809 by 07		
Sulfate	20 mg/l	107	90.0-110			S31244	15Nov11 1336 by 07	15Nov11 1809 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	152757-1	10 mg/l	104	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1137 by 297		
	152757-1	10 mg/l	106	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1140 by 297		
	Relative Percent Difference:		1.45	20.0	S31250				
Magnesium	152757-1	10 mg/l	103	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1137 by 297		
	152757-1	10 mg/l	104	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1140 by 297		
	Relative Percent Difference:		1.23	20.0	S31250				
Potassium	152757-1	10 mg/l	106	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1137 by 297		
	152757-1	10 mg/l	107	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1140 by 297		
	Relative Percent Difference:		0.565	20.0	S31250				
Sodium	152757-1	10 mg/l	107	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1137 by 297		
	152757-1	10 mg/l	109	75.0-125	S31250	16Nov11 1152 by 297	17Nov11 1140 by 297		
	Relative Percent Difference:		1.08	20.0	S31250				
Chloride	152752-1	20 mg/l	108	80.0-120	S31244	15Nov11 1336 by 07	15Nov11 1927 by 07		
	152752-1	20 mg/l	105	80.0-120	S31244	15Nov11 1336 by 07	15Nov11 1953 by 07		
	Relative Percent Difference:		1.85	10.0	S31244				
Sulfate	152752-1	20 mg/l	111	80.0-120	S31244	15Nov11 1336 by 07	15Nov11 1927 by 07		
	152752-1	20 mg/l	109	80.0-120	S31244	15Nov11 1336 by 07	15Nov11 1953 by 07		
	Relative Percent Difference:		1.21	10.0	S31244				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W38088-1		17Nov11 0843 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W38093-1	17Nov11 1102 by 290	18Nov11 1606 by 290	
Total Dissolved Solids	< 10 mg/l	10	10	W38119-1	21Nov11 0858 by 290	21Nov11 1400 by 258	
Calcium	< 0.1 mg/l	0.1	0.1	S31250-1	16Nov11 1152 by 297	17Nov11 1132 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S31250-1	16Nov11 1152 by 297	17Nov11 1132 by 297	
Potassium	< 1 mg/l	1	1	S31250-1	16Nov11 1152 by 297	17Nov11 1132 by 297	
Sodium	< 1 mg/l	1	1	S31250-1	16Nov11 1152 by 297	17Nov11 1132 by 297	
Chloride	< 0.2 mg/l	0.2	0.2	S31244-1	15Nov11 1336 by 07	15Nov11 1744 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31244-1	15Nov11 1336 by 07	15Nov11 1744 by 07	

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Chain of Custody

15 2757

Client/BILLING Information

Client:
Company: GBM^c & Associates
Address: 219 Brown Lane
Bryant, AR 72022
Phone No.: 501-847-7077
Fax No.: 501-847-7943

SPECIAL INSTRUCTIONS/PRECAUTIONS:

Email report to jfluger@gbmcassoc.com

Bill to GBMc

Project Name / Number: Tyson 4g 1078-

Parameters for Analysis/Methods

Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS SO4	T. Alkalinity							
1 PR-1		11/14/11	1256	W	2	Grab	X	X	X							
2 PR-2		↓	1226	↓	2	↓	X	X	X							
3 UT-2		↓	1320	↓	2	↓	X	X	X							
4 W001		↓	1345	↓	2	↓	X	X	X							
—		—		—	—	—	—	—	—							
—		—		—	—	—	—	—	—							
—		—		—	—	—	—	—	—							
—		—		—	—	—	—	—	—							
—		—		—	—	—	—	—	—							
Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						N, I	I	I							

Sampler(s): RHW / GDS
Shipment Method: GBMc Delivery
Turnaround Time Required: Normal

COC Completed by: RHW Date: 11/14/11 Time: 1645
COC Checked by: GD Smith Date: 11/15/2011 Time: 0910

Relinquished by: GD Sm Date: 11/15/2011 Time: 0940
Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Date: _____ Time: _____
Received in lab by: _____ Date: 11-15-11 Time: 0940

LABORATORY USE ONLY: **Samples Received On Ice?:** [✓ **YES**] or **NO** **Sample Temperature:** 2°C

V1.2 10/21/11

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INTERPLEX
CORPORATION
LABORATORIES

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on December 9, 2011. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

Steve Bradford

Steve Bradford
Deputy Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:
Five (5) water sample(s) received on December 9, 2011
Tyson 4g

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
153429-1	PR-2 12/8/11 1130	08-Dec-2011 1130	
153429-2	PR-1 12/8/11 1215	08-Dec-2011 1215	
153429-3	UT-2 12/8/11 1300	08-Dec-2011 1300	
153429-4	UT-2D 12/8/11 1300	08-Dec-2011 1300	
153429-5	W001 12/8/11 1415	08-Dec-2011 1415	

Qualifiers:

D	Result is from a secondary dilution factor

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 153429-1
Sample Identification: PR-2 12/8/11 1130

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**16** Analyzed: 13-Dec-2011 1015 by 302	1	**mg/l** Batch: W38322	
Total Dissolved Solids SM 2540C	Prep: 12-Dec-2011 1459 by 290	**74** Analyzed: 13-Dec-2011 1537 by 290	10	**mg/l** Batch: W38318	
Calcium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**4.1** Analyzed: 12-Dec-2011 1625 by 270	0.1	**mg/l** Batch: S31378	
Magnesium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**3.5** Analyzed: 12-Dec-2011 1625 by 270	0.03	**mg/l** Batch: S31378	
Potassium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**4.1** Analyzed: 12-Dec-2011 1625 by 270	1	**mg/l** Batch: S31378	
Sodium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**9.1** Analyzed: 12-Dec-2011 1625 by 270	1	**mg/l** Batch: S31378	
Chloride EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**10** Analyzed: 10-Dec-2011 0102 by 07	0.2	**mg/l** Batch: S31373	
Sulfate EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**8.8** Analyzed: 10-Dec-2011 0102 by 07	0.2	**mg/l** Batch: S31373	

AIC No. 153429-2
Sample Identification: PR-1 12/8/11 1215

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**7.2** Analyzed: 13-Dec-2011 1015 by 302	1	**mg/l** Batch: W38322	
Total Dissolved Solids SM 2540C	Prep: 12-Dec-2011 1459 by 290	**50** Analyzed: 13-Dec-2011 1537 by 290	10	**mg/l** Batch: W38318	
Calcium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**2.9** Analyzed: 12-Dec-2011 1628 by 270	0.1	**mg/l** Batch: S31378	
Magnesium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**2.0** Analyzed: 12-Dec-2011 1628 by 270	0.03	**mg/l** Batch: S31378	
Potassium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**2.4** Analyzed: 12-Dec-2011 1628 by 270	1	**mg/l** Batch: S31378	
Sodium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**3.2** Analyzed: 12-Dec-2011 1628 by 270	1	**mg/l** Batch: S31378	
Chloride EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**3.0** Analyzed: 10-Dec-2011 0126 by 07	0.2	**mg/l** Batch: S31373	
Sulfate EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**5.2** Analyzed: 10-Dec-2011 0126 by 07	0.2	**mg/l** Batch: S31373	

AIC No. 153429-3
Sample Identification: UT-2 12/8/11 1300

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**50** Analyzed: 13-Dec-2011 1015 by 302	1	**mg/l** Batch: W38322	

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ANALYTICAL RESULTS

AIC No. 153429-3 (Continued)
Sample Identification: UT-2 12/8/11 1300

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C	Prep: 12-Dec-2011 1459 by 290	**180** Analyzed: 13-Dec-2011 1537 by 290	10	**mg/l** Batch: W38318	
Calcium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**8.4** Analyzed: 12-Dec-2011 1631 by 270	0.1	**mg/l** Batch: S31378	
Magnesium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**9.0** Analyzed: 12-Dec-2011 1631 by 270	0.03	**mg/l** Batch: S31378	
Potassium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**10** Analyzed: 12-Dec-2011 1631 by 270	1	**mg/l** Batch: S31378	
Sodium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**29** Analyzed: 12-Dec-2011 1631 by 270	1	**mg/l** Batch: S31378	
Chloride EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**36** Analyzed: 10-Dec-2011 0150 by 07	0.2	**mg/l** Batch: S31373	
Sulfate EPA 300.0	Prep: 09-Dec-2011 1316 by 07	**22** Analyzed: 10-Dec-2011 0150 by 07	0.2	**mg/l** Batch: S31373	

AIC No. 153429-4
Sample Identification: UT-2D 12/8/11 1300

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**47** Analyzed: 13-Dec-2011 1015 by 302	1	**mg/l** Batch: W38322	
Total Dissolved Solids SM 2540C	Prep: 12-Dec-2011 1459 by 290	**170** Analyzed: 13-Dec-2011 1537 by 290	20	**mg/l** Batch: W38318	
Calcium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**8.6** Analyzed: 12-Dec-2011 1634 by 270	0.1	**mg/l** Batch: S31378	
Magnesium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**9.2** Analyzed: 12-Dec-2011 1634 by 270	0.03	**mg/l** Batch: S31378	
Potassium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**11** Analyzed: 12-Dec-2011 1634 by 270	1	**mg/l** Batch: S31378	
Sodium EPA 200.7	Prep: 12-Dec-2011 1039 by 271	**30** Analyzed: 12-Dec-2011 1634 by 270	1	**mg/l** Batch: S31378	
Chloride EPA 300.0	Prep: 09-Dec-2011 1358 by 07	**35** Analyzed: 10-Dec-2011 0213 by 07	0.2	**mg/l** Batch: S31374	
Sulfate EPA 300.0	Prep: 09-Dec-2011 1358 by 07	**21** Analyzed: 10-Dec-2011 0213 by 07	0.2	**mg/l** Batch: S31374	

AIC No. 153429-5
Sample Identification: W001 12/8/11 1415

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**200** Analyzed: 13-Dec-2011 1015 by 302	1	**mg/l** Batch: W38322	

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ANALYTICAL RESULTS

AIC No. 153429-5 (Continued)
Sample Identification: W001 12/8/11 1415

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**770**	10	**mg/l**	
SM 2540C	Prep: 12-Dec-2011 1459 by 290	Analyzed: 13-Dec-2011 1537 by 290		Batch: W38318	
Calcium		**14**	0.1	**mg/l**	
EPA 200.7	Prep: 12-Dec-2011 1039 by 271	Analyzed: 12-Dec-2011 1637 by 270		Batch: S31378	
Magnesium		**61**	0.03	**mg/l**	
EPA 200.7	Prep: 12-Dec-2011 1039 by 271	Analyzed: 12-Dec-2011 1637 by 270		Batch: S31378	
Potassium		**52**	1	**mg/l**	
EPA 200.7	Prep: 12-Dec-2011 1039 by 271	Analyzed: 12-Dec-2011 1637 by 270		Batch: S31378	
Sodium		**160**	10	**mg/l**	D
EPA 200.7	Prep: 12-Dec-2011 1039 by 271	Analyzed: 13-Dec-2011 1254 by 270		Batch: S31378	Dil: 10
Chloride		**200**	2	**mg/l**	D
EPA 300.0	Prep: 09-Dec-2011 1358 by 07	Analyzed: 10-Dec-2011 0237 by 07		Batch: S31374	Dil: 10
Sulfate		**110**	2	**mg/l**	D
EPA 300.0	Prep: 09-Dec-2011 1358 by 07	Analyzed: 10-Dec-2011 0237 by 07		Batch: S31374	Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		153356-1	1300 mg/l			12Dec11 1459 by 290	13Dec11 1537 by 290		
	Batch: W38318	Duplicate	1300 mg/l	0.770	10.0	12Dec11 1459 by 290	13Dec11 1537 by 290		
Total Dissolved Solids		153429-4	170 mg/l			12Dec11 1459 by 290	13Dec11 1537 by 290		
	Batch: W38318	Duplicate	760 mg/l	0.784	10.0	12Dec11 1459 by 290	13Dec11 1537 by 290		
Alkalinity as CaCO3		153429-1	16 mg/l				13Dec11 1015 by 302		
	Batch: W38322	Duplicate	16 mg/l	2.45	20.0		13Dec11 1015 by 302		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	103	85.0-115			S31378	12Dec11 1039 by 271	12Dec11 1618 by 270		
Magnesium	10 mg/l	102	85.0-115			S31378	12Dec11 1039 by 271	12Dec11 1618 by 270		
Potassium	10 mg/l	105	85.0-115			S31378	12Dec11 1039 by 271	12Dec11 1618 by 270		
Sodium	10 mg/l	106	85.0-115			S31378	12Dec11 1039 by 271	12Dec11 1618 by 270		
Chloride	20 mg/l	99.3	90.0-110			S31373	09Dec11 1315 by 07	09Dec11 1407 by 07		
Chloride	20 mg/l	102	90.0-110			S31374	09Dec11 1401 by 07	10Dec11 0500 by 07		
Sulfate	20 mg/l	98.5	90.0-110			S31373	09Dec11 1315 by 07	09Dec11 1407 by 07		
Sulfate	20 mg/l	100	90.0-110			S31374	09Dec11 1401 by 07	10Dec11 0500 by 07		

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MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	153429-1	10 mg/l	107	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1620 by 270		
	153429-1	10 mg/l	103	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1623 by 270		
	Relative Percent Difference:		3.00	20.0	S31378				
Magnesium	153429-1	10 mg/l	105	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1620 by 270		
	153429-1	10 mg/l	101	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1623 by 270		
	Relative Percent Difference:		2.87	20.0	S31378				
Potassium	153429-1	10 mg/l	109	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1620 by 270		
	153429-1	10 mg/l	106	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1623 by 270		
	Relative Percent Difference:		2.47	20.0	S31378				
Sodium	153429-1	10 mg/l	112	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1620 by 270		
	153429-1	10 mg/l	107	75.0-125	S31378	12Dec11 1039 by 271	12Dec11 1623 by 270		
	Relative Percent Difference:		2.77	20.0	S31378				
Chloride	153425-1	20 mg/l	96.3	80.0-120	S31373	09Dec11 1315 by 07	09Dec11 1431 by 07		
	153425-1	20 mg/l	98.2	80.0-120	S31373	09Dec11 1315 by 07	09Dec11 1455 by 07		
	Relative Percent Difference:		1.81	10.0	S31373				
Chloride	153426-1	20 mg/l	104	80.0-120	S31374	09Dec11 1401 by 07	10Dec11 0524 by 07		
	153426-1	20 mg/l	105	80.0-120	S31374	09Dec11 1401 by 07	10Dec11 0548 by 07		
	Relative Percent Difference:		0.850	10.0	S31374				
Sulfate	153425-1	20 mg/l	95.2	80.0-120	S31373	09Dec11 1315 by 07	09Dec11 1431 by 07		
	153425-1	20 mg/l	97.3	80.0-120	S31373	09Dec11 1315 by 07	09Dec11 1455 by 07		
	Relative Percent Difference:		1.99	10.0	S31373				
Sulfate	153426-1	20 mg/l	103	80.0-120	S31374	09Dec11 1401 by 07	10Dec11 0524 by 07		
	153426-1	20 mg/l	104	80.0-120	S31374	09Dec11 1401 by 07	10Dec11 0548 by 07		
	Relative Percent Difference:		1.52	10.0	S31374				

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W38322-1		13Dec11 1015 by 302	
Total Dissolved Solids	< 10 mg/l	10	10	W38318-1	12Dec11 1459 by 290	13Dec11 1537 by 290	
Calcium	< 0.1 mg/l	0.1	0.1	S31378-1	12Dec11 1039 by 271	12Dec11 1614 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S31378-1	12Dec11 1039 by 271	12Dec11 1614 by 270	
Potassium	< 1 mg/l	1	1	S31378-1	12Dec11 1039 by 271	12Dec11 1614 by 270	
Sodium	< 1 mg/l	1	1	S31378-1	12Dec11 1039 by 271	12Dec11 1614 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S31373-1	09Dec11 1315 by 07	09Dec11 1343 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31373-1	09Dec11 1315 by 07	09Dec11 1343 by 07	
Chloride	< 0.2 mg/l	0.2	0.2	S31374-1	09Dec11 1401 by 07	10Dec11 0436 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31374-1	09Dec11 1401 by 07	10Dec11 0436 by 07	

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Chain of Custody

153429

Client/BILLING Information	
Client:	GBMc
Company:	GBM^c & Associates
Address:	219 Brown Lane
	Bryant, AR 72022
Phone No.:	501-847-7077
Fax No.:	501-847-7943

SPECIAL INSTRUCTIONS/PRECAUTIONS:
email report to jfluger@gbmcassoc.com
call JOSH FLUGER w/ GBMc w/ any questions

Project Name / Number: Tyson UG

Parameters for Analysis/Methods

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4	T. Alkalinity
1	PR-2		12/8/11	1130	W	2	G	X	X	X
2	PR-1		↓	1215	W	2	G	X	X	X
3	UT-2			1300	W	2	G	X	X	X
A	UT-2D			1300	W	2	G	X	X	X
5	W001			1415	W	2	G	X	X	X
Preservative (Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)								N, I	I	I

Sampler(s): JSF/GYB
Shipment Method: GBMc Delivery
Turnaround Time Required: Normal
COC Completed by: Josh Fluger Date: 12/8/11 Time: 1615
COC Checked by: Date: 12/9/11 Time: 0815
Relinquished by: Date: 12/9/11 Time: 1010
Received by: ______ Date: ______ Time: ______
Relinquished by: ______ Date: ______ Time: ______
Received in lab by: Date: 12-9-11 Time: 1010

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 12/08/11

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40
1972 2012

GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on January 25, 2012. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Four (4) water sample(s) received on January 25, 2012
Waldron 4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
154645-1	PR-2 1/24/12 1130	24-Jan-2012 1130	
154645-2	PR-1 1/24/12 1210	24-Jan-2012 1210	
154645-3	UT-2 1/24/12 1240	24-Jan-2012 1240	
154645-4	W001 1/24/12 1305	24-Jan-2012 1305	

Qualifiers:

D Result is from a secondary dilution factor

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 154645-1
Sample Identification: PR-2 1/24/12 1130

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**43** Analyzed: 30-Jan-2012 1001 by 93	1	**mg/l** Batch: W38809	
Total Dissolved Solids SM 2540C Prep: 26-Jan-2012 1337 by 285	**160** Analyzed: 30-Jan-2012 0931 by 285	10	**mg/l** Batch: W38773	
Calcium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**5.0** Analyzed: 25-Jan-2012 2039 by 270	0.1	**mg/l** Batch: S31668	
Magnesium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**11** Analyzed: 25-Jan-2012 2039 by 270	0.03	**mg/l** Batch: S31668	
Potassium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**9.1** Analyzed: 25-Jan-2012 2039 by 270	1	**mg/l** Batch: S31668	
Sodium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**29** Analyzed: 25-Jan-2012 2039 by 270	1	**mg/l** Batch: S31668	
Chloride EPA 300.0 Prep: 26-Jan-2012 1748 by 07	**40** Analyzed: 27-Jan-2012 0741 by 07	0.2	**mg/l** Batch: S31683	
Sulfate EPA 300.0 Prep: 26-Jan-2012 1748 by 07	**39** Analyzed: 27-Jan-2012 0741 by 07	0.2	**mg/l** Batch: S31683	

AIC No. 154645-2
Sample Identification: PR-1 1/24/12 1210

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**16** Analyzed: 30-Jan-2012 1001 by 93	1	**mg/l** Batch: W38809	
Total Dissolved Solids SM 2540C Prep: 26-Jan-2012 1337 by 285	**44** Analyzed: 30-Jan-2012 0931 by 285	10	**mg/l** Batch: W38773	
Calcium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**4.5** Analyzed: 25-Jan-2012 2042 by 270	0.1	**mg/l** Batch: S31668	
Magnesium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**3.2** Analyzed: 25-Jan-2012 2042 by 270	0.03	**mg/l** Batch: S31668	
Potassium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**2.0** Analyzed: 25-Jan-2012 2042 by 270	1	**mg/l** Batch: S31668	
Sodium EPA 200.7 Prep: 25-Jan-2012 1101 by 297	**6.7** Analyzed: 25-Jan-2012 2042 by 270	1	**mg/l** Batch: S31668	
Chloride EPA 300.0 Prep: 26-Jan-2012 1748 by 07	**6.8** Analyzed: 27-Jan-2012 0802 by 07	0.2	**mg/l** Batch: S31683	
Sulfate EPA 300.0 Prep: 26-Jan-2012 1748 by 07	**12** Analyzed: 27-Jan-2012 0802 by 07	0.2	**mg/l** Batch: S31683	

AIC No. 154645-3
Sample Identification: UT-2 1/24/12 1240

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**130** Analyzed: 30-Jan-2012 1001 by 93	1	**mg/l** Batch: W38809	

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ANALYTICAL RESULTS

AIC No. 154645-3 (Continued)
Sample Identification: UT-2 1/24/12 1240

Analyte	Result	RL	Units	Qualifier
Total Dissolved Solids	**560**	10	**mg/l**	
SM 2540C Prep: 26-Jan-2012 1337 by 285	Analyzed: 30-Jan-2012 0931 by 285		Batch: W38773	
Calcium	**7.5**	0.1	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2045 by 270		Batch: S31668	
Magnesium	**41**	0.03	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2045 by 270		Batch: S31668	
Potassium	**38**	1	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2045 by 270		Batch: S31668	
Sodium	**130**	10	**mg/l**	D
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 26-Jan-2012 1201 by 270		Batch: S31668	Dil: 10
Chloride	**170**	2	**mg/l**	D
EPA 300.0 Prep: 26-Jan-2012 1748 by 07	Analyzed: 27-Jan-2012 0824 by 07		Batch: S31683	Dil: 10
Sulfate	**140**	2	**mg/l**	D
EPA 300.0 Prep: 26-Jan-2012 1748 by 07	Analyzed: 27-Jan-2012 0824 by 07		Batch: S31683	Dil: 10

AIC No. 154645-4
Sample Identification: W001 1/24/12 1305

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3	**170**	1	**mg/l**	
SM 2320B	Analyzed: 30-Jan-2012 1001 by 93		Batch: W38809	
Total Dissolved Solids	**780**	20	**mg/l**	
SM 2540C Prep: 26-Jan-2012 1337 by 285	Analyzed: 30-Jan-2012 0931 by 285		Batch: W38773	
Calcium	**5.4**	0.1	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2049 by 270		Batch: S31668	
Magnesium	**63**	0.03	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2049 by 270		Batch: S31668	
Potassium	**55**	1	**mg/l**	
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 25-Jan-2012 2049 by 270		Batch: S31668	
Sodium	**170**	10	**mg/l**	D
EPA 200.7 Prep: 25-Jan-2012 1101 by 297	Analyzed: 26-Jan-2012 1204 by 270		Batch: S31668	Dil: 10
Chloride	**240**	2	**mg/l**	D
EPA 300.0 Prep: 26-Jan-2012 1748 by 07	Analyzed: 27-Jan-2012 0846 by 07		Batch: S31683	Dil: 10
Sulfate	**230**	2	**mg/l**	D
EPA 300.0 Prep: 26-Jan-2012 1748 by 07	Analyzed: 27-Jan-2012 0846 by 07		Batch: S31683	Dil: 10

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DUPLICATE RESULTS

Analyte	AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids	154645-1	160 mg/l			26Jan12 1337 by 285	30Jan12 0931 by 285		
Batch: W38773	Duplicate	160 mg/l	0.643	10.0	26Jan12 1337 by 285	30Jan12 0931 by 285		
Total Dissolved Solids	154645-2	44 mg/l			26Jan12 1337 by 285	30Jan12 0931 by 285		
Batch: W38773	Duplicate	43 mg/l	2.30	10.0	26Jan12 1337 by 285	30Jan12 0931 by 285		
Alkalinity as CaCO3	154645-1	43 mg/l				30Jan12 1001 by 93		
Batch: W38809	Duplicate	42 mg/l	1.18	20.0		30Jan12 1059 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	101	85.0-115			S31668	25Jan12 1101 by 297	25Jan12 2030 by 270		
Magnesium	10 mg/l	99.8	85.0-115			S31668	25Jan12 1101 by 297	25Jan12 2030 by 270		
Potassium	10 mg/l	89.7	85.0-115			S31668	25Jan12 1101 by 297	25Jan12 2030 by 270		
Sodium	10 mg/l	101	85.0-115			S31668	25Jan12 1101 by 297	25Jan12 2030 by 270		
Chloride	20 mg/l	108	90.0-110			S31683	26Jan12 1611 by 07	27Jan12 0130 by 07		
Sulfate	20 mg/l	105	90.0-110			S31683	26Jan12 1611 by 07	27Jan12 0130 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	154645-1	10 mg/l	96.6	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2033 by 270		
	154645-1	10 mg/l	101	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2036 by 270		
	Relative Percent Difference:		3.32	20.0	S31668				
Magnesium	154645-1	10 mg/l	90.6	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2033 by 270		
	154645-1	10 mg/l	95.1	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2036 by 270		
	Relative Percent Difference:		2.21	20.0	S31668				
Potassium	154645-1	10 mg/l	98.4	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2033 by 270		
	154645-1	10 mg/l	99.7	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2036 by 270		
	Relative Percent Difference:		0.715	20.0	S31668				
Sodium	154645-1	10 mg/l	89.9	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2033 by 270		
	154645-1	10 mg/l	97.4	75.0-125	S31668	25Jan12 1101 by 297	25Jan12 2036 by 270		
	Relative Percent Difference:		2.02	20.0	S31668				
Chloride	154680-1	20 mg/l	111	80.0-120	S31683	26Jan12 1611 by 07	27Jan12 0151 by 07		
	154680-1	20 mg/l	110	80.0-120	S31683	26Jan12 1611 by 07	27Jan12 0213 by 07		
	Relative Percent Difference:		0.132	10.0	S31683				
Sulfate	154680-1	20 mg/l	109	80.0-120	S31683	26Jan12 1611 by 07	27Jan12 0151 by 07		
	154680-1	20 mg/l	108	80.0-120	S31683	26Jan12 1611 by 07	27Jan12 0213 by 07		
	Relative Percent Difference:		0.561	10.0	S31683				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W38809-3		30Jan12 1059 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W38773-1	26Jan12 1337 by 285	30Jan12 0931 by 285	
Calcium	< 0.1 mg/l	0.1	0.1	S31668-1	25Jan12 1101 by 297	25Jan12 2027 by 270	
Magnesium	< 0.03 mg/l	0.03	0.03	S31668-1	25Jan12 1101 by 297	25Jan12 2027 by 270	
Potassium	< 1 mg/l	1	1	S31668-1	25Jan12 1101 by 297	25Jan12 2027 by 270	
Sodium	< 1 mg/l	1	1	S31668-1	25Jan12 1101 by 297	25Jan12 2027 by 270	
Chloride	< 0.2 mg/l	0.2	0.2	S31683-1	26Jan12 1611 by 07	27Jan12 0108 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31683-1	26Jan12 1611 by 07	27Jan12 0108 by 07	

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Chain of Custody

154645

Client/BILLING Information		**SPECIAL INSTRUCTIONS/PRECAUTIONS:**
Client:	Josh Fluger	Email report to jfluger@gbmcassoc.com
Company:	GBM^c & Associates	
Address:	219 Brown Lane	
	Bryant, AR 72022	**Project Name / Number:**
Phone No.:	501-847-7077	waldron 4S
Fax No.:	501-847-7943	

Parameters for Analysis/Methods

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4, T. Alkalinity								
1	PR-2		1/24/12	1130	W	2	G	X	X								
2	PR-1		1/24/12	1210	W	2	G	X	X								
3	UT-2		1/24/12	1240	W	2	G	X	X								
4	W001		1/24/12	1305	W	2	G	X	X								
Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)							I,N	I								

Sampler(s): JGB/JST

Shipment Method: Hand Delivery

Turnaround Time Required: Standard

COC Completed by: Date: 1/25/12 Time: 0830

COC Checked by: Date: 1-25-12 Time: 0940

Relinquished by: Date: 1-25-12 Time: 0917

Received by: ____ Date: ____ Time: ____

Relinquished by: ____ Date: ____ Time: ____

Received in lab by: Date: 1-25-12 Time: 0917

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO Sample Temperature: 2°C

V1.2 01/25/12

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GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
219 Brown Lane
Bryant, AR 72022

This report contains the analytical results and supporting information for samples submitted on February 22, 2012. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: GBMc & Associates, Inc.
ATTN: Mr. Josh Fluger
jfluger@gbmcassoc.com

GBMc & Associates, Inc.
219 Brown Lane
Bryant, AR 72022

SAMPLE INFORMATION

Project Description:

Five (5) water sample(s) received on February 22, 2012
Tyson 4g

Receipt Details:

A Chain of Custody was provided. The samples were delivered in one (1) ice chest.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
155454-1	PR-2 2/21/12 0950	21-Feb-2012 0950	
155454-2	PR-1 2/21/12 1020	21-Feb-2012 1020	
155454-3	UT-2 2/21/12 1055	21-Feb-2012 1055	
155454-4	UT-2D 2/21/12 1100	21-Feb-2012 1100	
155454-5	W001 2/21/12 1150	21-Feb-2012 1150	

Qualifiers:

D Result is from a secondary dilution factor

References:

"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", 20th edition, 1998.
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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219 Brown Lane
Bryant, AR 72022

ANALYTICAL RESULTS

AIC No. 155454-1
Sample Identification: PR-2 2/21/12 0950

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**25** Analyzed: 28-Feb-2012 0936 by 93	1	**mg/l** Batch: W39061	
Total Dissolved Solids SM 2540C	Prep: 27-Feb-2012 0942 by 285	**88** Analyzed: 28-Feb-2012 1420 by 285	10	**mg/l** Batch: W39048	
Calcium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**4.5** Analyzed: 23-Feb-2012 1053 by 297	0.1	**mg/l** Batch: S31861	
Magnesium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**4.8** Analyzed: 23-Feb-2012 1053 by 297	0.03	**mg/l** Batch: S31861	
Potassium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**3.8** Analyzed: 23-Feb-2012 1053 by 297	1	**mg/l** Batch: S31861	
Sodium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**12** Analyzed: 23-Feb-2012 1053 by 297	1	**mg/l** Batch: S31861	
Chloride EPA 300.0	Prep: 22-Feb-2012 1500 by 07	**15** Analyzed: 22-Feb-2012 1808 by 07	0.2	**mg/l** Batch: S31871	
Sulfate EPA 300.0	Prep: 22-Feb-2012 1500 by 07	**20** Analyzed: 22-Feb-2012 1808 by 07	0.2	**mg/l** Batch: S31871	

AIC No. 155454-2
Sample Identification: PR-1 2/21/12 1020

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B		**15** Analyzed: 28-Feb-2012 0936 by 93	1	**mg/l** Batch: W39061	
Total Dissolved Solids SM 2540C	Prep: 27-Feb-2012 0942 by 285	**67** Analyzed: 28-Feb-2012 1420 by 285	10	**mg/l** Batch: W39048	
Calcium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**4.4** Analyzed: 27-Feb-2012 1617 by 297	0.1	**mg/l** Batch: S31861	
Magnesium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**3.2** Analyzed: 27-Feb-2012 1617 by 297	0.03	**mg/l** Batch: S31861	
Potassium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**2.0** Analyzed: 27-Feb-2012 1617 by 297	1	**mg/l** Batch: S31861	
Sodium EPA 200.7	Prep: 22-Feb-2012 1125 by 295	**6.6** Analyzed: 27-Feb-2012 1617 by 297	1	**mg/l** Batch: S31861	
Chloride EPA 300.0	Prep: 22-Feb-2012 1500 by 07	**6.4** Analyzed: 22-Feb-2012 1831 by 07	0.2	**mg/l** Batch: S31871	
Sulfate EPA 300.0	Prep: 22-Feb-2012 1500 by 07	**13** Analyzed: 22-Feb-2012 1831 by 07	0.2	**mg/l** Batch: S31871	

AIC No. 155454-3
Sample Identification: UT-2 2/21/12 1055

Analyte	Result	RL	Units	Qualifier
Alkalinity as CaCO3 SM 2320B	**72** Analyzed: 28-Feb-2012 0936 by 93	1	**mg/l** Batch: W39061	

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ANALYTICAL RESULTS

AIC No. 155454-3 (Continued)
Sample Identification: UT-2 2/21/12 1055

Analyte		Result	RL	Units	Qualifier
Total Dissolved Solids		**320**	10	**mg/l**	
SM 2540C	Prep: 27-Feb-2012 0942 by 285	Analyzed: 28-Feb-2012 1420 by 285		Batch: W39048	
Calcium		**8.1**	0.1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1621 by 297		Batch: S31861	
Magnesium		**18**	0.03	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1621 by 297		Batch: S31861	
Potassium		**19**	1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1621 by 297		Batch: S31861	
Sodium		**55**	1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1621 by 297		Batch: S31861	
Chloride		**78**	2	**mg/l**	D
EPA 300.0	Prep: 22-Feb-2012 1500 by 07	Analyzed: 22-Feb-2012 2007 by 07		Batch: S31871	Dil: 10
Sulfate		**75**	2	**mg/l**	D
EPA 300.0	Prep: 22-Feb-2012 1500 by 07	Analyzed: 22-Feb-2012 2007 by 07		Batch: S31871	Dil: 10

AIC No. 155454-4
Sample Identification: UT-2D 2/21/12 1100

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3		**71**	1	**mg/l**	
SM 2320B		Analyzed: 28-Feb-2012 0936 by 93		Batch: W39061	
Total Dissolved Solids		**310**	10	**mg/l**	
SM 2540C	Prep: 27-Feb-2012 0942 by 285	Analyzed: 28-Feb-2012 1420 by 285		Batch: W39048	
Calcium		**8.9**	0.1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1626 by 297		Batch: S31861	
Magnesium		**19**	0.03	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1626 by 297		Batch: S31861	
Potassium		**19**	1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1626 by 297		Batch: S31861	
Sodium		**56**	1	**mg/l**	
EPA 200.7	Prep: 22-Feb-2012 1125 by 295	Analyzed: 27-Feb-2012 1626 by 297		Batch: S31861	
Chloride		**74**	2	**mg/l**	D
EPA 300.0	Prep: 22-Feb-2012 1500 by 07	Analyzed: 22-Feb-2012 2031 by 07		Batch: S31871	Dil: 10
Sulfate		**70**	2	**mg/l**	D
EPA 300.0	Prep: 22-Feb-2012 1500 by 07	Analyzed: 22-Feb-2012 2031 by 07		Batch: S31871	Dil: 10

AIC No. 155454-5
Sample Identification: W001 2/21/12 1150

Analyte		Result	RL	Units	Qualifier
Alkalinity as CaCO3		**160**	1	**mg/l**	
SM 2320B		Analyzed: 28-Feb-2012 0936 by 93		Batch: W39061	

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ANALYTICAL RESULTS

AIC No. 155454-5 (Continued)
Sample Identification: W001 2/21/12 1150

Analyte	Result	RL	Units	Qualifier
Total Dissolved Solids SM 2540C Prep: 27-Feb-2012 0942 by 285	**810** Analyzed: 28-Feb-2012 1420 by 285	10	**mg/l** Batch: W39048	
Calcium EPA 200.7 Prep: 22-Feb-2012 1125 by 295	**5.3** Analyzed: 27-Feb-2012 1630 by 297	0.1	**mg/l** Batch: S31861	
Magnesium EPA 200.7 Prep: 22-Feb-2012 1125 by 295	**62** Analyzed: 27-Feb-2012 1630 by 297	0.03	**mg/l** Batch: S31861	
Potassium EPA 200.7 Prep: 22-Feb-2012 1125 by 295	**55** Analyzed: 27-Feb-2012 1630 by 297	1	**mg/l** Batch: S31861	
Sodium EPA 200.7 Prep: 22-Feb-2012 1125 by 295	**160** Analyzed: 28-Feb-2012 0927 by 297	10	**mg/l** Batch: S31861	D Dil: 10
Chloride EPA 300.0 Prep: 22-Feb-2012 1500 by 07	**200** Analyzed: 22-Feb-2012 2054 by 07	2	**mg/l** Batch: S31871	D Dil: 10
Sulfate EPA 300.0 Prep: 22-Feb-2012 1500 by 07	**210** Analyzed: 22-Feb-2012 2054 by 07	2	**mg/l** Batch: S31871	D Dil: 10

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DUPLICATE RESULTS

Analyte		AIC No.	Result	RPD	RPD Limit	Preparation Date	Analysis Date	Dil	Qual
Total Dissolved Solids		155450-1	1800 mg/l			27Feb12 0942 by 285	28Feb12 1420 by 285		
	Batch: W39048	Duplicate	1900 mg/l	2.10	10.0	27Feb12 0942 by 285	28Feb12 1420 by 285		
Total Dissolved Solids		155454-1	88 mg/l			27Feb12 0942 by 285	28Feb12 1420 by 285		
	Batch: W39048	Duplicate	86 mg/l	2.88	10.0	27Feb12 0942 by 285	28Feb12 1420 by 285		
Alkalinity as CaCO3		155454-1	25 mg/l				28Feb12 0936 by 93		
	Batch: W39061	Duplicate	25 mg/l	0.00	20.0		28Feb12 1155 by 93		

LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	10 mg/l	98.3	85.0-115			S31861	22Feb12 1125 by 295	23Feb12 1043 by 297		
Magnesium	10 mg/l	98.0	85.0-115			S31861	22Feb12 1125 by 295	23Feb12 1043 by 297		
Potassium	10 mg/l	95.5	85.0-115			S31861	22Feb12 1125 by 295	23Feb12 1043 by 297		
Sodium	10 mg/l	96.4	85.0-115			S31861	22Feb12 1125 by 295	23Feb12 1043 by 297		
Chloride	20 mg/l	107	90.0-110			S31871	22Feb12 1500 by 07	22Feb12 1632 by 07		
Sulfate	20 mg/l	106	90.0-110			S31871	22Feb12 1500 by 07	22Feb12 1632 by 07		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
Calcium	155454-1	10 mg/l	103	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1046 by 297		
	155454-1	10 mg/l	97.2	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1050 by 297		
	Relative Percent Difference:		3.84	20.0	S31861				
Magnesium	155454-1	10 mg/l	102	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1046 by 297		
	155454-1	10 mg/l	97.3	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1050 by 297		
	Relative Percent Difference:		3.30	20.0	S31861				
Potassium	155454-1	10 mg/l	99.4	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1046 by 297		
	155454-1	10 mg/l	95.5	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1050 by 297		
	Relative Percent Difference:		2.97	20.0	S31861				
Sodium	155454-1	10 mg/l	104	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1046 by 297		
	155454-1	10 mg/l	97.7	75.0-125	S31861	22Feb12 1125 by 295	23Feb12 1050 by 297		
	Relative Percent Difference:		3.01	20.0	S31861				
Chloride	155454-1	20 mg/l	119	80.0-120	S31871	22Feb12 1500 by 07	22Feb12 1656 by 07		
	155454-1	20 mg/l	120	80.0-120	S31871	22Feb12 1500 by 07	22Feb12 1720 by 07		
	Relative Percent Difference:		0.288	10.0	S31871				
Sulfate	155454-1	20 mg/l	120	80.0-120	S31871	22Feb12 1500 by 07	22Feb12 1656 by 07		
	155454-1	20 mg/l	120	80.0-120	S31871	22Feb12 1500 by 07	22Feb12 1720 by 07		
	Relative Percent Difference:		0.0707	10.0	S31871				

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LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
Alkalinity as CaCO3	< 1 mg/l	1	1	W39061-1		28Feb12 0936 by 93	
Total Dissolved Solids	< 10 mg/l	10	10	W39048-1	27Feb12 0942 by 285	28Feb12 1420 by 285	
Calcium	< 0.1 mg/l	0.1	0.1	S31861-1	22Feb12 1125 by 295	23Feb12 1038 by 297	
Magnesium	< 0.03 mg/l	0.03	0.03	S31861-1	22Feb12 1125 by 295	23Feb12 1038 by 297	
Potassium	< 1 mg/l	1	1	S31861-1	22Feb12 1125 by 295	23Feb12 1038 by 297	
Sodium	< 1 mg/l	1	1	S31861-1	22Feb12 1125 by 295	23Feb12 1038 by 297	
Chloride	< 0.2 mg/l	0.2	0.2	S31871-1	22Feb12 1500 by 07	22Feb12 1608 by 07	
Sulfate	< 0.2 mg/l	0.2	0.2	S31871-1	22Feb12 1500 by 07	22Feb12 1608 by 07	

GBM^{c} & Associates
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Chain of Custody

155454

Client/Billing Information

Client: GBMc & Associates
Company: GBM^{c} & Associates
Address: 219 Brown Lane
Bryant, AR 72022
Phone No.: 501-847-7077
Fax No.: 501-847-7943

SPECIAL INSTRUCTIONS/PRECAUTIONS:

email report to jfluger@gbmcassoc.com
call Josh Fluger w/ GBMc w/ any questions

Project Name / Number: Tyson 4/9

Parameters for Analysis/Methods

	Sample ID	Sample Description	Date	Time	Matrix S=Sed/Soil W=Water	Number of Containers	Composite or Grab	Ca, Mg, K, Na	Cl, TDS, SO4	T. Alkalinity							
	PR-2		2/21/12	0950	W	2	G	X	X	X							
2	PR-1			1020	W	2	G	X	X	X							
3	UT-2			1055	W	2	G	X	X	X							
4	UT-2D			1100	W	2	G	X	X	X							
5	W001			1150	W	2	G	X	X	X							
	Preservative	(Sulfuric acid =S, Nitric acid =N, NaOH =B, Ice =I)						N, I	I	I							

Sampler(s): JJF/JBB
Shipment Method: GBMc Delivery
Turnaround Time Required: Normal

COC Completed by: Date: 2/21/12 Time: 1640
COC Checked by: Date: 2/22/12 Time: 0910

Relinquished by: Date: 2/22/12 Time: 0911
Received by: Ally Fuell Date: 2/22/12 Time: 0911

Relinquished by: Ally Fuell Date: 2/22/12 Time: 1035
Received in lab by: Date: 2.22.12 Time: 1035

LABORATORY USE ONLY: Samples Received On Ice?: [✓ YES] or NO
Sample Temperature: 2 °C

V1.2 10/25/11

Appendix E

Summary of WET Tests

Table 13.

Date Test Initiated	Pimephales promelas (Fathead Minnow)														Routine WET Chemistry (Maximum values)									Minimums		WET Chemistry								NOTES
	Survival CNTL	Survival 100%	Survival 75%	Survival 56%	Survival 42%	Survival 32%	Survival NOEL	Growth CNTL Mean Dry Weight (mg)	Growth 100% Mean Dry Weight (mg)	Growth 75% Mean Dry Weight (mg)	Growth 56% Mean Dry Weight (mg)	Growth 42% Mean Dry Weight (mg)	Growth 32% Mean Dry Weight (mg)	Growth NOEL	TRC	Hardness	Alkalinity (mg/L)	Sp. Cond. (us/cm)	pH (Initial)	pH (Final)	Temp °C (Initial)	Temp °C (Final)	D.O. (Initial)	D.O. (Final)	Calcium (mg/L) Min	Calcium (mg/L) Max	Hardness Ca/Mg (mg/L) Min	Hardness Ca/Mg (mg/L) Max	Magnesium (mg/L) Min	Magnesium (mg/L) Max	Alkalinity (mg/L CaCO$_3$) Min	Alkalinity (mg/L CaCO$_3$) Max	
1/24/2006	97.8	100.0	97.8	95.5	95.3	95.6	100	0.00031	0.00041	0.00032	0.00039	0.00038	0.00041	100	0	98	81	1016	8.4	8.5	25	24	7.9	6.1	3.8	18.8	26.8	62.1	3.7	4.7	70	136	
4/25/2006	89.6	92.8	95.7	100.0	97.5	95.5	100	0.00029	0.00029	0.00025	0.00025	0.00027	0.00028	100	0	99	79	1116	8.4	8.2	25	24	7.0	6.0	4.5	5.8	28.1	34.4	4.0	4.8	67	138	
8/22/2006	88.0	80.7	94.9	92.5	94.3	94.0	100	0.53415	0.43433	0.56688	0.56318	0.52173	0.66750	100	0	103	81	1075	8.3	8.2	25	24	7.1	4.0	5.9	7.6	25.8	36.1	2.7	4.2	126	71	
10/31/2006	93.0	79.6	96.0	96.0	94.2	85.2	100	0.28767	0.25392	0.32990	0.32986	0.31818	0.29750	100	0	99	78	984	8.3	8.3	26	24	7.5	6.3	6.7	7.9	29.7	41.1	3.2	5.2	73	135	
1/23/2007	97.5	95.5	100.0	93.3	100.0	97.8	100	0.38444	0.46472	0.43023	0.40694	0.37389	0.35994	100	0	98	81	1151	8.3	8.4	24	23	7.8	6.5	4.3	4.5	15.4	28.1	3.7	4.1	185	220	
6/05/2007	100.0	85.6	89.6	100.0	96.0	97.8	100	0.35109	0.34133	0.32533	0.35417	0.36533	0.34378	100	0	98	80	1032	8.3	8.4	25	25	7.3	6.0	5.0	6.1	22.7	27.4	2.5	3.0	7	164	
9/11/2007	92.5	87.8	65.0	100.0	86.5	92.8	100	0.37056	0.33833	0.24500	0.35300	0.30750	0.26756	100	0	99	79	1095	8.4	8.4	24	24	7.9	5.9	9.5	10.7	45.6	76.0	4.2	5.1	87	165	
10/08/2007	98.0	77.1	96.4	93.8	90.2	100.0	100	0.41889	0.33645	0.41657	0.38719	0.30387	0.38109	100	0	99	78	1114	8.3	8.7	24	24	7.2	6.1	7.9	9.7	36.6	44.6	3.9	4.9	185	200	
3/18/2008	95.0	95.0	90.0	100.0	95.0	100.0	100	0.46250	0.47000	0.43750	0.45250	0.48000	0.50500	100	0	92	63	951	8.2	8.3	25	24	8.0	5.2	5.1	5.6	24.8	28.2	2.6	3.5	125	155	
4/29/2008	100.0	97.5	97.5	95.0	85.0	92.5	100	0.35000	0.33250	0.31750	0.27250	0.29750	0.29500	100	0	87	62	1058	8.2	8.1	25	24	8.0	6.3	5.1	6.1	28.3	31.6	3.8	4.0	83	100	
8/19/2008	97.5	97.5	97.5	97.5	97.5	97.5	100	0.38000	0.31500	0.36500	0.35750	0.28750	0.32750	100	0	88	63	856	8.4	8.0	25	24	8.1	5.3	7.7	9.4	23.6	30.3	1.1	1.8	80	134	
10/28/2008	92.5	95.0	92.5	100.0	95.0	92.5	100	0.54000	0.44500	0.50500	0.48500	0.51500	0.46500	100	0	92	63	1003	8.3	8.3	25	24	7.4	5.2	5.8	8.5	19.2	27.7	1.2	1.6	1	181	
3/10/2009	92.5	97.5	97.5	97.5	92.5	100.0	100	0.46000	0.39500	0.48750	0.40000	0.46000	0.49000	100	0	88	63	931	8.3	8.1	24	23	8.4	7.5	4.7	5.9	26.7	29.0	3.5	3.7	42	68	
4/28/2009	92.5	95.0	85.0	95.0	90.0	97.5	100	0.33750	0.36000	0.36750	0.38250	0.32000	0.40500	100	0	88	63	1066	8.4	8.5	26	24	7.7	6.4	6.6	7.9	205.0	226.0	45.2	50.8	150	177	
9/09/2009	92.5	95.0	90.0	87.5	95.0	90.0	100	0.69500	0.76000	0.64750	0.72750	0.70750	0.70750	100	0	87	63	1196	8.3	8.0	24	23	7.8	5.8	16.0	18.9	146.0	200.0	24.1	38.8	75	115	
10/20/2009	97.5	97.5	100.0	97.5	95.0	95.0	100	0.51750	0.51000	0.57500	0.52250	0.46000	0.45500	100	0	89	63	2007	8.4	8.5	25	25	8.0	7.0	18.8	20.7	517.0	557.0	114.0	123.0	192	209	
1/19/2010	97.5	92.5	90.0	97.5	87.5	95.0	100	0.29750	0.36000	0.36250	0.39000	0.38250	0.38250	100	0	87	63	1260	8.2	8.6	25	24	8.2	6.9	6.1	8.2	241.0	341.0	54.7	77.8	176	260	
4/13/2010	95.0	87.5	100.0	95.0	90.0	95.0	100	0.36000	0.33750	0.37250	0.44000	0.37750	0.30750	100	0	93	64	1111	8.3	8.3	25	25	8.3	6.5	4.9	5.5	145.0	156.0	32.4	34.6	138	147	
8/17/2010	97.5	0.0	7.5	55.0	92.5	95.0	42	0.33500	0.00000	0.02000	0.17250	0.26000	0.29000	32	0	92	63	1279	8.3	8.3	25	23	7.6	6.8	5.2	9.0	284.0	346.0	65.7	78.6	145	277	**Only test in 5 years to fail the quarterly testing**
9/08/2010	97.5	97.5	100.0	97.5	97.5	97.5	100	0.71250	0.64250	0.68750	0.78250	0.83000	0.74250	100	0	94	63	1606	8.5	8.2	24	24	8.0	6.5	6.5	7.3	321.0	355.0	73.9	81.8	64	97	
10/19/2010	97.5	100.0	95.0	87.5	100.0	92.5	100	0.55250	0.40500	0.52000	0.54500	0.59200	0.61000	100	0	94	63	1413	8.3	8.3	24	24	8.3	7.1	5.7	5.9	278.0	313.0	64.1	72.4	158	181	
11/09/2010	100.0	97.5	100.0	100.0	100.0	100.0	100	0.36250	0.38500	0.43000	0.35250	0.35500	0.35750	100	0	93	63	1483	8.3	8.5	25	23	8.0	6.1	5.7	6.1	322.0	373.0	74.8	87.0	183	222	
12/14/2010	100.0	97.5	97.5	100.0	100.0	97.5	100	0.28000	0.29500	0.31000	0.24750	0.32750	0.28750	100	0	91	62	1439	8.2	8.4	23	23	8.5	7.2	6.1	6.5	148.0	217.0	32.2	48.8	86	192	
1/25/2011	100.0	90.0	82.5	92.5	97.5	92.5	100	0.30250	0.30250	0.26500	0.28500	0.28250	0.33000	100	0	92	63	1238	8.4	8.2	23	23	8.1	7.0	6.3	7.3	178.0	229.0	39.1	51.7	187	202	
4/12/2011	85.0	90.0	82.5	97.5	92.5	87.5	100	0.38000	0.47750	0.44250	0.47000	0.49250	0.47750	100	0	95	64	1515	8.3	8.3	25	23	8.2	6.0	4.9	6.1	281.0	319.0	65.4	73.7	175	184	
8/09/2011	97.5	97.5	100.0	95.0	100.0	95.0	100	0.41250	0.52500	0.50250	0.42500	0.48000	0.50500	100	0	94	62	1643	8.2	8.1	25	24	8.6	8.0	6.4	7.1	341.0	377.0	79.0	87.4	144	181	
10/25/2011	95.0	92.5	92.5	82.5	82.5	90.0	100	0.34500	0.37250	0.33750	0.35250	0.34500	0.41750	100	0	93	63	1381	8.4	8.4	24	23	8.0	8.0	5.3	6.6	241.0	263.0	55.3	59.9	156	190	
Count	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	
Min	85.0	0.0	7.5	55.0	82.5	85.2	42.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0	0.0	87.0	62.0	856.0	8.2	8.0	23.0	23.0	7.0	4.0	3.8	4.5	15.4	27.4	1.1	1.6	1.0	68.0	
Max	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.7	0.8	0.7	0.8	0.8	0.7	100.0	0.0	103.0	81.0	2007.0	8.5	8.7	26.0	25.0	8.6	8.0	18.8	20.7	517.0	557.0	114.0	123.0	192.0	277.0	
Average	95.5	89.3	90.1	94.1	94.0	94.9	97.9	0.4	0.4	0.4	0.4	0.4	0.4	97.5	0.0	93.4	67.9	1222.9	8.3	8.3	24.6	23.8	7.9	6.4	6.7	8.5	148.2	176.6	31.8	37.7	117.0	166.7	
Median	97.5	95.0	95.7	96.0	95.0	95.0	100.0	0.4	0.4	0.4	0.4	0.4	0.4	100.0	0.0	93.0	63.0	1116.0	8.3	8.3	25.0	24.0	8.0	6.3	5.8	7.3	145.0	156.0	24.1	34.6	126.0	177.0	
Standard Dev.	3.91	18.89	18.21	8.94	4.82	3.79	11.16	0.16	0.17	0.17	0.17	0.17	0.17	13.09	0.00	4.51	7.80	264.12	0.08	0.17	0.74	0.64	0.42	0.87	3.34	4.21	138.48	154.03	32.84	37.09	56.93	51.28	

Table 14.

Date Test Initiated	Ceriodaphnia dubia (Water Flea)														Routine WET Chemistry (Maximum values)									Minimums		WET Chemistry								NOTES
	Survival CNTL	Survival 100%	Survival 75%	Survival 56%	Survival 42%	Survival 32%	Survival NOEL	Repro. CNTL	Repro. 100%	Repro. 75%	Repro. 56%	Repro. 42%	Repro. 32%	Repro. NOEC	TRC	Hardness	Alkalinity (mg/L)	Sp. Cond. (us/cm)	pH (Initial)	pH (Final)	Temp °C (Initial)	Temp °C (Final)	D.O. (Initial)	D.O. (Final)	Calcium (mg/L) Min	Calcium (mg/L) Max	Hardness Ca/Mg (mg/L) Min	Hardness Ca/Mg (mg/L) Max	Magnesium (mg/L) Min	Magnesium (mg/L) Max	Alkalinity (mg/L $CaCO_3$) Min	Alkalinity (mg/L $CaCO_3$) Max	
1/24/2006	90	90	100	100	90	100	100	15.3	15.3	17.3	17.1	13.7	13.6	100	0	98	81	1016	8.4	8.9	25	24	7.9	7.3	3.8	18.8	26.8	62.1	3.7	4.7	70	136	
4/25/2006	90	100	100	100	90	90	100	16.2	12.0	14.0	14.4	15.0	15.6	100	0	99	79	1116	8.4	8.6	25	24	7.0	7.3	4.5	5.8	28.1	34.4	4.0	4.8	67	138	
8/22/2006	90	90	100	100	100	100	100	19.4	18.3	17.9	18.3	21.3	21.5	100	0	103	81	1075	8.3	8.4	25	25	7.1	7.0	5.9	7.6	25.8	36.1	2.7	4.2	126	71	
10/31/2006	100	100	100	90	100	90	100	19.3	15.7	18.4	13.7	17.6	18.4	100	0	99	78	984	8.3	8.5	26	24	7.5	7.0	6.7	7.9	29.7	41.1	3.2	5.2	73	135	
1/23/2007	100	100	90	78	100	100	100	15.8	14.4	13.1	13.6	14.2	13.5	100	0	98	81	1151	8.3	8.8	24	24	7.8	7.5	4.3	4.5	15.4	28.1	3.7	4.1	185	220	
6/05/2007	100	100	90	100	100	100	100	21.6	15.3	19.0	17.7	18.4	22.3	100	0	98	80	1032	8.3	8.5	25	24	7.3	7.0	5.0	6.1	22.7	27.4	2.5	3.0	7	164	
9/11/2007	100	80	100	100	100	100	100	17.1	14.4	20.1	23.6	14.6	18.1	100	0	99	79	1095	8.4	8.6	24	24	7.5	7.2	9.5	10.7	45.6	76.0	4.2	5.1	87	165	
10/08/2007	100	90	80	100	89	100	100	27.3	27.1	23.4	31.8	29.9	33.3	100	0	99	78	1114	8.3	8.7	24	25	7.2	7.1	7.9	9.7	36.6	44.6	3.9	4.9	185	200	
3/18/2008	80	100	100	100	100	70	100	15.9	13.7	16.0	13.2	18.1	15.9	100	0	92	63	951	7.5	8.7	25	24	8.0	7.2	5.1	5.6	24.8	28.2	2.6	3.5	125	155	
4/29/2008	100	100	100	90	100	100	100	19.9	16.2	16.8	16.6	19.5	18.7	100	0	87	62	1058	8.2	8.4	25	25	8.0	7.3	5.1	6.1	28.3	31.6	3.8	4.0	83	100	
8/19/2008	80	90	80	100	100	100	100	15.4	16.1	15.6	15.6	16.7	16.1	100	0	88	63	856	8.4	7.8	25	24	8.1	6.2	7.7	9.4	23.6	30.3	1.1	1.8	80	134	
10/28/2008	100	90	80	100	100	90	100	17.6	15.1	14.5	15.6	18.0	15.7	100	0	92	63	1003	8.3	8.6	25	24	7.4	7.9	5.8	8.5	19.2	27.7	1.2	1.6	1	181	
3/10/2009	100	100	100	100	100	100	100	22.6	20.8	20.1	21.1	18.3	20.0	100	0	88	63	931	8.3	8.2	24	23	8.4	7.6	4.7	5.9	26.7	29.0	3.5	3.7	42	68	
4/28/2009	100	100	100	90	100	90	100	18.9	18.7	22.7	17.3	19.7	16.4	100	0	88	63	1066	8.4	8.6	26	25	7.7	7.5	6.6	7.9	205.0	226.0	45.2	50.8	150	177	
9/09/2009	100	80	90	90	90	100	100	15.8	15.6	13.2	15.8	14.7	18.7	100	0	87	63	1196	8.3	8.4	24	24	7.8	7.1	16.0	18.9	146.0	200.0	24.1	38.8	75	115	
10/20/2009	100	100	100	100	100	100	100	16.8	13.7	16.4	16.5	17.2	17.5	100	0	89	63	2007	8.2	8.6	25	25	8.0	7.4	18.8	20.7	517.0	557.0	114.0	123.0	192	209	
1/19/2010	100	70	80	100	100	100	100	16.4	15.4	14.4	14.3	15.8	16.1	100	0	87	63	1260	8.2	8.6	25	24	8.2	6.9	6.1	8.2	241.0	341.0	54.7	77.8	176	260	
4/13/2010	90	80	100	90	100	90	100	17.5	14.8	20.3	14.9	20.6	19.0	100	0	93	64	1111	8.3	8.6	25	25	8.3	6.3	4.9	5.5	145.0	156.0	32.4	34.6	138	147	
8/17/2010	90	50	40	60	50	50	100	15.5	5.0	4.6	8.2	7.0	5.9	56	0	92	63	1279	8.3	8.3	25	24	7.6	7.1	5.2	9.0	284.0	346.0	65.7	78.6	145	277	**Only test in 5 years to fail the quarterly testing**
9/08/2010	100	100	100	90	100	90	100	15.3	13.8	14.7	13.5	14.5	14.7	100	0	94	63	1606	8.3	8.3	24	24	8.0	7.8	6.5	7.3	321.0	355.0	73.9	81.8	64	97	
10/19/2010	100	100	90	80	100	90	100	16.2	15.2	13.6	14.0	17.8	14.7	100	0	94	63	1413	8.3	8.5	24	24	8.3	7.9	5.7	5.9	278.0	313.0	64.1	72.4	158	181	
11/09/2010	100	100	100	100	100	100	100	15.9	14.5	14.7	14.6	14.5	15.5	100	0	93	63	1483	8.3	8.5	25	23	8.0	6.8	5.7	6.1	322.0	373.0	74.8	87.0	183	222	
12/14/2010	100	90	90	100	100	100	100	16.0	15.0	14.9	15.2	15.6	16.6	100	0	91	62	1439	8.2	8.4	23	23	8.5	8.0	6.1	6.5	148.0	217.0	32.2	48.8	86	192	
1/25/2011	100	90	90	100	100	100	100	15.6	14.5	15.2	15.0	14.9	15.3	100	0	92	63	1238	8.4	8.5	23	23	8.1	6.1	6.3	7.3	178.0	229.0	39.1	51.7	187	202	
4/12/2011	100	100	90	100	100	100	100	18.6	17.5	17.6	17.8	18.2	17.9	100	0	95	64	1515	8.3	8.3	25	23	8.2	7.6	4.9	6.1	281.0	319.0	65.4	73.7	175	184	
8/09/2011	100	100	100	90	100	100	100	17.9	18.5	16.9	16.7	19.2	18.4	100	0	94	62	1643	8.2	8.3	25	23	8.6	8.1	6.4	7.1	341.0	377.0	79.0	87.4	144	181	
10/25/2011	100	100	100	100	100	100	100	16.5	17.1	19.3	17.5	17.3	17.9	100	0	93	63	1381	8.4	8.5	24	23	8.3	8.3	5.3	6.6	241.0	263.0	55.3	59.9	156	190	

Appendix F

DMR Records for the City of Waldron

Table 15.

Monitoring Results for AR0035769 as of 5/16/12

NPDES ID	Facility Name	Discharge Number	Parameter Desc	Monitoring Period End Date	Q1-Sample Measurement	Q2-Sample Measurement	C1-Sample Measurement	C2-Sample Measurement	C3-Sample Measurement	Parameter Code-Monitoring Loc-Season #	Q1-Limit Value	Q1-Limit Stat Base Code	Q2-Limit Value	Q2-Limit Stat Base Code	Quantity Units-Limit Unit Desc	C1-Limit Value	C1-Limit Stat Base Code	C2-Limit Value	C2-Limit Stat Base Code	C3-Limit Value	C3-Limit Stat Base Code	Concentration Units-Limit Unit Desc	Frequency of Analysis-Limit	Sample Type Desc-Limit	Monitoring Period End Date
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	10/31/2010	< 10.84			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	11/30/2010	< 7.51			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	12/31/2010	7.65			3.31	4	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	1/31/2011	10.06			3.55	5	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	2/28/2011	31.36			8	18	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	3/31/2011	11.59			3	3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	4/30/2011	12.34			3	3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	5/31/2011	< 11.34			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	6/30/2011	18.1			4	5	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	7/31/2011	12.09			3	3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	8/31/2011	< 12.93			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	9/30/2011	< 12.18			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	10/31/2011	< 10.84			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	11/30/2011	< 8.84			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	12/31/2011	< 9.42			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	1/31/2012	< 9.17			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	2/29/2012	< 7.51			< 3	< 3	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	BOD, carbonaceous, 05 day, 20 C	3/31/2012	11.09			3.67	5	80082-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	10/31/2010	297.74			70	70	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	11/30/2010	155.12			60	60	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	12/31/2010	231.44			75	75	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	1/31/2011	175.14			75	75	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	2/28/2011	91.74			25	25	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	3/31/2011	102.46			31.5	31.5	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	4/30/2011	27.65			6.5	6.5	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	5/31/2011	87.19			25.5	25.5	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	6/30/2011	237.69			50	50	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	7/31/2011	47.5			10	10	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	8/31/2011	225.4			57.5	57.5	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	9/30/2011	229.35			55	55	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	10/31/2011	297.74			70	70	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	11/30/2011	150.12			50	50	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	12/31/2011	145.95			35	35	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	1/31/2012	112.59			30	30	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	2/29/2012	56.71			20	20	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Chloride (as Cl)	3/31/2012	102.2			35	35	00940-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	10/31/2010				< 4	< 4	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	11/30/2010				4	62	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	12/31/2010				3	17	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	1/31/2011				20	62	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	2/28/2011				9	44	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	3/31/2011				4	31	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	4/30/2011				3	18	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	5/31/2011				1	2	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	6/30/2011				4	4	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	7/31/2011				6	16	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	8/31/2011				13	48	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	9/30/2011				78	128	74055-1-0	******		******		******	******		200	30DA GEO	400	7 DA GEO	#/100mL	Three Per Month	GRAB	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	10/31/2011				< 4	< 4	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	11/30/2011				5	8	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	12/31/2011				< 4	< 4	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	1/31/2012				4	4	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	2/29/2012				4	4	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Coliform, fecal general	3/31/2012				16	240	74055-1-1	******		******		******	******		1000	30DA GEO	2000	7 DA GEO	#/100mL	Three Per Month	GRAB	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	10/31/2010	.028			6.5	6.5	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	11/30/2010	< .016			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	12/31/2010	< .019			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	1/31/2011	< .014			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	2/28/2011	27.2			7.4	7.4	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	3/31/2011	.039			12	12	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	4/30/2011	< .026			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	5/31/2011	< .021			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	6/30/2011	.0309			6.5	6.5	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	7/31/2011	.052			11	11	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	8/31/2011	< .024			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	9/30/2011	.033			7.8	7.8	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	10/31/2011	.028			6.5	6.5	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	11/30/2011	< .018			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	12/31/2011	.026			6.3	6.3	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	1/31/2012	< .023			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	2/29/2012	< .017			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Copper, total recoverable	3/31/2012	< .018			< 6	< 6	01119-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	10/31/2010	.396	.58				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	11/30/2010	.295	.81				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	12/31/2010	.368	.909				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	1/31/2011	.399	.659				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	2/28/2011	.781	1.051				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	3/31/2011	.631	1.046				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	4/30/2011	.75	1.234				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	5/31/2011	.066	1.119				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	6/30/2011	.688	1.02				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	7/31/2011	.524	.961				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	8/31/2011	.501	.885				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	9/30/2011	NODI G	NODI G				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	10/31/2011	.396	.58				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	11/30/2011	.431	1.281				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	12/31/2011	.446	1.033				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	1/31/2012	.491	1.224				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	2/29/2012	.393	.665				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Flow, in conduit or thru treatment plant	3/31/2012	.456	.843				50050-1-0	Req. Mon.	MO AVG	Req. Mon.	DAILY MX	MGD	******		******		******		******	Daily	TOTALZ	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	10/31/2010	.6			.17	.18	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	11/30/2010	.26			.1	.16	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	12/31/2010	.4			.17	.22	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	1/31/2011	10.57			3.73	5.7	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	2/28/2011	8.15			2.08	5.85	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	3/31/2011	.62			.16	.43	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	4/30/2011	.22			.05	.06	00610-1-2	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	5/31/2011	.29			.08	.14	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	6/30/2011	.34			.08	.1	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	7/31/2011	.38			.09	.13	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	8/31/2011	.6			.14	.17	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	9/30/2011	.45			.11	.12	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	10/31/2011	.6			.17	.18	00610-1-0	35.4	MO AVG	******		lb/d	******		5	MO AVG	8	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	11/30/2011	< .18			< .06	< .06	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	12/31/2011	.29			.09	.13	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	1/31/2012	.41			.13	.17	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	2/29/2012	.17			.07	.08	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Nitrogen, ammonia total (as N)	3/31/2012	.98			.33	.78	00610-1-1	56.7	MO AVG	******		lb/d	******		8	MO AVG	12	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	10/31/2010			7.1			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	11/30/2010			8.2			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	12/31/2010			8.3			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	1/31/2011			9.1			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	2/28/2011			7.9			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	3/31/2011			8.6			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	4/30/2011			7			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	5/31/2011			7.5			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	6/30/2011			6			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	7/31/2011			6.4			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	8/31/2011			6			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	9/30/2011			6.2			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	10/31/2011			7.1			00300-1-0	******		******		******	5	INST MIN	******		******		mg/L	Three Per Month	GRAB	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	11/30/2011			7.7			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	12/31/2011			10.4			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	1/31/2012			9.6			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	2/29/2012			9			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Oxygen, dissolved (DO)	3/31/2012			7.6			00300-1-1	******		******		******	6	MO AV MN	******		******		mg/L	Three Per Month	GRAB	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	pH	10/31/2010			6.37		6.48	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	pH	11/30/2010			6.23		6.59	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	pH	12/31/2010			6.57		6.69	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	pH	1/31/2011			6.27		6.38	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	1/31/2011

NPDES ID	Facility Name	Discharge Number	Parameter Desc	Monitoring Period End Date	Q1-Sample Measurement	Q2-Sample Measurement	C1-Sample Measurement	C2-Sample Measurement	C3-Sample Measurement	Parameter Code-Monitoring Loc-Season #	Q1-Limit Value	Q1-Limit Stat Base Code	Q2-Limit Value	Q2-Limit Stat Base Code	Quantity Units-Limit Unit Desc	C1-Limit Value	C1-Limit Stat Base Code	C2-Limit Value	C2-Limit Stat Base Code	C3-Limit Value	C3-Limit Stat Base Code	Concentration Units-Limit Unit Desc	Frequency of Analysis-Limit	Sample Type Desc-Limit	Monitoring Period End Date
AR0035769	WALDRON, CITY OF	001-A	pH	2/28/2011			6.02		6.36	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	pH	3/31/2011			6.16		6.42	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	4/30/2011			6.13		6.21	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	pH	5/31/2011			6.14		6.36	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	6/30/2011			6.29		6.54	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	pH	7/31/2011			6.09		6.13	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	8/31/2011			6.31		6.41	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	9/30/2011			6.2		6.54	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	pH	10/31/2011			6.37		6.48	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	11/30/2011			6.06		6.07	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	pH	12/31/2011			6.01		6.08	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	pH	1/31/2012			6.01		6.07	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	pH	2/29/2012			6.05		6.08	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	pH	3/31/2012			6		6.13	00400-1-0	******		******		******	6	MINIMUM	******		9	MAXIMUM	SU	Three Per Month	GRAB	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	10/31/2010	15.74			3.7	3.7	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	11/30/2010	.1			.04	.04	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	12/31/2010	1.54			.5	.5	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	1/31/2011	.11			.39	.39	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	2/28/2011	8.44			2.3	2.3	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	3/31/2011	1.04			.32	.32	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	4/30/2011	1.19			.28	.28	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	5/31/2011	6.15			1.8	1.8	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	6/30/2011	11.4			2.4	2.4	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	7/31/2011	4.75			1	1	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	8/31/2011	4.7			1.2	1.2	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	9/30/2011	15.43			3.7	3.7	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	10/31/2011	15.74			3.7	3.7	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	11/30/2011	6			2	2	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	12/31/2011	5.84			1.4	1.4	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	1/31/2012	7.81			2.08	2.08	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	2/29/2012	3.57			12.6	1.26	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Phosphorus, total (as P)	3/31/2012	6.48			2.22	2.22	00665-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	10/31/2010	757.11			178	178	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	11/30/2010	530.01			205	205	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	12/31/2010	651.1			211	211	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	1/31/2011	546.44			234	234	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	2/28/2011	579.8			158	158	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	3/31/2011	507.41			156	156	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	4/30/2011	578.5			136	136	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	5/31/2011	478.72			140	140	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	6/30/2011	1031.6			217	217	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	7/31/2011	917.5			193	193	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	8/31/2011	964.3			246	246	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	9/30/2011	879.87			211	211	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	10/31/2011	757.11			178	178	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	11/30/2011	627.5			209	209	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	12/31/2011	783.96			188	188	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	1/31/2012	622.99			166	166	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	2/29/2012	391.31			138	138	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total dissolved	3/31/2012	478.7			164	164	70295-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	10/31/2010	< 3.61			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	11/30/2010	< 2.5			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	12/31/2010	3.03			1.31	2	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	1/31/2011	9.06			3.2	9	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	2/28/2011	27.38			6.99	19	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	3/31/2011	< 3.86			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	4/30/2011	9.7			2.36	4	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	5/31/2011	5.67			1.5	3	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	6/30/2011	< 4.11			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	7/31/2011	3.59			1	1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	8/31/2011	< 4.14			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	9/30/2011	5.45			1.34	2	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	10/31/2011	< 3.61			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	11/30/2011	< 2.95			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	12/31/2011	5.28			1.68	2	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	1/31/2012	< 3.06			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	2/29/2012	< 2.81			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Solids, total suspended	3/31/2012	< 3.31			< 1	< 1	00530-1-0	106.3	MO AVG	******		lb/d	******		15	MO AVG	22.5	7 DA AVG	mg/L	Three Per Month	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	10/31/2010	93.57			22	22	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	11/30/2010	41.37			16	16	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	12/31/2010	74.06			24	24	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	1/31/2011	58.38			25	25	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	2/28/2011	84.4			23	23	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	3/31/2011	100.83			31	31	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	4/30/2011	136.1			32	32	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	5/31/2011	71.81			21	21	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	6/30/2011	109.34			23	23	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	7/31/2011	133.1			28	28	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	8/31/2011	125.4			32	32	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	9/30/2011	87.57			21	21	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	10/31/2011	93.57			22	22	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	11/30/2011	78.06			26	26	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	12/31/2011	91.74			22	22	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	1/31/2012	82.57			22	22	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	2/29/2012	65.22			23	23	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Sulfate, total (as SO4)	3/31/2012	102.2			35	35	00945-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	mg/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	10/31/2010	.051			12	12	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	10/31/2010
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	11/30/2010	< .0196			7.6	7.6	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	11/30/2010
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	12/31/2010	.169			55	55	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	12/31/2010
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	1/31/2011	.12			51	51	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	1/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	2/28/2011	.183			50	50	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	2/28/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	3/31/2011	.257			79	79	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	3/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	4/30/2011	.311			73	73	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	4/30/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	5/31/2011	.12			35	35	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	5/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	6/30/2011	.409			86	86	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	6/30/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	7/31/2011	.299			63	63	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	7/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	8/31/2011	.043			11	11	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	8/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	9/30/2011	.5			120	120	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	9/30/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	10/31/2011	.051			12	12	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	10/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	11/30/2011	.15			50	50	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	11/30/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	12/31/2011	.183			44	44	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	12/31/2011
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	1/31/2012	.21			56	56	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	1/31/2012
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	2/29/2012	.096			34	34	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	2/29/2012
AR0035769	WALDRON, CITY OF	001-A	Zinc, total recoverable	3/31/2012	.17			59	59	01094-1-0	Req. Mon.	MO AVG	******		lb/d	******		Req. Mon.	MO AVG	Req. Mon.	7 DA AVG	ug/L	Monthly	COMP-3	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Ceriodaphnia	3/31/2011				47		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Ceriodaphnia	6/30/2011				27		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Ceriodaphnia	9/30/2011				26.4		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Ceriodaphnia	12/31/2011				25.1		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Ceriodaphnia	3/31/2012				15.9		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Pimephales	3/31/2011				8.93		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Pimephales	6/30/2011				8.06		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Pimephales	9/30/2011				13.8		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Pimephales	12/31/2011				23.2		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Coef Of Var Statre 7Day Chronic Pimephales	3/31/2012				8.77		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	3/31/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	6/30/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	9/30/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	12/31/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	3/31/2012				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	3/31/2011				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	6/30/2011				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	9/30/2011				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	12/31/2011				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Low Flow Pass/Fail Survival Test Static Renew	3/31/2012				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic C	3/31/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic C	6/30/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic C	9/30/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic C	12/31/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic C	3/31/2012				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic P	3/31/2011				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic P	6/30/2011				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic P	9/30/2011				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011

NPDES ID	Facility Name	Discharge Number	Parameter Desc	Monitoring Period End Date	Q1-Sample Measurement	Q2-Sample Measurement	C1-Sample Measurement	C2-Sample Measurement	C3-Sample Measurement	Parameter Code-Monitoring Loc-Season #	Q1-Limit Value	Q1-Limit Stat Base Code	Q2-Limit Value	Q2-Limit Stat Base Code	Quantity Units-Limit Unit Desc	C1-Limit Value	C1-Limit Stat Base Code	C2-Limit Value	C2-Limit Stat Base Code	C3-Limit Value	C3-Limit Stat Base Code	Concentration Units-Limit Unit Desc	Frequency of Analysis-Limit	Sample Type Desc-Limit	Monitoring Period End Date
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic P	12/31/2011				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Lethal Static Renewal 7 Day Chronic P	3/31/2012				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	3/31/2011				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	6/30/2011				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	9/30/2011				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	12/31/2011				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	3/31/2012				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	3/31/2011				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	6/30/2011				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	9/30/2011				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	12/31/2011				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	NOEC Sub-Lethal Static Renewal 7 Day Chro	3/31/2012				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Static Renewal 7 Day Chronic Cerio	3/31/2011				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Static Renewal 7 Day Chronic Cerio	6/30/2011				1		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Static Renewal 7 Day Chronic Cerio	9/30/2011				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Static Renewal 7 Day Chronic Cerio	12/31/2011				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Static Renewal 7 Day Chronic Cerio	3/31/2012				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Statre 7Day Chronic Pimephales Pr	3/31/2011				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Statre 7Day Chronic Pimephales Pr	6/30/2011				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Statre 7Day Chronic Pimephales Pr	9/30/2011				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	9/30/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Statre 7Day Chronic Pimephales Pr	12/31/2011				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Q	Pass/Fail Statre 7Day Chronic Pimephales Pr	3/31/2012				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Quarterly	COMP24	3/31/2012
AR0035769	WALDRON, CITY OF	TX1-S	Coef Of Var Statre 7Day Chronic Ceriodaphnia	12/31/2010				8.22		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-S	Coef Of Var Statre 7Day Chronic Ceriodaphnia	6/30/2011				33.4		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-S	Coef Of Var Statre 7Day Chronic Ceriodaphnia	12/31/2011				13.8		TQP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-S	Low Flow Pass/Fail Survival Test Static Renew	12/31/2010				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-S	Low Flow Pass/Fail Survival Test Static Renew	6/30/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-S	Low Flow Pass/Fail Survival Test Static Renew	12/31/2011				0		TLP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Lethal Static Renewal 7 Day Chronic C	12/31/2010				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Lethal Static Renewal 7 Day Chronic C	6/30/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Lethal Static Renewal 7 Day Chronic C	12/31/2011				100		TOP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Sub-Lethal Static Renewal 7 Day Chro	12/31/2010				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Sub-Lethal Static Renewal 7 Day Chro	6/30/2011				75		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-S	NOEC Sub-Lethal Static Renewal 7 Day Chro	12/31/2011				100		TPP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Semiannual	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-S	Pass/Fail Static Renewal 7 Day Chronic Cerio	12/31/2010				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-S	Pass/Fail Static Renewal 7 Day Chronic Cerio	6/30/2011				1		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	6/30/2011
AR0035769	WALDRON, CITY OF	TX1-S	Pass/Fail Static Renewal 7 Day Chronic Cerio	12/31/2011				0		TGP3B-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Semiannual	COMP24	12/31/2011
AR0035769	WALDRON, CITY OF	TX1-Y	Coef Of Var Statre 7Day Chronic Pimephales	12/31/2010				21.6		TQP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Annual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-Y	Low Flow Pass/Fail Survival Test Static Renew	12/31/2010				0		TLP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Annual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-Y	NOEC Lethal Static Renewal 7 Day Chronic P	12/31/2010				100		TOP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Annual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-Y	NOEC Sub-Lethal Static Renewal 7 Day Chro	12/31/2010				100		TPP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		%	Annual	COMP24	12/31/2010
AR0035769	WALDRON, CITY OF	TX1-Y	Pass/Fail Statre 7Day Chronic Pimephales Pr	12/31/2010				0		TGP6C-1-0	******		******		******	******		Req. Mon.	7 DA AVG	******		pass=0/fail=1	Annual	COMP24	12/31/2010

Table 16.

Violations as of 5/16/12

Discharge Number	Monitoring Period End Date	DMR Value Received Date	Monitoring Location Desc	Parameter Number	Parameter Desc	Limit Value	DMR Value	Units: Permit - Reported	Violation Code	Violation Desc
001-A	10/31/2010	11/23/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		70	mg/L	D80	DMR, Monitor Only - Overdue
001-A	10/31/2010	11/23/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		297.74	lb/d	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		60	mg/L	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		155.12	lb/d	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		75	mg/L	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		231.44	lb/d	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		75	mg/L	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		175.14	lb/d	D80	DMR, Monitor Only - Overdue
001-A	02/28/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		25	mg/L	D80	DMR, Monitor Only - Overdue
001-A	02/28/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		91.74	lb/d	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		31.5	mg/L	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	00940-1-0	Chloride (as Cl)		102.46	lb/d	D80	DMR, Monitor Only - Overdue
001-A	10/31/2010	11/23/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		22	mg/L	D80	DMR, Monitor Only - Overdue
001-A	10/31/2010	11/23/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		93.57	lb/d	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		16	mg/L	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		41.37	lb/d	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		24	mg/L	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		74.06	lb/d	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		25	mg/L	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		58.38	lb/d	D80	DMR, Monitor Only - Overdue
001-A	02/28/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		23	mg/L	D80	DMR, Monitor Only - Overdue

Discharge Number	Monitoring Period End Date	DMR Value Received Date	Monitoring Location Desc	Parameter Number	Parameter Desc	Limit Value	DMR Value	Units: Permit - Reported	Violation Code	Violation Desc
001-A	02/28/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		84.4	lb/d	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		31	mg/L	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	00945-1-0	Sulfate, total (as SO4)		100.83	lb/d	D80	DMR, Monitor Only - Overdue
001-A	09/30/2011	11/9/2011	Effluent Gross	50050-1-0	Flow, in conduit or thru treatment plant			MGD	D80	DMR, Monitor Only - Overdue
001-A	10/31/2010	11/23/2011	Effluent Gross	70295-1-0	Solids, total dissolved		178	mg/L	D80	DMR, Monitor Only - Overdue
001-A	10/31/2010	11/23/2011	Effluent Gross	70295-1-0	Solids, total dissolved		757.11	lb/d	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		205	mg/L	D80	DMR, Monitor Only - Overdue
001-A	11/30/2010	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		530.01	lb/d	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		211	mg/L	D80	DMR, Monitor Only - Overdue
001-A	12/31/2010	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		651.1	lb/d	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		234	mg/L	D80	DMR, Monitor Only - Overdue
001-A	01/31/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		546.44	lb/d	D80	DMR, Monitor Only - Overdue
001-A	02/28/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		158	mg/L	D80	DMR, Monitor Only - Overdue
001-A	02/28/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		579.8	lb/d	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		156	mg/L	D80	DMR, Monitor Only - Overdue
001-A	03/31/2011	11/1/2011	Effluent Gross	70295-1-0	Solids, total dissolved		507.41	lb/d	D80	DMR, Monitor Only - Overdue
TX1-S	06/30/2011	11/1/2011	Effluent Gross	TGP3B-1-0	Pass/Fail Static Renewal 7 Day Chronic Ceriodaphnia		1	pass=0/fail=1	D80	DMR, Monitor Only - Overdue
TX1-S	06/30/2011	11/1/2011	Effluent Gross	TLP3B-1-0	Low Flow Pass/Fail Survival Test Static Renewal 7 Day Chronic Ceriodaphnia dubia		0	pass=0/fail=1	D80	DMR, Monitor Only - Overdue
TX1-S	06/30/2011	11/1/2011	Effluent Gross	TOP3B-1-0	NOEC Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia		100	%	D80	DMR, Monitor Only - Overdue
TX1-S	06/30/2011	11/1/2011	Effluent Gross	TPP3B-1-0	NOEC Sub-Lethal Static Renewal 7 Day Chronic Ceriodaphnia dubia		75	%	D80	DMR, Monitor Only - Overdue
TX1-S	06/30/2011	11/1/2011	Effluent Gross	TQP3B-1-0	Coef Of Var Statre 7Day Chronic Ceriodaphnia		33.4	%	D80	DMR, Monitor Only - Overdue

Appendix G

Detailed Habitat Characteristics

7.0 Semi-Quantitative Habitat Assessment SOP

Purpose

Physical habitat in streams includes all those physical attributes that influence or provide sustenance to biological attributes, both botanical and zoological, within the stream. Stream physical habitat varies naturally, as do biological characteristics; thus, habitat conditions differ even in the absence of point and anthropogenic non-point disturbance. Within a given ecoregion, stream drainage area, stream gradient and the geology are likely to be strong natural determinants of many aspects of stream habitat, because of their influence on discharge, flood stage, and stream energy (both static and kinetic). Kaufmann (1993) identified seven general physical habitat attributes important in influencing stream ecology and the maintenance of biological integrity:

1) channel dimensions,
2) channel gradient,
3) channel substrate size and type,
4) habitat complexity and cover,
5) riparian vegetation cover and structure,
6) anthropogenic alterations, and
7) channel-riparian interaction.

Land use activities can directly or indirectly alter any and/or all of these attributes. Nevertheless, the trends for each attribute will naturally vary with stream size (drainage area) and overall gradient. The relationships of specific physical habitat measurements described in this section to these seven attributes are discussed by Kaufmann (1993). Although they are actually biological measures, aquatic macrophytes, riparian vegetation, in-stream habitat and canopy cover are included in this and other physical habitat assessments because of their role in habitat structure and light inputs.

The objectives of a habitat characterization are to:

1) assess the availability and quality of habitat for the development and maintenance of benthic invertebrate and fish communities, and
2) evaluate the role of habitat quality in relation to the attainment of designated uses and biological integrity.

There are three main headings for the components of the physical habitat characterization each with several categories. Measurements for each of the components (14 categories total) are recorded on copies of a two-page field form entitled Stream Habitat Assessment (Semi-Quantitative), and include:

1) Channel Morphology
   a) Reach Length Determination
   b) Riffle-Pool Sequence
   c) Depth and Width Regime

2) In-Stream Structure
    a) Epifaunal substrate
    b) In-Stream Habitat
    c) Substrate Characterization
    d) Embeddedness
    e) Sediment Deposition
    f) Aquatic Macrophytes and Periphyton
3) Riparian Characteristics
    a) Canopy Cover
    b) Bank Stability and slope
    c) Vegetative Protection
    d) Riparian Vegetative Zone Width
    e) Land-use Stream Impacts

Field physical habitat measurements from a field habitat characterization are used in conjunction with water chemistry, temperature, macroinvertebrate and vertebrate (typically fish) community analyses, and other data sources to assess attainment of designated uses, potential aquatic life impacts from stressors or maintenance of an expected level of biological integrity.

These procedures are intended for evaluating physical habitat in wadeable streams, but may be adapted for use in larger streams as necessary. The field procedures applied to this characterization are most efficiently applied during low flow conditions and during times when terrestrial vegetation is active, but can also be applied during spring seasonal conditions when higher base flows are present; or during fall or winter low flow conditions. This collection of procedures is designed for monitoring applications where robust, quantitative or semi-quantitative descriptions of habitat are desired. This semi-quantitative habitat procedure is usually used in conjunction with the *General Physical Habitat Characterization* and the *Qualitative Habitat Assessment* to provide a detailed view of the streams habitat condition.

The habitat characterization protocol provided herein differs from other rapid habitat assessment approaches (e.g., Plafkin et al., 1989, Rankin, 1995) by employing a, systematic spatial sampling that minimizes bias in the placement and positioning of measurements. Measures are taken over defined channel areas and these sampling areas are placed systematically at spacing that is proportional to the length of the entire study reach. This systematic sampling design provides resolution appropriate to the length of the study reach. The habitat assessment protocol summarized in this SOP is based on those of USEPA in their EMAP and RBP procedures (Lazorchak, 1998 and Barbour, 1999), USGS NAWQA program (Fitzpatrick, 1998) and Missouri Department of Natural Resources ESP (Sarver, 2000).

We strive to make the protocol objective and repeatable by using previously developed methods to produce repeatable measures of physical habitat in place of estimation techniques wherever possible.

Two people typically complete the specified assessment, including stream flow measurements, in about two hours of field time. However, the time required can vary considerably with channel characteristics.

The procedures are employed on a sampling reach of length equal to 20 times the bankfull width, or at least 100 yards of in-stream distance. The semi-quantitative habitat sampling reach length should coincide as much as possible with that of the fish and macroinvertebrate collection reaches. Measurements are taken in each of 10 sub-reaches, which are systematically placed, at intervals equal to approximately one tenth (1/10) the length of the represented study reach. Measurements and observations for each habitat characteristic are made in each of the sub-reaches as the assessment team moves along the stream channel. An average or total of the scores for each of the 10 sub-reaches is then calculated resulting in a mean value for each characteristic for the entire reach.

Procedure

The habitat assessment will be conducted within (or to the extent possible) the stream reach from which the benthic and fish communities are to be characterized. The physical habitat will be characterized from measurements and observations of stream attributes made within 10 sub-reaches. The team assessing habitat should move along the stream channel (near the thalwag) observing habitat characteristics within each sub-reach. A description of and the rational for measuring each of the attributes is provided below. The details of how these attributes are recorded/evaluated are also described below in the following sections.

Channel Morphology

Channel morphology (or geomorphology) is a characterization of the shape of the stream channel including measurements and/or visual estimates of channel dimensions and riffle-pool sequences. i.e. a measure of the amount of riffles, runs and pools that occur in a given reach.

The channel observed includes that portion of the stream between the base flow wetted area and the top of the normal high water channel often referred to as the bankfull stage (Figure 1.) The "bankfull" or "active" channel is defined as the channel that is filled by moderate-sized flood events that typically occur every one or two years. Such flow levels are on the verge of entering the flood plain and are believed to control channel dimensions in most streams.

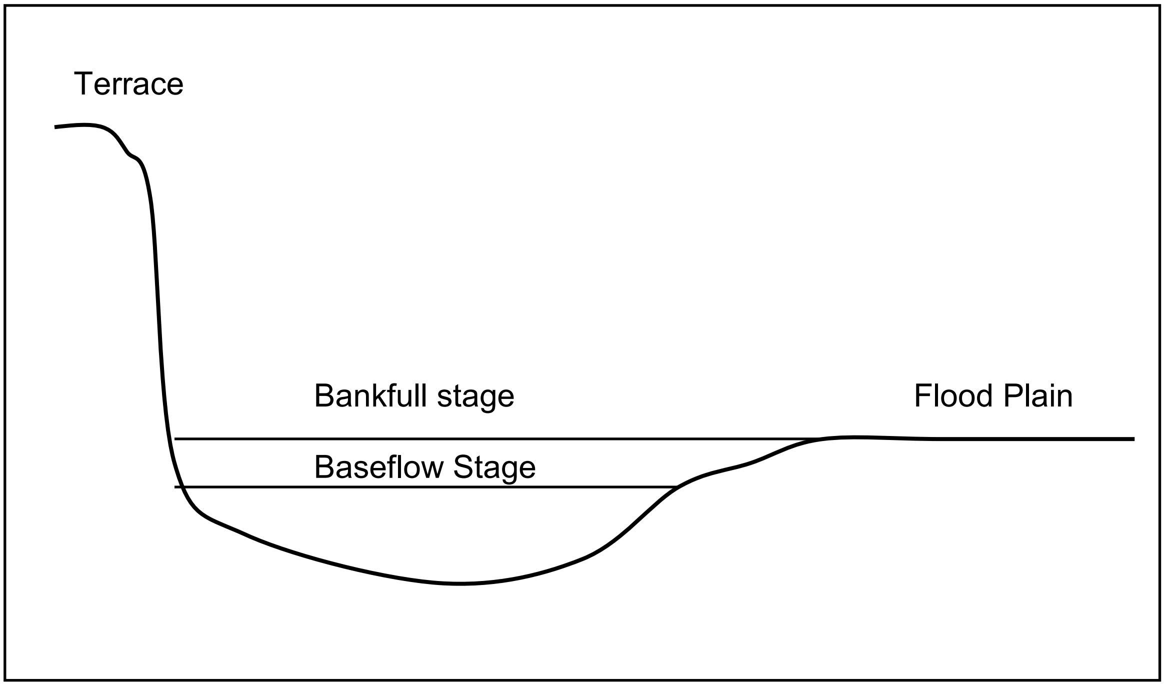


Figure 1. Stream channel depicting bankfull stage.

1) Reach and Sub Reach Length Determination

   Reach length is determined by measuring bankfull width at five locations, deriving an average bankfull width and multiplying that average by 20. First, bankfull stage or normal high water is identified at 5 transects within the study area. At least two separate riffles (or alternatively runs in streams not exhibiting riffle morphology) must be included among the 5 transects. Then bankfull width and depth (bankfull depth can only be determined from the riffle/run morphology) is determined from the 5 streams transects and recorded on the record sheet. Transect locations should be selected to include each prominent morphology type represented in the stream. Bankfull widths are measured to the nearest foot and bankfull depths are measured to the nearest 1/10 foot using a wading rod and tape measure/range finder, respectively. This total reach length (average width x 20) is then divided by ten to determine the length of each of ten sub-reaches for analysis. Analysis of the first sub-reach should begin at the head of a given stream morphology type (i.e. riffle, run or pool).

2) Riffle-Pool Sequence

   Stream morphology refers to the abundance and placement (sequencing) of riffles, runs, and pools in a stream system. This sequencing is an indicator of a streams hydrological regime and stability as well as a determinant of its potential to sustain diverse aquatic communities. Within the overall reach and beginning at the head of a morphological type (riffle, run or pool) the length of each morphological type in the sub-reach should be measured using a tape measure range finder or and recorded on the record sheet. The sequence of each morphological type should be depicted for that sub-reach on the record sheet using the provided notations so as to create a map or drawing to the location of each riffle, run or pool. The resulting measurements should provide a quantitative measure of the percent of the overall study reach representing each stream morphological type (i.e. 40% riffle, 30% run, 30% pool, etc).

3) Depth and Width Regime

   Average stream depth and width will be calculated in riffles (or runs in the absence of riffles) and pools in each sub-reach as follows. Depths will be measured across the stream, similar to that depicted in Figure 2, in a representative section of each riffle, run, and pool within the sub-reach. Depths are generally taken in the thalwag (deepest area in stream channel) and approximately half way between the thalwag and the left and right banks. An estimated average depth for riffles, runs, and pools occurring in a sub-reach is derived from the cross-sectional depth measurements and recorded on the record sheet to the nearest 1/10 foot.

   An average thalwag depth is also recorded on the record sheet to the nearest 1/10 foot. Once completed for all 10 sub-reaches this should provide accurate semi-quantitative measurements of riffle, run and pool average depth and depth variability across the entire stream reach.

   Stream wetted widths will be measured along a transect in a representative section of each riffle, run and pool in the sub-reach. An estimated average width for each morphological type in a sub-reach should be recorded on the record sheet to the nearest foot. Once completed for all 10 sub-reaches this should provide accurate semi-quantitative measurements of riffle, run and pool widths across the entire stream reach.

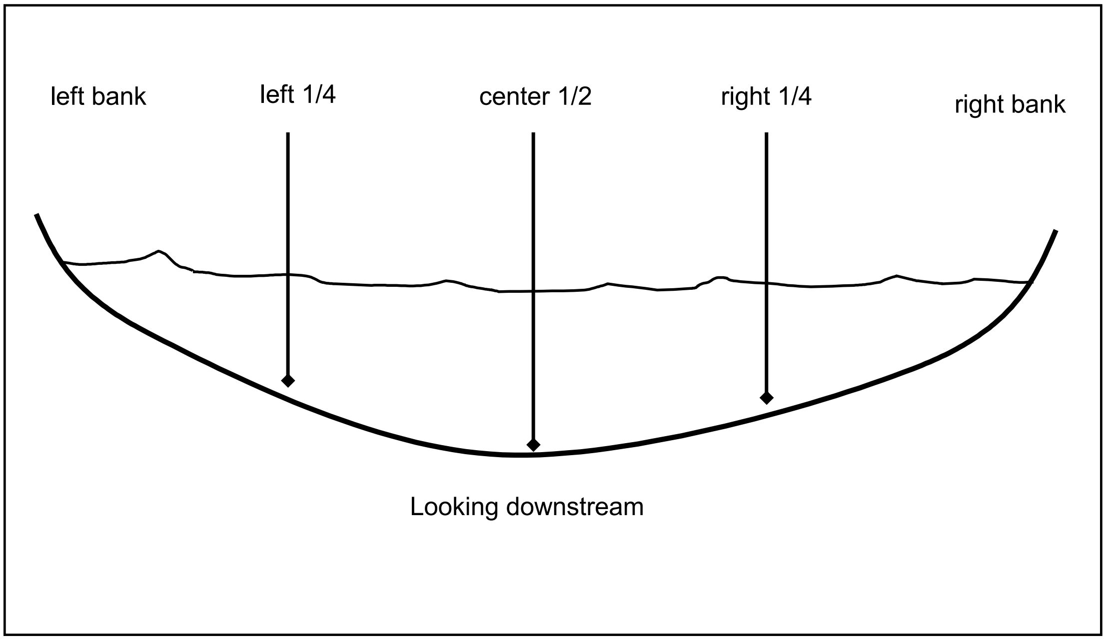


Figure 2. Approximate position of measurements across transect.

In-Stream Structure

In-stream structure describes the characteristics of the stream within the wetted perimeter that makes up the habitat suitable for colonization of aquatic biota. This includes information about natural substrates (gravel, boulders, etc), aquatic plants and algae, and debris that has been washed into or fallen into the stream, such as logs, leaves, etc. A stream capable of sustaining diverse aquatic communities will contain a variety of in-stream structure including some that is permanent and some that is mobile during high flow events.

4) Epifaunal Substrate (Macroinvertebrates)

Epifaunal substrate refers to the area on the bottom of the stream (entire wetted bottom) where macroinvertebrates inhabit. This attribute is scored as a percentage of the stream bottom in a sub-reach which contains substrates suitable for macroinvertebrate colonization. Scoring for this attribute should rely heavily on the stability of the substrate, the size of the interstitial spaces, and the cleanliness (not covered in thick algae or sediment deposits) of the substrate. Cobbles and coarse gravel will score higher percentages as they contain larger interstitial spaces for colonization, while sand and silt would score lower since they provide little spaces. In addition, root wads along the bank would score higher as they are more stable features than are depositional areas or small woody debris. Epifaunal substrate is scored on a “percent stable habitat coverage” within the sub-reach.

5) In-Stream Habitat (Fish)

In-stream habitat refers to the habitat features within the wetted area of the stream sub-reach which are available for fish colonization. This attribute is scored as the percentage of the wetted stream bottom in a sub-reach which is covered with fish habitat. Similar to the epifaunal substrate attribute, substrates composed of cobbles and boulders score higher for fish cover as they provide better spaces for colonization. Other habitats that score high are large woody debris (individual logs with diameter >4 inches or complex woody structures composed of rootwads, logs, or limbs with diameter of 1.5 ft. or greater)and undercut banks. While habitats that score lower are those such as depositional areas, leaf packs, and fine sediments or sand. In-stream habitat is scored on a “percent stable habitat coverage” within the sub-reach.

6) Substrate Characterization

The dominant stream substrate size classification for riffles and pools within each sub-reach will be recorded on the record sheet. Only substrates within the wetted perimeter are evaluated. This information will be used to characterize the similarities and or differences in substrate structure and complexity in the riffles, runs and pools of the study reach as it relates to the development and maintenance of the systems biological integrity.

Classify the particle into one of the size classes listed on the Semi-Quantitative Habitat Assessment Field Form based on the size of the intermediate axis (median dimension) of its length, width, and depth. This "median" dimension is the sieve size through which the particle can pass.

Bedrock	smooth or rough
Boulder	>25 cm (>10 in.)
Cobble	6-25 cm (3 – 10 in.)
Coarse Gravel	1.6 – 6 cm (<3 in.)
Fine Gravel	0.2 – 1.6 cm
Sand	<0.2 cm
Silt/Mud/Clay	fine, not gritty

Always make notations for unusual substrates such as concrete or asphalt and denote these artificial substrates as "other" and describe them in the comments section of the field data form. Code and describe other artificial (such as large appliances, tires, car bodies, etc.) substrates in the same manner.

7) Embeddedness

Embeddedness is the fraction of a particle's surface that is surrounded by (embedded in) sand or finer sediments on the stream bottom. By definition, the embeddedness of sand, silt, clay, and muck is 100 percent and the embeddedness of hardpan and bedrock is 0 percent.

For this attribute estimations are not made per sub-reach but for the entire stream reach as a whole. An estimation of the "percent embedded" is recorded for coarse riffle substrates in the study reach. This is accomplished by removing 12 pieces of cobble, gravel, or small boulders in at least two different riffles (three maximum) and recording the percent embedded for each. Percent embedded can be visually observed as the darkened portion of the coarse substrate that was buried in the streams fine bed material. If the darkened area covers half the coarse substrates height than the percent embedded is 50%, etc (Figure 3.)

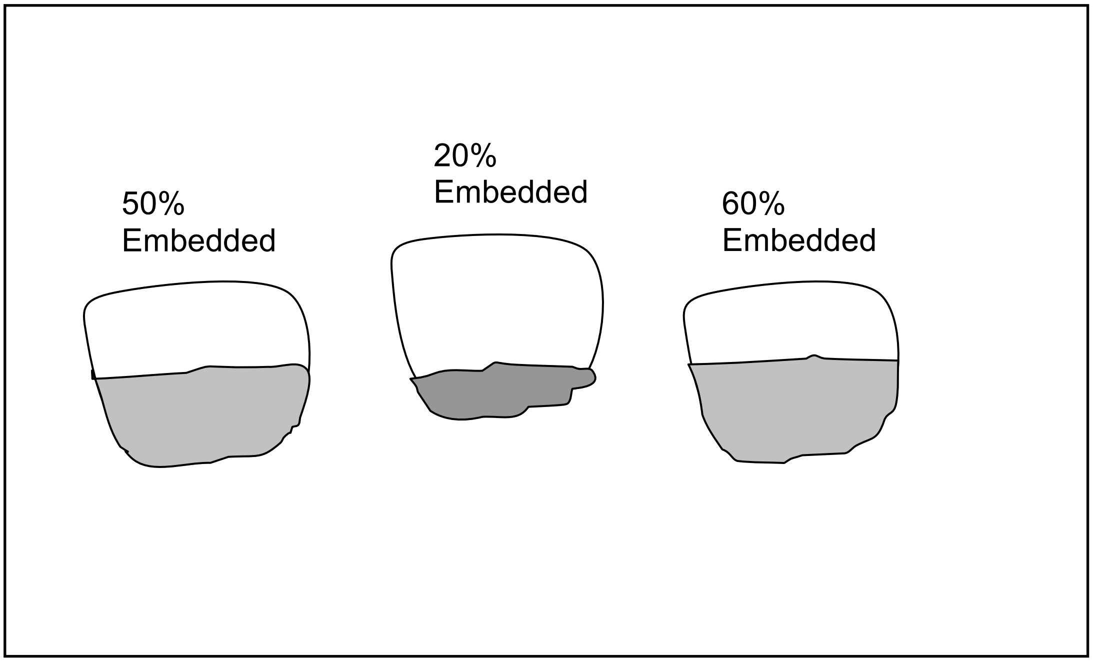


Figure 3. Depiction of percent embedded characteristics.

8) Sediment Deposition

   The sediment deposition attribute refers to the amount of stream bottom (in the wetted perimeter) that is covered by fine sediments and/or particulate organic matter. This attribute is scored as a percentage of the wetted portion of the stream bottom in each sub-reach which is covered by such loose materials.

9) Aquatic Macrophytes and Periphyton Coverage

   An estimate of the percentage of area covered by macrophytes and periphyton in a sub-reach is made and recorded for riffles, runs and pools. Macrophytes refers to aquatic plants that grow in the stream (both emergent and submerged), and periphyton refers to algae that grows on fixed surfaces. This attribute helps biologists determine stream productivity from a nutrient enrichment perspective and also for the availability of food sources for aquatic biota.

Riparian Characteristics

The riparian area includes the area from the stream bank in a direction away from the stream into the upland areas. It is these stream-side riparian zones that ultimately help shape the stream and provide organic material as nutrients to the aquatic system. A well developed riparian area protects stream banks form erosion, provides shading, inputs nutrients, provides materials as habitat (in-stream structure) and filters run-off entering the stream. In the absence of well developed riparian zones the stream is more impacted by encroaching land-uses.

10) Canopy Cover

Canopy cover (percent stream shading) over the stream is determined for each of the sub-reaches. Estimates of cover are made by looking into the canopy over the stream channel. Estimates are made from mid-channel and each quarter channel to determine the average percent canopy cover for the width of the stream in the sub-reach. Percent stream shading at each measurement point can be estimated visually or by use of a spherial densiometer.

11) Bank Stability, Height, and Slope

Bank stability is an important attribute that is an indication of a stream reaches overall hydrologic equilibrium. A bank's stability also determines its ability to provide stable habitat for biota and its propensity to release large sediment yields to the stream, which ultimately cause high turbidity and deposition in downstream reaches. The right and left banks are classified separately according to the following categories:

Score 9-10 = Stable, little evidence of erosion, < 5% bank eroding
Score 6-8 = Moderately stable, some evidence of new erosion, 5-29% bank eroding
Score 3-5 = Moderately unstable, obvious new erosion, 30-59% bank eroding
Score 1-2 = Unstable, most of bank actively eroding, 60-100% bank eroding

Banks composed of sands and gravels are much less stable than banks composed of silt/mud/clay or cobbles. The density of well rooted (more permanent) vegetation and root structure also help to improve a banks stability. Stability is determined by visual observation.

Average bank height (in feet) in each sub-reach is recorded for each bank (left & right). Bank height affects stability of a bank and is an indicator of erosion potential. Bank height can also be an indicator of vertical movement within the stream (i.e. down-cutting). Bank height is estimated by visual observations.

Average bank slope (in degrees) in a sub-reach, is recorded for each bank (left and right). Bank slope affects the stability of a bank and is an indicator of past erosion. A gentle slope may average 30º while a steep or undercut bank may average 90º or 100º, respectively. Bank slope is estimated by visual observation.

12) Vegetative Protection

Bank vegetative protection is evaluated as a percent of the bank surface area which is covered by stable riparian vegetation and their associated roots in a sub-reach. The percent protected is that portion that is stable and not prone to erode by high flows. Each bank (right and left) is assessed separately and the value recorded on the record sheet. Banks are assessed by visual observation from the edge of the water to the top of the first terrace or normal top of bank.

13) Riparian Vegetative Zone Width

Riparian zone width encompasses the area from the top of the normal stream bank outwards into the upland area. The broader the riparian vegetative zone width the more protected the stream banks are from alteration, the fewer pollutants will enter the stream from run-off, and the more available food sources there are to be deposited into the stream from the surrounding forest. Riparian zone width is scored for each bank in a sub-reach according to the following scale:

Score 9-10 = Riparian Zone Width > 18 meters
Score 6-8 = Riparian Zone Width 18 - 12 meters
Score 3-5 = Riparian Zone Width 11 - 6 meters
Score 1-2 = Riparian Zone Width < 6 meters

The width of the riparian zone is estimated by visual observation. Typically, particularly if stream banks are tall, the observation is from the top of the stream bank looking outward. It is often not possible to determine riparian width from the stream.

14) Land-Use Stream Impacts

Significant Alteration of the land-uses in the immediate riparian area can have detrimental affects on the stream habitat and biota. Urban and agricultural activities are often considered the more prominent of those land-uses that may impact a stream. These impacts are assessed by indicting a specific land-use impact associated with a sub-reach (on either bank) on the record sheet and assigning a degree of impact score to the land-use. Land use assessments should be made while arriving or leaving the site by observation of land uses in the general area of the stream. The following land-use categories and impact scoring system are provided:

Land-uses:
C = Cattle,
R = Row Crops,
U = Urban encroachment,
I = Industrial Encroachment, and
O = Other (noted on field form)

Scoring:
0 = no land-use impacts,
1 = minor impacts,
2 = moderate impacts, and
3 = major impacts

Scoring and Analysis of Habitat Assessment Data

Scores from the Semi-Quantitative Habitat Assessment can be utilized in two different ways. First, data collected for each attribute (assessment category) can be used independently to describe the study reach collectively. This method results in information such as: average riffle depth, average pool width, %riffle in entire reach, average bank stability, average (median) substrate size class in pools and riffles, mean %canopy cover, etc. Second, the data collected during the assessment can be used in conjunction with the Qualitative Habitat Assessment procedure to score each of the ten "qualitative" indices with near quantitative accuracy (semi-quantitative). A combination of the two methodologies should be incorporated into all intensive aquatic biota field studies where habitat assessment accuracy and repeatability is critical. The following sections outline the scoring of the qualitative habitat indices using the semi-quantitative data.

High Gradient (riffle-pool stream complexes)

1) Epifaunal Substrate / Available Fish Cover

   Average values from semi-quantitative categories 4 (Epifaunal Substrate) and 5 (In-Stream habitat) are combined into an overall average percent coverage and used to score this metric.

   The following table presents the scoring criteria:

Rank	Optimal	Sub-Optimal	Marginal	Poor
% Coverage	>70%	40%-70%	20%-39%	<20%
Score	20 -16	15 -11	10 - 6	5 - 1

2) Embeddedness

   Reach average percent embedded (from category 7) is used directly to score this metric.

Rank	Optimal	Sub-Optimal	Marginal	Poor
% Embedded	<25%	25%-50%	49%-75%	>75%
Score	20 -16	15 -11	10 - 6	5 - 1

3) Velocity / Depth Regime

   Semi-Quantitative categories 2 (Riffle-Pool Sequence) and 3 (Depth and Width regime) along with flow and velocity data collected in the reach is used to score this metric. Use the following table to determine which regimes are present:

Rank	Slow-deep	Slow-shallow	Fast deep	Fast shallow
Velocity	<1 fps	<1 fps	>1 fps	>1 fps
Depth Regime	>1.6 feet	<1.6 feet	>1.6 feet	<1.6 feet
Typical Morphology	Deep pool	Shallow pool	run	riffle

   If a reach has deep and shallow pools, and distinctive run and riffle morphology, then you have at least three regimes and possible all four regimes. Score each rank lower if shallow regimes are the missing regimes. Scoring is applied as per the following table.

Rank	Optimal	Sub-Optimal	Marginal	Poor
No. Regimes	Four regimes present	Three regimes present	Two regimes present	One regime present
Score	20 -16	15 -11	10 - 6	5 - 1

4) Channel Alteration

Scored from visual assessment of entire reach. Not aided by semi-quantitative attributes.

5) Sediment Deposition

Reach average percent bottom affected by deposition (from category 8) is used directly to score this metric.

Rank	Optimal	Sub-Optimal	Marginal	Poor
% Bottom Affected	<5%	5%-30%	31%-50%	>50%
Score	20 -16	15 -11	10 - 6	5 - 1

Utilize the lower end of each scale to represent reaches where recent sediment bar formation is evident.

6) Frequency of Riffles

Using semi-quantitative category 3 (Depth and Width Regime) the average width of the stream is determined as the average of riffle and pool widths combined. Using category 2 (Riffle-Pool Sequence) the distance between riffles can be calculated using the sequencing notations and the morphological lengths. The table presented below should be used to develop scores for this metric.

Example: a reach with an average width of 18 feet, with 4 riffles separated by a 50 foot pool, a 20 foot run, and a 100 foot pool would result in an average distance between riffles of 57 feet. Therefore, the ratio = 57/18 = 3.2 and would rank as Optimal (score @ 18).

Rank	Optimal	Sub-Optimal	Marginal	Poor
Ratio (distance between riffles : stream width)	<7 : 1	7 – 15 : 1	16 -25 : 1	>25 : 1
Score	20 -16	15 -11	10 - 6	5 - 1

In continuous riffle streams the consistent placement of boulders and logs provides scores in the highest range of the optimal category.

7) Channel Flow Status

Scored from visual assessment of entire reach. Not aided by semi-quantitative attributes.

8) Bank Stability

The average bank stability score for each represented bank from the semi-quantitative assessment (category 11) is directly applied to the qualitative assessment scoring for this metric (i.e. an average reach score of 8 for the right bank and 7 for the left bank gets transferred directly to the qualitative score sheet as such.)

9) Vegetative Protection

Reach average percent bank protected (from category 12 of the semi-quantitative record sheet) is used directly to score this metric for the right and left bank.

Rank	**Optimal**	**Sub-Optimal**	**Marginal**	**Poor**
% Protected	>90%	70% - 90%	50% - 69%	<50%
Score	10-9	8-6	5-3	2-1

10) Riparian Vegetative Zone Width

The average riparian zone width score for each represented bank from the semi-quantitative assessment (category 13) is directly applied to the qualitative assessment scoring for this metric (i.e. an average reach score of 8 for the right bank and 7 for the left bank gets transferred directly to the qualitative score sheet as such.)

Alternative Metrics for Low Gradient Streams (pool dominated complexes)

1) Pool Substrate Characterization (replacement for Embeddedness)

Using the Substrate Characterization data from the semi-quantitative assessment (category 6) and the aquatic vegetation assessment (category 9) the following table may be used to score this metric.

Rank	**Optimal**		**Sub-Optimal**	**Marginal**	**Poor**
Substrate	Cobble or Gravel		Sand/Silt/Clay	Sand/Silt/Clay	Bedrock or Clay Only
Macrophytes Present	Yes	No	Yes	No	No
Score	20 - 18	17 - 16	15 - 11	10 - 6	5 - 1

2) Pool Variability (replacement for Velocity/Depth Regime)

Semi-Quantitative categories 2 (Riffle-Pool Sequence) and 3 (Depth and Width regime) are used to help score this metric. Use the following table to determine pool variability.

Pool Characteristic	**Large-Deep**	**Large-Shallow**	**Small-Deep**	**Small-Shallow**
Size	Length ≥ Width	Length ≥ Width	Length < Width	Length < Width
Depth	≥3.2 feet	< 3.2 feet	≥3.2 feet	< 3.2 feet

An equal balance of all four pool types achieves higher scores. A prevalence of shallow pools scores lower.

3) Channel Sinuosity (replacement for Frequency of Riffles)

This metric is assessed separately from the semi-quantitative data. It can be estimated in the field, measured during a longitudinal survey or calculated from current aerial photographs.

Table 17.

Habitat Characterization Summary Table - Poteau River, Waldron, AR

	Study Locations			
Observation	**PR-1**	**PR-2**	**PR-3**	**UT-2**
Date	10/18/2011	10/18/2011	10/19/2011	10/18/2011
Location (upstream / downstream):	**Upstream/Downstream**	**Upstream/Downstream**	**Jpstream/Downstrean**	**Upstream/Downstream**
Latitude:	34° 54.725'/ 34° 54.771	34° 54.851/ 34° 54.942	34° 55.741/ 34° 55.674'	34° 54.705/ 34° 54.741'
Longitude:	94° 6.188'/ 94° 6.378	94° 6.591/ 94° 6.542	94° 9.942/ 94° 10.083	94° 6.398/ 94° 6.399
General Stream Characteristics:				
Total Habitat Reach Length, ft	1000	960	1040	188
Average Bankfull Width, ft	50	48	52	9.4
Average Bankfull Depth, ft[1]	1.94	2.68	1.83	1.3
Average Velocity, fps	0.01	0.02	1.11	0.29
Flow, cfs	0.06	1.19	2.69	1.53
Morphology Regime				
% Riffle	10	4	18	100
% Run	22	8	24	0
% Pool	68	88	58	0
Depth and Width Regime				
Average Riffle Thalwag Depth, ft.	0.5	0.6	0.7	0.4
Average Riffle Overall Depth, ft.	0.2	0.3	0.5	0.2
Average Riffle Wetted Width, ft	25.0	36.0	13.0	12.0
Average Run Thalwag Depth, ft.	0.7	0.9	0.9	--
Average Run Overall Depth, ft.	0.5	0.5	0.6	--
Average Run Wetted Width, ft	14.0	51.0	28.8	--
Average Pool Thalwag Depth, ft.	1.5	2.3	1.2	--
Average Pool Overall Depth, ft.	1.1	1.7	0.9	--
Average Pool Wetted Width, ft	44.4	44.1	44.3	--
In-Stream Habitat (Percent Stable Habitat)				
Epifaunal Substrate, Macroinvertebrates	39	34	51	52
In-Stream Cover, Fish	53	56	54	45
Substrate Characterization (Dominate Substrate)				
Riffle	Bedrock/Gravel	Cobble/Course Gravel	Cobble	Cobble
Run	Coarse Gravel	Cobble	Bedrock	Cobble
Pool	Coarse Gravel/Bedrock	Bedrock	Bedrock	Cobble
Embeddedness				
% Embeddedness	13	30	20	43
Sediment Deposition				
Average Percent of Bottom Affected	10	24	10	18
Aquatic Macrophytes and Periphyton (Percent Coverage)				
Average Riffle Macrophytes	15	5	26	0
Average Riffle Periphyton	18	80	73	60
Average Run Macrophytes	10	1	12	0
Average Run Periphyton	40	80	77	0
Average Pool Macrophytes	21	1	6	0
Average Pool Periphyton	41	58	84	0
Canopy Cover (Percent Stream Shading)				
Stream Shading	57	58	69	94
Bank Stability and Slope				
Average Left Bank Stability	7	8	7	7
Average Left Bank Slope (degrees)	58	56	68	53
Average Right Bank Stability	8	7	6	8
Average Right Bank Slope (degrees)	52	58	69	38
Bank Vegetative Protection				
Average Left Bank Protection (percent)	68	67	61	46
Average Right Bank Protection (percent)	74	57	70	71
Riparian Vegetative Zone Width				
Average Left Bank Riparian Width, meters	9	9	6	6
Average Right Bank Riparian Width, meters	7	8	4	10
Land-Use Stream Impacts				
Impacts	U/O/1	U/2	O/1	I/3

Table 18.

PR-1 Habitat Assessment Table 10/18/2011

Reach Length Determination:												
Measurement No. / Morph Regime	#1 / Riffle	#2 / Pool	#3 / Riffle	#4 / Riffle	#5 / Pool				Average	Reach Length (ft)	Sub-Reach Length (ft)	
Bankfull Width, ft	62	47	49	54	38				50.0	1000	100.0	
Bankfull Depth, ft[1]	1.9	2.1	2.1	1.0	2.6				1.9			
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Total	%
Riffle					100						100	10.0
Run			100	100		20					220	22.0
Pool	100	100				80	100	100	100	100	680	68.0
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	100.0
Average Thalwag Riffle Depth, ft.					0.5						0.5	
Average Overall Riffle Depth, ft.					0.2						0.2	
Average Riffle Wetted Width, ft					25						25.0	
Average Thalwag Run Depth, ft.			0.9	0.7		0.6					0.7	
Average Overall Run Depth, ft.			0.5	0.5		0.5					0.5	
Average Run Wetted Width, ft			15	12		15					14.0	
Average Thalwag Pool Depth, ft.	1.3	1.6				1.5	2.2	1	1.1	1.8	1.5	
Average Overall Pool Depth, ft.	1	1				1.1	1.5	0.6	0.9	1.3	1.1	
Average Pool Wetted Width, ft	38	38				30	20	55	65	65	44.4	
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Epifaunal Substrate, Macroinvertebrates	40	40	60	60	20	50	45	50	15	10	39.0	
In-Stream Cover, Fish	50	50	60	60	25	60	65	65	40	55	53.0	
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Riffle					7						7	
Run			4	4,5		7					4	
Pool	4	4,7				4	4	4	7	7	4	
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)												
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
% Embedded			20	5							13	
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Percent of Bottom Affected	20	20	5	5	5	15	15	5	5	5	10	
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle Macrophytes					15						15	
Riffle Periphyton					18						18	
Run Macrophytes			5	15		10					10	
Run Periphyton			60	30		30					40	
Pool Macrophytes	20	15				5	30	60	20	0	21	
Pool Periphyton	80	60				45	40	20	20	20	41	
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Stream Shading	60	55	60	45	40	40	60	65	70	75	57	
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Stability	7	8	8	7	8	8	7	7	7	7	7	
Average Left Bank Slope (degrees)	60	45	70	55	50	75	55	60	60	50	58	
Average Right Bank Stability	8	8	7	7	7	8	9	8	8	6	8	
Average Right Bank Slope (degrees)	60	50	60	50	50	30	40	45	55	75	52	
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)												
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Protection (percent)	70	80	70	45	80	80	60	60	65	65	68	
Average Right Bank Protection (percent)	75	75	65	65	65	95	85	70	70	70	74	
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Left Bank Riparian Width, meters	10	10	10	10	10	8	8	7	7	7	9	
Right Bank Riparian Width, meters	5	5	6	6	6	10	10	8	7	8	7	
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)												
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Impacts	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	U/O/1	

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 19.

PR-2 Habitat Assessment Table 10/18/2011

Reach Length Determination:												
Measurement No. / Morph Regime	#1 / Pool	#2 / Riffle	#3 / Pool	#4 / Pool	#5 / Riffle				Average	Reach Length (ft)	Sub-Reach Length (ft)	
Bankfull Width, ft	55	46	46	42	51				48.0	960	96.0	
Bankfull Depth, ft[1]	3.7	1.5	3.5	2.8	1.9				2.7			
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Total	%
Riffle	21	17									38	4.0
Run	75										75	7.8
Pool		79	96	96	96	96	96	96	96	96	847	88.2
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	100.0
Average Thalwag Riffle Depth, ft.	0.5	0.6									0.6	
Average Overall Riffle Depth, ft.	0.3	0.3									0.3	
Average Riffle Wetted Width, ft	41	31									36.0	
Average Thalwag Run Depth, ft.	0.9										0.9	
Average Overall Run Depth, ft.	0.5										0.5	
Average Run Wetted Width, ft	51										51.0	
Average Thalwag Pool Depth, ft.		2	1.9	2.1	1.9	1.9	2.1	3.1	2.6	2.8	2.3	
Average Overall Pool Depth, ft.		1.4	1.6	1.7	1.2	1.6	1.7	2.2	2.0	1.8	1.7	
Average Pool Wetted Width, ft		45	30	50	55	50	42	40	40	45	44.1	
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Epifaunal Substrate, Macroinvertebrates	60	50	20	30	25	20	35	35	35	30	34.0	
In-Stream Cover, Fish	70	50	30	30	65	65	70	70	55	50	55.5	
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Riffle	4	4									4	
Run	4										4	
Pool		4	4	7,6	7	7,3	7,4	1,3	7	7,4	7	
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)												
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
% Embedded	30	30									30	
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Percent of Bottom Affected	10	30	10	10	5	40	30	30	20	50	24	
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle Macrophytes	5	5									5	
Riffle Periphyton	80	80									80	
Run Macrophytes	1										1	
Run Periphyton	80										80	
Pool Macrophytes		5	0	0	0	0	0	0	0	0	1	
Pool Periphyton		90	60	80	70	10	50	50	55	55	58	
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Stream Shading	75	10	35	60	75	75	50	60	65	70	58	
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Stability	6	8	8	8	7	8	8	9	9	5	8	
Average Left Bank Slope (degrees)	80	50	50	50	75	60	45	45	45	60	56	
Average Right Bank Stability	7	7	7	7	7	7	7	7	7	7	7	
Average Right Bank Slope (degrees)	60	55	65	50	55	50	55	60	60	70	58	
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)												
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Protection (percent)	50	70	75	80	80	80	80	80	60	10	67	
Average Right Bank Protection (percent)	70	65	45	70	50	60	65	65	45	30	57	
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Left Bank Riparian Width, meters	10	10	10	10	10	10	10	7	9	7	9	
Right Bank Riparian Width, meters	10	10	10	10	10	5	5	7	7	7	8	
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)												
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Impacts	U/2	U/2	U/2	U/2	U/2	U/O/2	U/O/2	U/O/2	U/O/2	U/O/2	U/2	

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 20.

PR-3 Habitat Assessment Table 10/19/2011

Reach Length Determination:												
Measurement No. / Morph Regime	#1 / Glide	#2 / Run	#3 / Riffle	#4 / Riffle	#5 / Pool				Average	Reach Length (ft)	Sub-Reach Length (ft)	
Bankfull Width, ft	47	53	54	56	53				52.0	1040	104.0	
Bankfull Depth, ft[1]	1.6	2.2	1.4	1.8	2.2				1.8			
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Total	%
Riffle			74	44		25	44				187	18.0
Run	94		30	10		40	35	44			253	24.3
Pool	10	104		50	104	39	25	60	104	104	600	57.7
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	100.0
Average Thalwag Riffle Depth, ft.			0.6	0.7		0.8	0.7				0.7	
Average Overall Riffle Depth, ft.			0.4	0.4		0.5	0.5				0.5	
Average Riffle Wetted Width, ft			10	18		14	10				13.0	
Average Thalwag Run Depth, ft.	0.6		0.7	0.9		1	1	0.9			0.9	
Average Overall Run Depth, ft.	0.4		0.5	0.6		0.6	0.7	0.6			0.6	
Average Run Wetted Width, ft	25		50	35		18	30	15			28.8	
Average Thalwag Pool Depth, ft.	0.9	1		1.2	1.5	1.8	1.3	0.7	0.9	1.5	1.2	
Average Overall Pool Depth, ft.	0.6	0.8		1	1	1.4	1	0.6	0.7	1	0.9	
Average Pool Wetted Width, ft	30	54		60	40	40	35	42	45	53	44.3	
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Epifaunal Substrate, Macroinvertebrates	50	30	80	65	60	70	65	30	30	30	51.0	
In-Stream Cover, Fish	50	30	75	65	60	65	65	35	40	50	53.5	
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle			4	4		4	4				4	
Run	7		4	4		4	7	7			7,4	
Pool	7	7		7	7	7	7	7	7	7	7	
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)												
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
% Embedded	5	0	70	20	0	5	0	0	15	80	20	
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Percent of Bottom Affected	5	5	5	10	10	15	10	20	5	10	10	
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle Macrophytes			50	10		5	40				26	
Riffle Periphyton			60	80		80	70				73	
Run Macrophytes	15		5	25		15	5	5			12	
Run Periphyton	95		75	80		65	80	65			77	
Pool Macrophytes	15	5		10	5	5	0	5	5	0	6	
Pool Periphyton	95	95		70	80	80	80	90	90	75	84	
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Stream Shading	65	70	65	70	80	70	60	60	65	80	69	
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Stability	6	5	5	6	6	5	9	9	8	8	7	
Average Left Bank Slope (degrees)	80	85	80	75	75	80	45	50	50	55	68	
Average Right Bank Stability	8	5	5	5	6	6	6	7	7	7	6	
Average Right Bank Slope (degrees)	60	85	85	65	60	80	50	55	65	80	69	
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)												
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Protection (percent)	75	50	50	65	70	60	55	50	70	60	61	
Average Right Bank Protection (percent)	80	65	60	75	75	75	70	60	75	60	70	
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Left Bank Riparian Width, meters	5	5	6	6	6	6	6	6	5	4	6	
Right Bank Riparian Width, meters	5	5	5	4	4	4	4	4	4	4	4	
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)												
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Impacts	O/1	O/1	O/1	O/1	O/1	O/1	O/1	O/1	O/1	O/1	O/1	

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 21.

UT-2 Habitat Assessment Table 10/18/2011

Reach Length Determination:												
Measurement No. / Morph Regime	#1 / Riffle	#2 / Riffle	#3 / Pool	#4 / Riffle	#5 /				Average	Reach Length (ft)	Sub-Reach Length (ft)	
Bankfull Width, ft	9	10	8.5	9	10.5	--	--	--	9.4	188	18.8	
Bankfull Depth, ft[1]	1	1.3	1.7	1.1	1.3	--	--	--	1.3			
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Total	%
Riffle	18	18	18	18	18	18	18	18	18	18	180	100.0
Run	--	--	--	--	--	--	--	--	--	--	0	0.0
Pool	--	--	--	--	--	--	--	--	--	--	0	0.0
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	100.0
Average Thalwag Riffle Depth, ft.	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.4	
Average Overall Riffle Depth, ft.	0.2	0.2	0.4	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	
Average Riffle Wetted Width, ft	12	12	12	12	12	12	12	12	12	12	12.0	
Average Thalwag Run Depth, ft.												
Average Overall Run Depth, ft.												
Average Run Wetted Width, ft												
Average Thalwag Pool Depth, ft.												
Average Overall Pool Depth, ft.												
Average Pool Wetted Width, ft												
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Epifaunal Substrate, Macroinvertebrates	45	45	55	50	50	50	50	60	60	50	51.5	
In-Stream Cover, Fish	45	45	50	40	45	45	40	50	50	40	45.0	
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle	3	3	3	3	3	3	3	3	3	4	3.0	
Run												
Pool												
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)												
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
% Embedded		50			15			55		50	43	
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Percent of Bottom Affected	20	10	20	5	15	15	35	40	5	10	18	
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Riffle Macrophytes	0	0	0	0	0	0	0	0	0	0	0.0	
Riffle Periphyton	20	50	50	60	70	75	60	60	80	75	60.0	
Run Macrophytes												
Run Periphyton												
Pool Macrophytes												
Pool Periphyton												
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Stream Shading	90	95	95	95	95	90	90	95	95	95	94	
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Stability	8	7	7	7	7	7	7	7	7	7	7	
Average Left Bank Slope (degrees)	45	30	50	45	55	60	55	60	65	65	53	
Average Right Bank Stability	7	8	8	8	8	8	8	8	8	8	8	
Average Right Bank Slope (degrees)	45	45	45	45	45	40	35	30	25	25	38	
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)												
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Average Left Bank Protection (percent)	80	45	45	40	40	45	55	35	35	35	46	
Average Right Bank Protection (percent)	65	80	80	70	65	75	80	60	65	65	71	
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Average	
Left Bank Riparian Width, meters	9	5	5								6	
Right Bank Riparian Width, meters	10	10	10								10	
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)												
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	Dominate	
Impacts	I/3	I/3	I/3	I/3	I/3	I/3	I/3	I/3	I/3	I/3	I/3	

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 22.

Habitat Characterization Summary Table - Poteau River, Waldron, AR

Observation	**Study Locations**			
	PR-0E	**PR-0W**	**PR-0.5**	**PR-1**
Date	4/30/2015	4/28/2015	4/30/2015	4/29/2015
Location (upstream / downstream):	**Upstream/Downstream**	**Upstream/Downstream**	**Jpstream/Downstrean**	**Upstream/Downstream**
Latitude:				
Longitude:				
General Stream Characteristics:				
Total Habitat Reach Length, ft	804	632	1116	1084
Average Bankfull Width, ft	40.2	31.6	55.8	54.2
Average Bankfull Depth, ft[1]	3.08	2.1	3.42	3.1
Average Velocity, fps	0.67	0.67	0.64	0.58
Flow, cfs	22.70	11.44	42.07	33.12
Morphology Regime				
% Riffle	13	20	14	25
% Run	24	43	13	31
% Pool	64	38	73	44
Depth and Width Regime				
Average Riffle Thalwag Depth, ft.	1.0	1.2	1.2	1.2
Average Riffle Overall Depth, ft.	0.6	0.6	0.5	1.0
Average Riffle Wetted Width, ft	35.4	28.3	39.0	39.3
Average Run Thalwag Depth, ft.	1.3	1.6	2.1	1.0
Average Run Overall Depth, ft.	0.9	1.1	1.0	1.5
Average Run Wetted Width, ft	28.3	31.2	21.0	49.5
Average Pool Thalwag Depth, ft.	2.8	2.4	2.8	2.1
Average Pool Overall Depth, ft.	2.2	1.8	1.9	1.9
Average Pool Wetted Width, ft	38.9	29.6	51.2	46.1
In-Stream Habitat (Percent Stable Habitat)				
Epifaunal Substrate, Macroinvertebrates	39	28	34	32
In-Stream Cover, Fish	49	27	43	29
Substrate Characterization (Dominate Substrate)				
Riffle	Coarse gravel	Coarse gravel	Coarse gravel	Fine gravel
Run	Bedrock	Bedrock	Coarse gravel	Bedrock
Pool	Bedrock	Fine gravel	Bedrock	Bedrock
Embeddedness				
% Embeddedness	20	14	23	15
Sediment Deposition				
Average Percent of Bottom Affected	12	3	8	10
Aquatic Macrophytes and Periphyton (Percent Coverage)				
Average Riffle Macrophytes	29	33	35	34
Average Riffle Periphyton	33	14	47	26
Average Run Macrophytes	8	11	10	29
Average Run Periphyton	10	28	45	13
Average Pool Macrophytes	8	9	2	9
Average Pool Periphyton	3	3	3	4
Canopy Cover (Percent Stream Shading)				
Stream Shading	64	43	72	68
Bank Stability and Slope				
Average Left Bank Stability	5	6	7	11
Average Left Bank Slope (degrees)	81	73	69	67
Average Right Bank Stability	3	5	5	7
Average Right Bank Slope (degrees)	78	48	72	54
Bank Vegetative Protection				
Average Left Bank Protection (percent)	65	88	77	79
Average Right Bank Protection (percent)	75	81	81	86
Riparian Vegetative Zone Width				
Average Left Bank Riparian Width, meters	6	3	5	4
Average Right Bank Riparian Width, meters	3	6	9	8
Land-Use Stream Impacts				
Impacts	C 3	C 1	C 1	I 1

Table 23.

PR-0E Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	42	42	39	39	39				40.2	804			80.4
Bankfull Depth, ft[1]	3.2	2.5	3.5	2.2	4.0				3.1				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	10	22	--	36	22	--	--	--	--	13			103
Run	6	--	--	--	--	--	38	--	82	69			195
Pool	66	60	82	44	60	82	44	82	--	--		59.58333333	520
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	1	0.8	--	1.1	1.1	--	--	--	--	0.8			1.0
Average Overall Riffle Depth, ft.	0.6	0.5	--	0.6	0.6	--	--	--	--	0.7			0.6
Average Riffle Wetted Width, ft	40	35	--	35	40	--	--	--	--	27			35.4
Average Thalwag Run Depth, ft.	0.9	--	--	--	--	--	1.2	--	1.8	1.2			1.3
Average Overall Run Depth, ft.	0.6	--	--	--	--	--	1	--	1.1	1			0.9
Average Run Wetted Width, ft	40	--	--	--	--	--	12	--	33	28			28.3
Average Thalwag Pool Depth, ft.	2.7	2.8	2.7	2.2	2.7	3.8	3.3	2.1	--	--			2.8
Average Overall Pool Depth, ft.	1.9	2.5	2.4	1.8	2	2.8	2.7	1.8	--	--			2.2
Average Pool Wetted Width, ft	40	38	35	35	40	35	48	40	--	--			38.9
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	55	50	15	75	40	45	35	30	20	25			39.0
In-Stream Cover, Fish	55	50	60	55	55	70	40	35	40	30			49.0
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	4	4	--	4	4	--	--	--	--	4			4
Run	4	--	--	--	--	--	3	--	7	7			7
Pool	7	7	7	4	4	7	3	3	0	--			7
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	10	15	15	30	10	25	20	10	30	40	30	5	20
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	20	20	15	0	30	10	5	5	5	10			12
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	30	50	--	40	20	--	--	--	--	5			29
Riffle Periphyton	30	30	--	40	35	--	--	--	--	30			33
Run Macrophytes	10	--	--	--	--	--	10	--	5	5			8
Run Periphyton	30	--	--	--	--	--	10	--	0	0			10
Pool Macrophytes	15	5	0	20	10	5	0	5	--	--			8
Pool Periphyton	0	0	0	5	5	5	0	5	--	--			3
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	55	65	75	40	35	75	75	75	60	85			64
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	3	4	5.5	5	5	4.5	4	3.5	6.5	10			5
Average Left Bank Slope (degrees)	60	70	80	85	90	85	85	85	80	90			81
Average Right Bank Stability	3	4	3	3	3	3	4	4	4	3			3
Average Right Bank Slope (degrees)	85	90	80	85	80	60	75	80	75	70			78
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	80	75	60	85	55	75	85	40	60	30			65
Average Right Bank Protection (percent)	60	50	70	80	80	75	85	80	90	80			75
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	8	9	9	9	8	8	5	2	1	1			6
Right Bank Riparian Width, meters	5	1	1	1	1	8	8	2	1	1			3
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	C/3	C/3	C/3	C/3	C/3	C/3	C/3	C/3	C/3	C/3			C 3

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 24.

PR-0W Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	26	25	32	33	42				31.6	632			63.2
Bankfull Depth, ft[1]	1.1	1.0	3.5	1.4	3.5				2.1				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	--	64	20	24	20	--	--	--	--	--			128
Run	64	--	--	16	--	--	--	64	64	64			272
Pool	--	--	44	24	44	64	64	--	--	--			240
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	--	1.2	1	1.2	1.2	--	--	--	--	--			1.2
Average Overall Riffle Depth, ft.	--	0.5	0.5	0.7	0.6	--	--	--	--	--			0.6
Average Riffle Wetted Width, ft	--	25	25	33	30	--	--	--	--	--			28.3
Average Thalwag Run Depth, ft.	1	--	--	2	--	--	--	2.5	1.3	1			1.6
Average Overall Run Depth, ft.	2	--	--	1	--	--	--	1	0.9	0.8			1.1
Average Run Wetted Width, ft	20	--	--	32	--	--	--	35	35	34			31.2
Average Thalwag Pool Depth, ft.	--	--	2.8	2.8	3.2	2	1.2	--	--	--			2.4
Average Overall Pool Depth, ft.	--	--	2	2	2.5	1.5	1	--	--	--			1.8
Average Pool Wetted Width, ft	--	--	32	32	42	38	3.8	--	--	--			29.6
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	15	75	35	45	45	15	15	15	10	10			28.0
In-Stream Cover, Fish	25	25	25	30	45	45	40	10	10	10			26.5
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	--	4	4	4	4	--	--	--	--	--			4
Run	7	--	--	4	--	--	--	7	7	7			7
Pool	--	--	3	3	3	7	3	--	--	--			3
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	0	10	10	0	20	20	10	5	5	30	30	25	14
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	5	0	0	0	5	10	5	0	0	0			3
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	--	70	10	35	15	--	--	--	--	--			33
Riffle Periphyton	--	15	20	10	10	--	--	--	--	--			14
Run Macrophytes	10	--	--	20	--	--	--	15	5	5			11
Run Periphyton	25	--	--	10	--	--	--	25	50	30			28
Pool Macrophytes	--	--	10	10	5	15	5	--	--	--			9
Pool Periphyton	--	--	10	0	5	0	0	--	--	--			3
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	40	45	40	35	35	45	40	40	65	40			43
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	3	3.5	6.5	8	8	5	6	5.5	6	6			6
Average Left Bank Slope (degrees)	60	50	70	80	85	40	80	85	90	90			73
Average Right Bank Stability	6	6	5.5	4	4	5	5	4	4	4			5
Average Right Bank Slope (degrees)	60	45	45	50	50	50	50	40	45	45			48
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	85	90	90	95	85	85	90	75	90	90			88
Average Right Bank Protection (percent)	90	80	80	90	85	95	75	75	75	60			81
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	9	8	2	1	1	4	4	1	1	1			3
Right Bank Riparian Width, meters	4	4	5	8	8	7	7	7	4	3			6
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	C/U 1	C/U 1	C/U 2	C/U 2	C/U 2	C/U 2	C 1	C 1	C 1	C 1			C 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 25.

PR-0.5 Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	51	54	54	63	57				55.8	1116			111.6
Bankfull Depth, ft[1]	3	3.6	3.2	2.6	4.7				3.4				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	48	--	--	--	67	--	--	34	--	--			149
Run	--	--	--	--	--	--	112	26	--	--			138
Pool	64	112	112	112	45	112	--	2	112	112			783
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	1.6	--	--	--	1.0	--	--	1.1	--	--			1.2
Average Overall Riffle Depth, ft.	0.7	--	--	--	0.4	--	--	0.4	--	--			0.5
Average Riffle Wetted Width, ft	48	--	--	--	55	--	--	14	--	--			39.0
Average Thalwag Run Depth, ft.	--	--	--	--	--	--	2.2	2	--	--			2.1
Average Overall Run Depth, ft.	--	--	--	--	--	--	0.8	1.2	--	--			1.0
Average Run Wetted Width, ft	--	--	--	--	--	--	30	12	--	--			21.0
Average Thalwag Pool Depth, ft.	2	2.2	2.6	3.2	4	4	--	2.8	3.3	1.5			2.8
Average Overall Pool Depth, ft.	1.8	1.7	2	2.5	2.9	2	--	1.6	1.8	0.7			1.9
Average Pool Wetted Width, ft	46	50	50	50	55	50	--	55	55	50			51.2
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	60	20	15	15	60	25	60	45	25	15			34.0
In-Stream Cover, Fish	50	35	40	35	50	60	45	50	45	15			42.5
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	4	--	--	--	4	--	--	4	--	--			4
Run	--	--	--	--	--	--	4	4	--	--			4
Pool	7	7	7	7	3	3	--	3	3	7			7 3
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	0	0	50	20	30	50	15	10	20	40	0	35	23
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	10	5	5	5	15	20	0	10	10	0			8
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	40	--	--	--	60	--	--	5	--	--			35
Riffle Periphyton	50	--	--	--	50	--	--	40	--	--			47
Run Macrophytes	--	--	--	--	--	--	15	5	--	--			10
Run Periphyton	--	--	--	--	--	--	50	40	--	--			45
Pool Macrophytes	5	5	0	0	0	5	0	5	0	0			2
Pool Periphyton	5	5	5	5	0	5	0	0	0	0			3
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	80	60	35	70	60	65	90	85	85	90			72
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	5.5	6	5.5	6	10	10	8	7	7	3.5			7
Average Left Bank Slope (degrees)	80	85	65	80	70	70	80	55	60	45			69
Average Right Bank Stability	4.5	3.5	6	5	4.5	5	4	5.5	6	6.5			5
Average Right Bank Slope (degrees)	70	50	75	75	70	85	45	80	85	80			72
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	50	60	90	70	90	80	80	85	80	80			77
Average Right Bank Protection (percent)	85	90	90	85	90	80	95	80	55	55			81
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	5	8	9	9	3	2	2	3	4	6			5
Right Bank Riparian Width, meters	5	9	9	9	9	9	9	9	9	9			9
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	U 2	U 1	U 1	--	C 1	C 1	C 1	C 1	C 1	--			C 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Table 26.

PR-1 Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	61	54	54	54	48				54.2	1084			108.4
Bankfull Depth, ft[1]	3.5	3.2	2.7	2.8	3.3				3.1				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	90	60	30	--	25	70	--	--	--	--			275
Run	--	--	--	110	85	30	--	110	--	--			335
Pool	20	50	80	--	--	--	110	--	110	110			480
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	1	--	1.5	--	1.0	1.1	--	--	--	--			1.2
Average Overall Riffle Depth, ft.	1.8	--	0.8	--	0.7	0.7	--	--	--	--			1.0
Average Riffle Wetted Width, ft	60	--	48	--	39	10	--	--	--	--			39.3
Average Thalwag Run Depth, ft.	--	1	--	1	1	1.1	--	--	--	--			1.0
Average Overall Run Depth, ft.	--	2	--	1.1	2.2	0.7	--	--	--	--			1.5
Average Run Wetted Width, ft	--	60	--	48	45	45	--	--	--	--			49.5
Average Thalwag Pool Depth, ft.	1.5	2	2.4	--	--	--	2.4	1.8	1.9	3			2.1
Average Overall Pool Depth, ft.	2.2	2.5	2.2	--	--	--	1.5	1.0	1.4	2.6			1.9
Average Pool Wetted Width, ft	45	45	45	--	--	--	43	45	50	50			46.1
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	85	35	20	30	40	40	20	20	15	15			32.0
In-Stream Cover, Fish	40	20	25	30	25	25	35	20	30	40			29.0
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	3	3	3	--	7	7	--	--	--	--			3
Run	--	--	--	3	7	7	--	7	--	--			7
Pool	3	3	3	--	--	--	7	--	7	7			7
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	15	20	10	20	70	15	10	5	10	0	0	0	15
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	5	10	5	0	0	0	30	35	10	5			10
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	30	--	20	--	10	75	--	--	--	--			34
Riffle Periphyton	5	--	5	--	45	50	--	--	--	--			26
Run Macrophytes	--	15	--	40	20	25	--	45	--	--			29
Run Periphyton	--	0	--	5	40	10	--	10	--	--			13
Pool Macrophytes	5	5	3	--	--	--	30	--	10	0			9
Pool Periphyton	0	0	0	--	--	--	20	--	5	0			4
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	75	80	60	55	50	60	60	80	70	85			68
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	12	12	10	10	12	10	11	15	15	5.5			11
Average Left Bank Slope (degrees)	60	60	65	70	60	80	80	65	65	60			67
Average Right Bank Stability	12	12	8	6	4	4	3	5	6.5	10			7
Average Right Bank Slope (degrees)	60	60	55	70	45	40	35	50	55	65			54
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	90	85	85	80	80	75	75	75	70	70			79
Average Right Bank Protection (percent)	85	85	85	80	85	95	95	90	85	70			86
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	5	2	2	2	2	4	5	5	6	7			4
Right Bank Riparian Width, meters	4	4	9	9	8	8	9	9	8	7			8
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	I 1	I 1	I 1	I 1	I 1	I 1	--	--	--	--			I 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

PR-2 Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	54	56	45	54	60				53.8	1076			107.6
Bankfull Depth, ft[1]	4	2.5	2.7	4.3	2.7				3.2				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11		Total
Riffle	65	--	--	--	--	--	--	--	--	--	30		95
Run	10	--	--	--	--	--	--	--	--	--	80		90
Pool	35	110	110	110	110	110	110	10	110	110	--		925
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11		Average
Average Thalwag Riffle Depth, ft.	0.8	--	--	--	--	--	--	--	--	--	1.2		1.0
Average Overall Riffle Depth, ft.	1.9	--	--	--	--	--	--	--	--	--	0.8		1.4
Average Riffle Wetted Width, ft	50	--	--	--	--	--	--	--	--	--	--		50.0
Average Thalwag Run Depth, ft.	1	--	--	--	--	--	--	--	--	--	1.3		1.2
Average Overall Run Depth, ft.	1.5	--	--	--	--	--	--	--	--	--	1		1.3
Average Run Wetted Width, ft	36	--	--	--	--	--	--	--	--	--	42		39.0
Average Thalwag Pool Depth, ft.	2.1	2.5	2.8	3.2	2.9	2.8	4.5	5	3	2.2	--		3.1
Average Overall Pool Depth, ft.	2.5	2	2.2	2.6	2.5	2.2	3.3	2.5	2.4	1.7	--		2.4
Average Pool Wetted Width, ft	39	42	42	51	50	40	40	45	43	42	--		43.4
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Average
Epifaunal Substrate, Macroinvertebrates	65	20	20	15	15	15	15	15	15	15	30		21.8
In-Stream Cover, Fish	40	50	30	40	40	45	40	40	35	35	25		38.2
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Dominate
Riffle	4	--	--	--	--	--	--	--	--	--	--		4
Run	4	--	--	--	--	--	--	--	--	--	7		7
Pool	4	3	3	5	7	7	7	7	7	7	--		7
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	5	5	5	0	0	5	0	0	5	0	0	22	4
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11		Average
Percent of Bottom Affected	5	10	5	5	5	20	15	15	15	10	0		10
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	35	--	--	--	--	--	--	--	--	--	20		28
Riffle Periphyton	55	--	--	--	--	--	--	--	--	--	40		48
Run Macrophytes	5	--	--	--	--	--	--	--	--	--	5		5
Run Periphyton	35	--	--	--	--	--	--	--	--	--	20		28
Pool Macrophytes	0	10	5	0	0	0	0	0	0	0	--		2
Pool Periphyton	0	0	0	0	5	5	6	5	5	5	--		3
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Average
Stream Shading	85	70	75	80	80	80	70	80	80	75	80		78
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Average
Average Left Bank Stability	6	5	6	6.5	7	5	5.5	6.5	12	10	12		7
Average Left Bank Slope (degrees)	60	40	40	65	50	60	60	60	60	70	70		58
Average Right Bank Stability	7	15	15	7	6.5	5.5	5	5.5	6	5.5	6.5		8
Average Right Bank Slope (degrees)	60	65	65	65	65	60	60	60	60	60	45		60
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Average
Average Left Bank Protection (percent)	60	65	75	80	90	90	90	90	80	75	80		80
Average Right Bank Protection (percent)	80	60	60	80	80	70	85	85	85	80	70		76
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Average
Left Bank Riparian Width, meters	9	9	9	10	10	10	7	5	4	3	3		7
Right Bank Riparian Width, meters	9	6	9	6	5	5	7	8	8	8	6		7
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	# 11		Dominate
Impacts	--	--	--	U 1	U 1	U 1	U 1	--	C 1	C 1	C 1		U 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

PR-3 Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	54	51	54	51	51				52.2	1060			106.0
Bankfull Depth, ft[1]	2.8	3.0	2.4	3.0	2.4				2.7				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	--	70	66	--	53	--	40	--	--	--			229
Run	--	--	--	--	--	--	--	--	--	--			0
Pool	106	36	40	106	53	106	56	106	106	106			821
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	--	1.2	1.3	--	1.0	--	1.7	--	--	--			1.3
Average Overall Riffle Depth, ft.	--	0.6	0.6	--	0.7	--	1.3	--	--	--			0.8
Average Riffle Wetted Width, ft	--	47	47	--	45	--	35	--	--	--			43.5
Average Thalwag Run Depth, ft.	--	--	--	--	--	--	--	--	--	--			#DIV/0!
Average Overall Run Depth, ft.	--	--	--	--	--	--	--	--	--	--			#DIV/0!
Average Run Wetted Width, ft	--	--	--	--	--	--	--	--	--	--			#DIV/0!
Average Thalwag Pool Depth, ft.	1.9	1.6	2	2.3	2	3	2	1.9	2.2	--			2.1
Average Overall Pool Depth, ft.	1.5	1.4	1.7	1.7	1.7	2.5	1.6	1.6	2.0	--			1.7
Average Pool Wetted Width, ft	45	45	47	50	45	43	50	54	45	45			46.9
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	20	40	40	20	50	15	45	15	29	15			28.9
In-Stream Cover, Fish	25	25	30	40	40	20	20	25	30	30			28.5
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	--	3	3	--	4	--	4	--	--	--			3 4
Run	--	--	--	--	--	--	--	--	--	--			--
Pool	7	7	7	7	7	7	7	7	7	7			7
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	5	10	0	10	0	15	5	50	30	10	15	50	17
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	10	10	15	5	0	0	5	5	5	5			6
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	--	60	70	--	40	--	40	--	--	--			53
Riffle Periphyton	--	20	20	--	50	--	30	--	--	--			30
Run Macrophytes	--	--	--	--	--	--	--	--	--	--			#DIV/0!
Run Periphyton	--	--	--	--	--	--	--	--	--	--			#DIV/0!
Pool Macrophytes	15	5	10	15	5	5	5	5	0	5			7
Pool Periphyton	0	0	0	5	0	0	0	0	0	0			1
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	60	70	65	60	60	65	60	60	80	80			66
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	6.5	6	6	6	6	5.5	5	7	10	10			7
Average Left Bank Slope (degrees)	80	75	75	70	70	60	45	70	60	60			67
Average Right Bank Stability	6.5	6	7	7	7	4	6	6	6	5.5			6
Average Right Bank Slope (degrees)	75	70	70	70	75	80	55	75	80	80			73
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	75	75	80	80	70	75	80	85	95	95			81
Average Right Bank Protection (percent)	90	90	90	90	85	80	75	85	80	80			85
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	7	6	4	6	4	5	9	8	3	3			6
Right Bank Riparian Width, meters	5	4	2	2	2	2	2	2	2	3			3
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1			C 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

JC-1 Habitat Assessment Table Spring 2015

Reach Length Determination:													
Measurement No. / Morph Regime	#1 /	#2 /	#3 /	#4 /	#5 /				Average	Reach Length (ft)			Sub-Reach Length (ft)
Bankfull Width, ft	75	54	60	78	87				70.8	1416			141.6
Bankfull Depth, ft[1]	5	3.0	4.0	3.0	6.0				4.2				
Morphology Regime (ft)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Total
Riffle	--	142	67	62	75	--	--	--	77	142			565
Run	--	--	75	76	67	--	--	10	65	--			293
Pool	142	--	--	--	--	142	142	132	--	--			558
Depth and Width Regime	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Thalwag Riffle Depth, ft.	--	2.5	2.5	2.3	2.5	--	--	--	3	2			2.5
Average Overall Riffle Depth, ft.	--	1.7	1.7	1.0	1.3	--	--	--	2.3	1.2			1.5
Average Riffle Wetted Width, ft	--	54	54	55	50	--	--	--	40	54			51.2
Average Thalwag Run Depth, ft.	--	--	3	4	--	--	--	3.5	3.5	--			3.5
Average Overall Run Depth, ft.	--	--	2	2	--	--	--	2.8	2.8	--			2.4
Average Run Wetted Width, ft	--	--	58	65	--	--	--	45	45	--			53.3
Average Thalwag Pool Depth, ft.	7.5	--	--	--	2.5	3.5	4.5	4.5	--	--			4.5
Average Overall Pool Depth, ft.	2.8	--	--	--	5	7.6	6	6.0	--	--			5.5
Average Pool Wetted Width, ft	75	--	--	--	78	99	90	90	--	--			86.4
In-Stream Habitat (Percent Stable Habitat)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Epifaunal Substrate, Macroinvertebrates	70	80	70	70	60	20	20	25	40	75			53.0
In-Stream Cover, Fish	60	40	50	70	50	55	65	60	45	40			53.5
Substrate Characterization (Dominate Substrate)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Riffle	--	5	5	5	5	--	--	--	--	5			5
Run	--	--	5	5	--	--	--	5	5	--			5
Pool	5	--	--	--	5	4	4	4	5	--			5 4
Bedrock (7), Boulder (6), Cobble (5), Coarse Gravel (4), Fine Gravel (3), Sand (2), Silt / Clay (1)													
Embeddedness	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	Average
% Embedded	10	0	0	0	5	40	0	0	10	0	5	5	6
Sediment Deposition	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Percent of Bottom Affected	25	0	10	20	40	35	45	15	5	0			20
Aquatic Macrophytes and Periphyton (Percent Coverage)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Riffle Macrophytes	--	5	5	0	5	--	--	--	10	0			4
Riffle Periphyton	--	90	90	80	80	--	--	--	70	70			80
Run Macrophytes	--	--	3	0	--	--	--	0	6	--			2
Run Periphyton	--	--	65	50	--	--	--	5	5	--			31
Pool Macrophytes	0	--	--	--	0	0	0	0	--	--			0
Pool Periphyton	70	--	--	--	40	10	5	5	--	--			26
Canopy Cover (Percent Stream Shading)	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Stream Shading	70	60	55	65	55	45	35	40	30	20			48
Bank Stability and Slope	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Stability	7	6	8	12	9	7	9	6	4	5			7
Average Left Bank Slope (degrees)	60	50	55	70	50	75	65	50	45	55			58
Average Right Bank Stability	6	6	6	3	6	10	10	7	4	5			6
Average Right Bank Slope (degrees)	80	50	40	20	30	75	75	70	30	40			51
Stable (9 - 10), Moderately Stable (6 - 8), Moderately Unstable (3 - 5), Unstable (1 - 2)													
Bank Vegetative Protection	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Average Left Bank Protection (percent)	30	90	90	75	90	90	95	95	95	95			85
Average Right Bank Protection (percent)	70	90	90	90	85	90	95	95	90	85			88
Riparian Vegetative Zone Width	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Average
Left Bank Riparian Width, meters	9	9	9	9	9	9	9	9	9	9			9
Right Bank Riparian Width, meters	4	5	5	6	6	7	8	8	8	8			7
>18 Meters (9 - 10), 12 - 18 Meters (6 - 8), 6 - 11 Meters (3 - 5), <6 Meters (1 - 2)													
Land-Use Stream Impacts	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10			Dominate
Impacts	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1	C 1			C 1

C=Cattle R=Row Crops U=Urban Encroachment I=Industrial Encroachment O=Other

Score 0=none 1=minor affect 2=moderate affect 3= major affect

[1] Average bankfull depth is calculated on riffles and/or runs only.

Appendix H

Data Collected During Diel Measurements

Table 30.

Poteau River October 2011 Diel Measurements
Station PR-2

	DateTime	Temp	SpCond	DO%	DO Conc	pH
	M/D/Y	C	mS/cm	%	mg/L	
0	10/18/2011 8:31	19.61	0.897	71.5	6.54	7.54
1	10/18/2011 8:46	19.54	0.883	68.6	6.28	7.54
2	10/18/2011 9:01	19.41	0.882	70.3	6.45	7.53
3	10/18/2011 9:16	19.43	0.88	69	6.33	7.52
4	10/18/2011 9:31	19.37	0.861	68.7	6.31	7.49
5	10/18/2011 9:46	19.3	0.834	70.8	6.52	7.46
6	10/18/2011 9:58	19.26	0.838	70.5	6.49	7.43
7	10/18/2011 10:13	19.14	0.784	72.6	6.7	7.41
8	10/18/2011 10:28	19.07	0.756	74.4	6.87	7.37
9	10/18/2011 10:43	19.06	0.732	75.1	6.94	7.36
10	10/18/2011 10:58	19.01	0.71	77.1	7.13	7.35
11	10/18/2011 11:13	18.94	0.703	77.9	7.22	7.35
12	10/18/2011 11:28	18.83	0.704	80.3	7.46	7.38
13	10/18/2011 11:43	18.73	0.708	81.3	7.56	7.4
14	10/18/2011 11:58	18.57	0.711	84	7.84	7.46
15	10/18/2011 12:13	18.37	0.702	85.5	8.01	7.49
16	10/18/2011 12:28	18.35	0.688	85.8	8.05	7.51
17	10/18/2011 12:43	18.24	0.676	86.2	8.11	7.52
18	10/18/2011 12:58	18.21	0.666	88.3	8.31	7.53
19	10/18/2011 13:13	18.09	0.638	90.2	8.51	7.56
20	10/18/2011 13:28	18.13	0.642	90.1	8.5	7.56
21	10/18/2011 13:43	18.14	0.629	91.6	8.63	7.57
22	10/18/2011 13:58	18.12	0.611	93.4	8.81	7.6
23	10/18/2011 14:13	18.29	0.616	94.2	8.85	7.61
24	10/18/2011 14:28	18.31	0.607	95.4	8.96	7.62
25	10/18/2011 14:43	18.34	0.602	96.9	9.09	7.64
26	10/18/2011 14:58	18.41	0.605	97	9.09	7.64
27	10/18/2011 15:13	18.45	0.608	96.1	9	7.65
28	10/18/2011 15:28	18.47	0.609	97.9	9.16	7.65
29	10/18/2011 15:43	18.45	0.608	97.4	9.12	7.67
30	10/18/2011 15:58	18.48	0.614	97.3	9.11	7.68
31	10/18/2011 16:13	18.47	0.616	98.1	9.18	7.69
32	10/18/2011 16:28	18.47	0.619	96.9	9.07	7.69
33	10/18/2011 16:43	18.47	0.621	96	8.99	7.67
34	10/18/2011 16:58	18.5	0.628	97.2	9.09	7.69
35	10/18/2011 17:13	18.53	0.629	95.6	8.94	7.69
36	10/18/2011 17:28	18.48	0.635	95.1	8.9	7.68
37	10/18/2011 17:43	18.5	0.652	95.3	8.92	7.7
38	10/18/2011 17:58	18.52	0.655	95.1	8.89	7.72
39	10/18/2011 18:13	18.49	0.663	95.9	8.97	7.74
40	10/18/2011 18:28	18.49	0.674	94.6	8.85	7.74
41	10/18/2011 18:43	18.49	0.68	93.6	8.76	7.74
42	10/18/2011 18:58	18.46	0.691	93.3	8.73	7.74

	DateTime M/D/Y	Temp C	SpCond mS/cm	DO% %	DO Conc mg/L	pH
43	10/18/2011 19:13	18.44	0.7	92.3	8.64	7.74
44	10/18/2011 19:28	18.43	0.702	91.9	8.61	7.74
45	10/18/2011 19:43	18.38	0.724	91.4	8.57	7.72
46	10/18/2011 19:58	18.33	0.733	90	8.45	7.72
47	10/18/2011 20:13	18.29	0.731	89.7	8.42	7.72
48	10/18/2011 20:28	18.24	0.735	88.3	8.3	7.71
49	10/18/2011 20:43	18.22	0.749	87.5	8.23	7.71
50	10/18/2011 20:58	18.21	0.749	85.9	8.08	7.73
51	10/18/2011 21:13	18.17	0.768	84.8	7.98	7.7
52	10/18/2011 21:28	18.09	0.766	83.5	7.87	7.72
53	10/18/2011 21:43	18.1	0.77	82.6	7.78	7.68
54	10/18/2011 21:58	18.06	0.772	81.8	7.72	7.68
55	10/18/2011 22:13	18	0.778	80.9	7.64	7.67
56	10/18/2011 22:28	17.97	0.783	79.8	7.54	7.67
57	10/18/2011 22:43	17.94	0.786	78.8	7.45	7.66
58	10/18/2011 22:58	17.89	0.791	78	7.39	7.66
59	10/18/2011 23:13	17.83	0.798	77.5	7.34	7.65
60	10/18/2011 23:28	17.8	0.806	76.3	7.24	7.67
61	10/18/2011 23:43	17.8	0.816	75.3	7.14	7.66
62	10/18/2011 23:58	17.71	0.823	74.4	7.07	7.66
63	10/19/2011 0:13	17.66	0.827	74	7.04	7.66
64	10/19/2011 0:28	17.56	0.823	74.5	7.1	7.66
65	10/19/2011 0:43	17.53	0.826	73.8	7.04	7.66
66	10/19/2011 0:58	17.43	0.826	73.1	6.99	7.66
67	10/19/2011 1:13	17.4	0.832	72.7	6.95	7.65
68	10/19/2011 1:28	17.35	0.834	72.2	6.91	7.66
69	10/19/2011 1:43	17.29	0.839	71.9	6.89	7.66
70	10/19/2011 1:58	17.25	0.839	71.5	6.86	7.65
71	10/19/2011 2:13	17.25	0.844	71.3	6.84	7.64
72	10/19/2011 2:28	17.23	0.848	70.7	6.79	7.65
73	10/19/2011 2:43	17.17	0.86	71.5	6.87	7.64
74	10/19/2011 2:58	17.12	0.86	71.7	6.9	7.64
75	10/19/2011 3:13	17.01	0.86	71.8	6.92	7.64
76	10/19/2011 3:28	16.92	0.859	71.7	6.92	7.65
77	10/19/2011 3:43	16.88	0.86	71.5	6.91	7.65
78	10/19/2011 3:58	16.85	0.86	71.4	6.91	7.65
79	10/19/2011 4:13	16.82	0.862	70.8	6.85	7.65
80	10/19/2011 4:28	16.73	0.865	71.6	6.94	7.65
81	10/19/2011 4:43	16.69	0.868	71	6.89	7.65
82	10/19/2011 4:58	16.61	0.871	71.6	6.96	7.66
83	10/19/2011 5:13	16.56	0.872	71.5	6.96	7.66
84	10/19/2011 5:28	16.46	0.874	71.3	6.96	7.66
85	10/19/2011 5:43	16.45	0.877	71.2	6.95	7.67
86	10/19/2011 5:58	16.35	0.882	71.9	7.02	7.67
87	10/19/2011 6:13	16.33	0.883	71.4	6.98	7.67

	DateTime M/D/Y	Temp C	SpCond mS/cm	DO% %	DO Conc mg/L	pH
88	10/19/2011 6:28	16.32	0.885	70.8	6.92	7.67
89	10/19/2011 6:43	16.3	0.892	70.6	6.9	7.67
90	10/19/2011 6:58	16.23	0.896	71	6.96	7.68
91	10/19/2011 7:13	16.2	0.897	70.6	6.92	7.68
92	10/19/2011 7:28	16.17	0.917	71.4	7	7.65
93	10/19/2011 7:43	16.19	0.925	71.4	7	7.66
94	10/19/2011 7:58	16.19	0.92	71.9	7.05	7.69
95	10/19/2011 8:13	16.11	0.928	72.7	7.14	7.7
96	10/19/2011 8:28	16.07	0.93	73.1	7.19	7.71
97	10/19/2011 8:43	16.1	0.93	73.4	7.21	7.71
98	10/19/2011 8:58	16.1	0.936	73.9	7.26	7.67
99	10/19/2011 9:13	16.14	0.94	74.1	7.27	7.68
100	10/19/2011 9:28	16.12	0.946	75.5	7.41	7.68
101	10/19/2011 9:43	16.17	0.953	76	7.46	7.69
102	10/19/2011 9:58	16.12	0.965	77.4	7.6	7.7
103	10/19/2011 10:13	16.14	0.986	78.2	7.67	7.73
104	10/19/2011 10:28	16.18	0.99	78.9	7.74	7.74
105	10/19/2011 10:43	16.18	0.992	80	7.84	7.75
106	10/19/2011 10:58	16.19	0.98	81	7.94	7.76
107	10/19/2011 11:13	16.24	0.991	83	8.12	7.77
108	10/19/2011 11:28	16.32	0.997	85.2	8.33	7.8
109	10/19/2011 11:43	16.4	0.997	85.5	8.34	7.8
110	10/19/2011 11:58	16.52	0.997	85.8	8.35	7.8
111	10/19/2011 12:13	16.65	1.004	89.5	8.69	7.82
112	10/19/2011 12:28	16.78	1.003	90.9	8.8	7.83
113	10/19/2011 12:43	16.98	1.002	93.7	9.03	7.86
114	10/19/2011 12:58	17.01	0.997	93.4	9	7.85
	average	17.6	0.8	81.1	7.7	7.6
	min	16.1	0.6	68.6	6.3	7.4
	max	19.6	1.0	98.1	9.2	7.9
	stdev	1.03	0.12	9.64	0.86	0.10
	n	115	115	115	115	115

Appendix I

2011 Macroinvertebrate Taxa

Table 31.

Raw macroinvertebrate collection for Poteau River in Spring 2011.

Taxa	**Biotic Index**	**Trophic Group**	**Station Sampled in Spring 2011**			
			PR-1	**PR-2**	**PR-3**	**UT-1**
ANNELIDA						
Hirudinea	7.8	PR	3	11	9	44
Oligochaeta	10	GC	3	4		43
Amphipoda						
Hyalella azteca	7.9	GC	4			
Isopoda						
Lirceus	7.7	GC	1	1		
CRUSTACAE						
Cambaridae	6	GC	2		1	
GASTROPODA						
Physa	9.1	SC	14	4	1	62
Planorbide	7	SC	2		4	
BIVALVIA						
Corbicula	6.3	FC	2		4	
Sphaeridae	7.7	FC			17	
EPHEMEROPTERA						
Baetis	6	GC	6		7	
Caenis	7.6	GC	1	2	87	
Leptophlebiida	2	SC	1			
Stenonema femoratum	7.5	SC	1		4	
ODONATA						
Argia	8.7	PR			3	
Dromogomphus	6.3	PR	1			
Enallagma	9	PR	5	2	5	
Hagenius	4	PR			1	
Hetaerina	6.2	PR			3	
Libellula	9.8	PR	1			
Miathyria	---	PR		1		
Patchydiplax	9.6	PR	1	2		
Perithemis	10	PR		1		
PLECOPTERA						
Agnetina	2	PR	4	3		
Isoperla	2	PR				
HEMIPTERA						
Corixidae	6	PR	1	1		
Rhagovelia	7.3	PR				3
MEGALOPTERA						
Corydalus	5.6	PR	1			

Taxa	**Biotic Index**	**Trophic Group**	**Station Sampled in Spring 2011**			
			PR-1	**PR-2**	**PR-3**	**UT-1**
TRICHOPTERA						
Cheumatopsyche	6.6	FC	2	4	60	
Hetaerina	6.2	PR			3	
LEPIDOPTERA						
Parapoynx	5	SH			1	
Petrophila	1.8	SC			1	
COLEOPTERA						
Ancyronyx	6.9	SC			1	
Berosus	8.6	PR	3		1	
Dubiraphia	6.4	GC	1	2		
Gyrinus	6.3	PR	2			
Scirtes	5	SH				
Stenelmis larvae	5.4	SC	43	13	73	
Stenelmis adult	5.4	SC	20	1	6	
DIPTERA						
Atrichopogen	6	GC			3	
Chironominae	6	GC	123	343	262	488
Orthocladinae	6	GC	15	4		
Probezzia	6	PR	1			
Setacera	5.7	SH		2	1	
Simulium	4.4	FC	91	78	29	274
Tanypodinae	6	PR	51	29	19	
Tabanus	9.7	PR			1	
Tipulidae	3	SH			1	
Total Abundance:			406	508	608	914

Table 32.

Raw macroinvertebrate collection for Poteau River in Fall 2011.

Taxa	**Biotic Index**[1]	**Trophic Group**[2]	**Station Sampled in Fall 2011**			
			PR-1	**PR-2**	**PR-3**	**UT-1**
ANNELIDA						
Hirudinea	7.8	PR	6	9	5	61
Oligochaeta	10	GC	8	1	3	38
Amphipoda						
Hyalella azteca	7.9	GC	14	7	3	
GASTROPODA						
Physa	9.1	SC	8		4	32
Planorbide	7	SC	5		6	
BIVALVIA						
Corbicula	6.3	FC	3		4	
Sphaeridae	7.7	FC	3		38	
EPHEMEROPTERA						
Baetis	6	GC			7	
Caenis	7.6	GC	3	7	90	
Stenacron	7.1	GC			1	
Stenonema femoratum	7.5	SC	32		2	
ODONATA						
Anax	6.4	PR				
Argia	8.7	PR	1	2	24	11
Dromogomphus	6.3	PR	1		3	
Dythemis	3.7	PR		1		
Enallagma	9	PR	4		28	
Erythemis	7.7	PR	2		1	
Ischnura	9.4	PR	1			1
Libellula	9.8	PR		1		1
Macromia	6.7	PR			2	
Parchydiplax	9.6	PR	2			
Perithemis	10	PR	2			1
Plathemis	10	PR				2
HEMIPTERA						
Rhagovelia	7.3	PR				6
TRICHOPTERA						
Cheumatopsyche	6.6	FC		33	188	16
Chimarra	2.8	FC		1	23	
Helicopsyche	0	SC		1	4	
Hydropsyche	4	FC			4	
LEPIDOPTERA						
Cossidae	--	--	2			

Taxa	**Biotic Index**[1]	**Trophic Group**[2]	**Station Sampled in Fall 2011**			
			PR-1	**PR-2**	**PR-3**	**UT-1**
Petrophila	1.8	SC			4	
COLEOPTERA						
Belostoma	9.8	PR	1			
Berosus	8.6	PR	4	3	12	
Dubiraphia	6.4	GC			27	
Ectopria	4.3	SC			1	
Psephenus	2.5	SC			1	
Stenelmis larvae	5.4	SC	10	10	35	
Stenelmis adult	5.4	SC			5	
Tropisternus	9.8	PR	2			1
DIPTERA						
Anopheles	9.1	FC	1		1	
Bezzia	6	GC	2			
Ceratopogonidae	6	PR		1		
Chironominae	6	GC	56	141	74	
Forcipomyiinae	6	GC	1			
Orthocladinae	6	GC	1	1	8	1
Tanypodinae	6	PR	17	10	28	
Tabanus	9.7	PR	1			
Thaymaleidae	--	--	4			
Simulium	4.4	FC		1	11	34
Total Abundance:			197	230	647	205

Appendix J

List of Fishes Collected

Table 33.
Raw fish collection for Poteau River in Fall 2011.

Scientific Name	**Common Name**	**PR-1**	**PR-2**	**PR-3**	**UT-2**
		10/18/2011	**10/18/2011**	**10/19/2011**	**10/18/2011**
CYPRINIDAE					
Campostoma anomalum	central stoneroller	54	14	36	131
Cyprinella lutrensis	red shiner		4		1
Cyprinella whipplei	steelcolor shiner		5	53	
Lythrurus umbratilis	redfin shiner	1		4	1
Notropis boops	bigeye shiner	11	205	9	12
Notropis atherinoides	emerald shiner			11	
Pimephales vigilax	bullhead minnow		45	65	
Pimehpales notatus	bluntnose minnow	5	94	46	12
ATHERINIDAE					
Labidesthes sicculus	brook silverside	1		6	
FUNDULIDAE					
Fundulus olivaceus	blackspotted topminnow	2	1	5	
POECILIIDAE					
Gambusia affinis	mosquitofish	7	20	2	43
LEPISOSTEIDAE					
Lepisosteus oculatus	spotted gar			1	
ICTALURIDAE					
Noturus exilis	slender madtom			2	
Ictalurus punctatus	channel catfish		1		
Ameiurus melas	black bullhead				1
Ameiurus natalis	yellow bullhead	7	8	1	15
CENTRARCHIDAE					
Lepomis cyanellus	green sunfish	14	13	67	23
Lepomis gulosus	warmouth	3	5		3
Lepomis macrochirus	bluegill sunfish	22	45	15	2
Lepomis megalotis	longear sunfish	123	189	99	42
Lepomis humilis	orangespotted sunfish			3	
Micropterus salmoides	largemouth bass	3	2	4	3
PERCIDAE					
Etheostoma spectabile	orangethroat darter	48	28	18	
Etheostoma blennioides	greenside darter		4	1	
Etheostoma whipplei	redfin darter	16	9	11	
Etheostoma zonale	banded darter			7	
TOTAL NUMBER OF FISH		317	692	466	289

Appendix K

ADEQ Investigation Report Livestock Auction

ADEQ
ARKANSAS
Department of Environmental Quality

January 9, 2012

Jerry Beaty, Owner
Waldron Livestock Auction
P.O. Box 1990
Waldron, AR 72958

Re: Complaint Investigation

Dear Mr. Beaty:

On January 6, 2012, I performed an investigation of your facility in response to a complaint. The complaint alleged that “pollution was ending up in Bull Creek”.

This investigation revealed that you are in violation of the Federal Clean Water Act, the Arkansas Water and Air Pollution Control Act, and the regulations promulgated thereunder. Specifically, I found the following violation:

Placing waste in a location likely to cause pollution to the waters of the State. Stockpiling manure in this manner and in this location could potentially allow rainfall that comes into contact with this manure pile to runoff into the surrounding waterways. If you intend to stockpile manure, it should be placed on an impermeable surface and covered to prevent runoff.

The above item requires your immediate attention. Please submit a written response to this finding to the Water Division Enforcement Branch Manager, of this Department. This response should be mailed to the address below, or e-mailed to Water-Enforcement-Report@adeq.state.ar.us. This response should contain documentation describing the course of action taken to correct each item noted. This corrective action should be completed as soon as possible, and the written response with all necessary documentations (i.e. photos) is due by January 19, 2012.

If I can be of any assistance, please feel free to contact me at 870 389-6970.

Sincerely,

Shan Lynch

Shan Lynch
District Field Inspector
Water Division

cc: Permits Branch

	FOR OFFICE USE ONLY: *AIR HW RST SW WATER MINING*

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
5301 Northshore Drive, North Little Rock, AR 72118-5317

COMPLAINT REPORT

LOG#:	**AFIN#:** **PERMIT#:**
DATE RECEIVED: 12-21-2011	**COUNTY:** Scott
COMPLAINANT NAME: anon	**COMPLAINT AGAINST:** Jerry Beaty / Owner Waldron Livestock Auction
ADDRESS:	**ADDRESS:** P.O. Box 1990 Waldron, AR 72958
PHONE: **FAX:**	**PHONE:** 479 883-6646 cell

PERSON RECEIVING REPORT: Steve Johnson	**DATE:** 12-21-2011	**SUPERVISOR REFERRAL:**	**DATE:**
INSPECTOR REFERRED: Shan Lynch	**DATE:** 12-21-0211	**MEDIA SUPERVISOR REFERRAL:**	**DATE:**
PHONE REFERRAL CONTACT:	**DATE:**	**RECEIVING INSPECTOR:**	**DATE:**

DESCRIPTION *(IN DETAIL)*

Pollution ending up in Bull Creek

LOCATION *(IN DETAIL)*

On AR Hwy 71B in downtown Waldron

PREVIOUS COMPLAINT? ☐ **YES** ☑ **NO** **DATES:**

DISCHARGE TO WATERS OF THE STATE? ☐ **YES** ☑ **NO** **NAME OF WATERBODY:**

HOW COMPLAINT WAS RECEIVED: ☑ **PHONE** ☐ **LETTER** ☐ **VERBAL** ☐ **FAX** ☐ **E-MAIL**

FOLLOW UP ON COMPLAINT

COMPLAINT #:	***AFIN #:***
INSPECTOR: Shan Lynch	***DATE:*** 1-6-2012
ACTION TAKEN:	***PHOTOS TAKEN:*** yes

On the morning of January 6, 2012, I visited the location of the Waldron Livestock Auction. No responsible official was present when I arrived, but, I was given a phone number by an individual there on other business. I called Mr. Beaty at that time and announced that I had received a complaint and I was given permission to look around the site. On site, I noticed a large pile of manure located near the loading chute area and adjacent a drainage ditch that flows into Bull Creek. Photographs were taken of this manure pile. I then went to where Bull Creek and this drainage ditch merge. At this location I did not visually see any impact of this manure pile. Photographs were also taken at this time. I visited with Mr. Beaty again a little later and we discussed the large pile of manure. He stated that he has plans of having that manure removed by an individual who wants to land apply it on his farm. We also discussed that any manure stock piled in this manner would likely have to be stored under a cover as to not allow any runoff into the waters of the State.

FURTHER ACTION TAKEN/TO BE TAKEN:

Letter to Mr. Beaty informing that stockpiled manure needs to be stored in a manner to prevent runoff to State waters.

INSPECTOR SIGNATURE: Shan Lynch

DATE: January 9, 2012

Water Division NPDES Photographic Evidence Sheet

Location:	Waldron Livestock Auction						
Photographer:	Shan Lynch			**Witness:**	None		
Photo #	1	**Of**	4	**Date:**	1-6-2012	**Time:**	8:43
Description:	Pile of manure located to right of tree from cleaning out pens at sale barn. Drainage ditch between manure and hay bales flows away from camera location to tree line in background.						

Photographer:	Shan Lynch			**Witness:**	None		
Photo #	2	**Of**	4	**Date:**	1-6-2012	**Time:**	8:53
Description:	Same as Photo 1						

Water Division NPDES Photographic Evidence Sheet

Location:	Waldron Livestock Auction						
Photographer:	Shan Lynch			**Witness:**	None		
Photo #	3	**Of**	4	**Date:**	1-6-2012	**Time:**	8:49
Description:	Same as above, however, flow toward photographer. Runoff under drive at culvert in lower right.						

Photographer:	Shan Lynch			**Witness:**	None		
Photo #	4	**Of**	4	**Date:**	1-6-2012	**Time:**	8:48
Description:	Photo taken from near creek merger with drainage ditch.						

Appendix L

ADEQ Investigation Report Waldron Equalization Basin

ADEQ
ARKANSAS
Department of Environmental Quality

April 3, 2012

Honorable Don Owens, Mayor
City of Waldron
370 Featherston Street
P.O. Box 310
Waldron, AR 72958

Re: Complaint Investigation

Dear Mayor Owens:

On April 2, 2012, I responded to an allegation from an anonymous complainant that wastewater from the City of Waldron's equalization basin was being discharged into the receiving stream and that this discharge had an excessively green color.

This investigation revealed that you are in violation of the Federal Clean Water Act, the Arkansas Water and Air Pollution Control Act, and the regulations promulgated thereunder. Specifically, I found the following violation:

Pictures show that on February 21, 2012, the City was discharging untreated or partially treated wastewater from the equalization basin into Bull Creek, a tributary of the Poteau River. Please be advised that this is an unpermitted and unreported discharge. Unpermitted discharges are a violation of your NPDES permit and should be reported as required.

The above items require your immediate attention. Please submit a written response to these findings to the Water Division Inspection Branch of this Department. This response should be mailed to the address at the bottom of the first page of the letter or e-mailed to Water-Enforcement-Report@adeq.state.ar.us. This response should contain documentation describing the course of action taken to correct each item noted. This corrective action should be completed as soon as possible, and the written response with all necessary documentation (i.e. photos) is due by April 14, 2012.

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
5301 NORTHSHORE DRIVE / NORTH LITTLE ROCK / ARKANSAS 72118-5317 / TELEPHONE 501-682-0744 / FAX 501-682-0880
www.adeq.state.ar.us

If I can be of any assistance, please feel free to contact me at 870 389-6970.

Sincerely,

Shan Lynch

Shan Lynch
District Field Inspector
Water Division

cc: Permits Branch

	FOR OFFICE USE ONLY: ***AIR HW RST SW WATER MINING***

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
5301 Northshore Drive, North Little Rock, AR 72118-5317

COMPLAINT REPORT

LOG#:	***AFIN#:*** 64-00027 ***PERMIT#:*** AR0035769
DATE RECEIVED: 3-30-2012	***COUNTY:*** Scott
COMPLAINANT NAME: Anon	***COMPLAINT AGAINST:*** City of Waldron
ADDRESS:	***ADDRESS:*** 370 Featherston Rd. / P.O. Box 310; Waldron, AR 72958
PHONE: ***FAX:***	***PHONE:*** 479 637-3181

PERSON RECEIVING REPORT: Marysia Jastrzebski	***DATE:*** 3-30-2012	***SUPERVISOR REFERRAL:*** Steve Johnson	***DATE:*** 3-30-2012
INSPECTOR REFERRED: Shan Lynch	***DATE:*** 3-30-2012	***MEDIA SUPERVISOR REFERRAL:***	***DATE:***
PHONE REFERRAL CONTACT:	***DATE:***	***RECEIVING INSPECTOR:***	***DATE:***

DESCRIPTION ***(IN DETAIL)***

Complainant reports that the receiving stream for Tyson and Waldron's municipal system is green in color. A pipe discharging this green colored water was noted that apparently originates from an equalization basin at the City of Waldron's wastewater treatment plant.

LOCATION ***(IN DETAIL)***

The City of Waldron's wastewater treatment plant is located north of town off of Fir Street, on the road that goes around the Tyson facility.

PREVIOUS COMPLAINT? ☐***YES*** ☑ ***NO*** ***DATES:***

DISCHARGE TO WATERS OF THE STATE? ☑***YES*** ☐ ***NO*** ***NAME OF WATERBODY:*** Bull Creek, tributary of Poteau River.

HOW COMPLAINT WAS RECEIVED: ☐ ***PHONE*** ☐ ***LETTER*** ☐ ***VERBAL*** ☐***FAX*** ☑ ***E-MAIL***

FOLLOW UP ON COMPLAINT

COMPLAINT #:

AFIN #: 64-00027

INSPECTOR: Shan Lynch

DATE: April 2, 2012

ACTION TAKEN:

PHOTOS TAKEN: yes – by complainant

On April 2, 2012, at the first opportunity since receiving the complaint from Steve Johnson, I contacted Dustin Allen, the Wastewater Treatment Plant Supervisor and inquired about the discharge of green water. He stated that he was not at the plant on March 30th and therefore was not an eyewitness to the color of the discharge, however while on the phone he consulted with an individual who was onsite on March 30th. This person stated that the effluent was "clear and good". I then asked if he had recently requested a permit authorized "anticipated bypass". He stated that he had requested an anticipated bypass about three or four weeks ago and he had discharged water from the equalization basin at that time. He also stated that he had witnessed or communicated with an individual that was collecting samples on Bull Creek for the neighboring Tyson facility. Tyson and the City both discharge into this receiving stream in close proximity to each other. After our conversation, I contacted the complainant. He stated that he noticed this green discharge while collecting samples for Tyson on February 21st, 2012. He also mentioned that he had taken some photographs and at that time he e-mailed me a copy of these photographs of the discharge from the City of Waldron's EQ basin. After our conversation, I contacted ADEQ Enforcement Administrator Kevin Suel who oversees the enforcement for the City of Waldron. He explained that anticipated bypasses are no longer granted and that the facility that bypasses is required to submit an SSO report. The last SSO report submitted by Waldron to ADEQ was on April 28th, 2011. This discharge from the City of Waldron's EQ basin would be an unpermitted and unreported discharge.

FURTHER ACTION TAKEN/TO BE TAKEN:

NC letter to the city citing unpermitted and unreported discharge.

INSPECTOR SIGNATURE: Shan Lynch

DATE: April 3, 2012

Water Division NPDES Photographic Evidence Sheet							
Location:	City of Waldron Wastewater Treatment Plant						
Photographer:	Complainant			**Witness:**			
Photo #	1	**Of**	4	**Date:**	2-21-2012	**Time:**	
Description:	EQ basin. Note sufficient freeboard and valve wrench at left of photo on levee.						

Photographer:	Complainant			**Witness:**			
Photo #	2	**Of**	4	**Date:**	2-21-2012	**Time:**	
Description:	Standing on levee looking down at discharge						

Water Division NPDES Photographic Evidence Sheet

Location:	City of Waldron Wastewater Treatment Plant								
Photographer:	Complainant				**Witness:**				
Photo #	3	**Of**	4		**Date:**	2-21-2012	**Time:**		
Description:	Discharge from lagoon								

Photographer:	Complainant				**Witness:**			
Photo #	4	**Of**	4		**Date:**	2-21-2012	**Time:**	
Description:	Discharge at confluence with Poteau River							

Appendix M

Engineering Cost Estimates for Reverse Osmosis

Tyson Foods
Dissolved Minerals Treatment Cost Estimate

BASIS: 1.25 MGD Filtration/Reverse Osmosis/Concentrated Reject Crystallization
Ground storage tanks
Effluent TDS/SO4 = 1200/320 mg/l
NPDES limit TDS/SO4 = 660/70 mg/l

Reject flow= 0.34 MGD

ITEM	
CAPITAL	TOTAL ($000)
UF+Carbon+RO	$13,632
Storage tanks	$1,250
Evaporative crystallization system	$15,681
TOTAL CAPITAL	**$30,563**

ANNUAL OPERATING	TOTAL ($000)
Filtration	$250
RO	$1,955
CRYSTALLIZATION	$816
EQUIP REPLACEMENT	$1,528
TOTAL OPERATING	**$4,549**

PROCESS FLOW: 24HR EMER STG+UF+8HR STORAGE+CARBON+24HR STORAGE+RO+REJECT STORAGE 40HR+(1)250GPM BRINE CONC+(1)20GPM CRYSTALLIZER

FROM PERRY'S P.22-52			Implicit Price Deflator			
6 MGD 38 g/l 45% conversion 6 train system			1996	83.159	1995	92.103
NEED 1.25 MGD, 3.4 g/l 95% conversion			2006	103.231	2011	113.361
assume 1 train system, 35% of cost	1996	0.35	inflation adj			
	base	adj	2006	2011		
ITEM	$000	$000	$000			
UF+ Carbon filter			3000			
Membranes+housings installed	3600	$1,260	$1,564.12	$2,132.19		
process equip	13700	$4,795	$5,952.36	$8,114.17		
site work	500	$175	$217.24	$296.14		
structural	1850	$648	$803.79	$1,095.71		
permitting	25	$9	$10.86	$14.81		
Engr	3341	$1,169	$1,451.59	$1,978.79		
TOT CAP		$8,056	**$13,000**	**$13,632**		
OPERATING						
elec	1976.875	$692	$858.91	$1,170.85		
consum+chem	187	$65	$81.25	$110.76		
Maint	482	$169	$209.42	$285.48		
labor	265	$93	$115.14	$156.95		
membrane repl	390	$137	$169.45	$230.99		
TOT OP		$1,155	**$1,434**	**$1,955**		

RO REJECT TREATMENT
Per Bill Heinz, VP GE Treatment 425-828-2400x1330

Trt train consists of (2) 250 GPM Brine Concentrator, then (1) 20 GPM Crystallizer
includes solids conveyor 0.6 TYSON assume half capacity, 60% of cost

	2006		2011
CAPITAL	$ (000)		
Brine Conc.	$9,100	$5,460	$5,995.79
Crystallizer	$4,900	$2,940	$3,228.50
Installation	$9,800	$5,880	$6,457.00
TOTAL	$23,800	$14,280	$15,681
OPERATING			
ELEC (3100 KW/HR)	$1,359	$679	$746.01
SOLIDS DISPOSAL	$64	$64	$70.19
TOTAL	$1,423	$743	$816

Appendix N

2015 Macroinvertebrate Taxa and Habitat Data

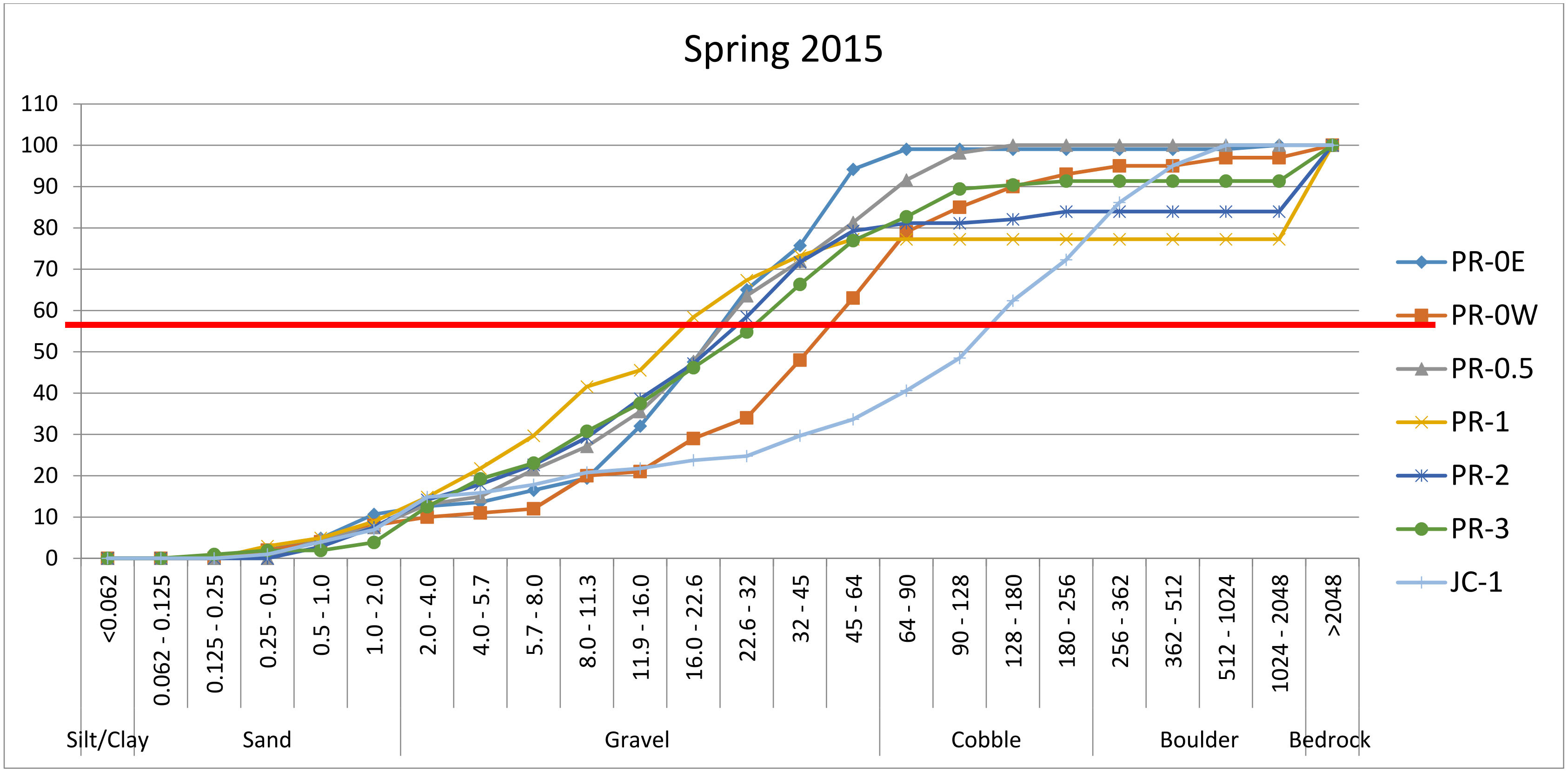
Table 34.

Habitat Quality

Spring 2015							
Parameters	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
1. Epifaunal Substrate	10	8	9	9	6	8	13
2. % Embeddedness	17	18	16	18	20	17	19
3. Velocity/Depth Regime	14	15	17	15	13	17	18
4. Channel Alteration	15	18	16	16	15	17	16
5. Sediment Deposition	14	18	15	14	14	15	12
6. Frequency of riffles	17	15	15	17	7	16	18
7. Channel Flow Status	14	15	16	15	17	17	18
8. Bank Stability	8.5	10.5	11.9	18.3	15.1	12.9	13.6
9. Vegetative Protection	6	8	7	7	7	7	8
10. Riparian Zone Width	9	9	14	12	14	8	16
Score	124.4	134.4	136.6	140.8	128.3	135.0	151.1
Average	12.4	13.4	13.7	14.1	12.8	13.5	15.1
Ranking	S	S	S	S	S	S	S
Scores: 16-20 = optimal, 11-15 = sub-optimal, 6-10 = marginal, 0-5 = poor							

Fall 2015							
Parameters	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
1. Epifaunal Substrate	5	6	8	8	6	7	13
2. % Embeddedness	19	14	16	19	15	19	18
3. Velocity/Depth Regime	5	5	7	8	13	14	8
4. Channel Alteration	12	15	15	15	16	15	16
5. Sediment Deposition	11	20	11	15	15	16	15
6. Frequency of riffles	19	19	19	19	19	19	19
7. Channel Flow Status	5	5	8	7	11	13	7
8. Bank Stability	7.0	15.0	13.0	14.0	15.0	12.0	17.0
9. Vegetative Protection	6	12	11	10	11	10	15
10. Riparian Zone Width	7	6	12	8	12	7	16
Score	96.0	117.0	120.0	123.0	133.0	132.0	144.0
Average	9.6	11.7	12.0	12.3	13.3	13.2	14.4
Ranking	M	S	S	S	S	S	S
Scores: 16-20 = optimal, 11-15 = sub-optimal, 6-10 = marginal, 0-5 = poor							

Pebble Counts



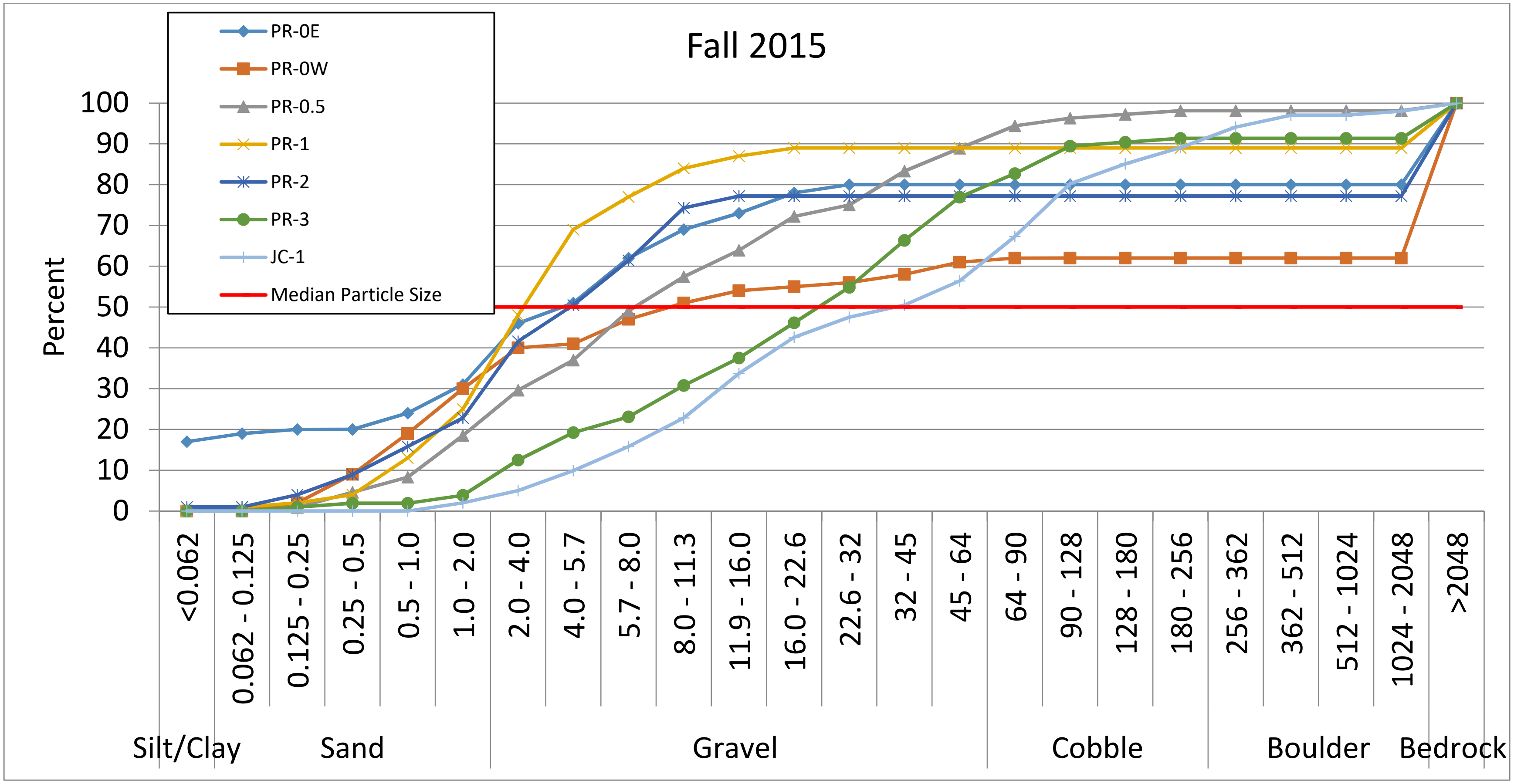

Fall 2015
PR-0E
PR-0W
PR-0.5
PR-1
PR-2
PR-3
JC-1
Median Particle Size
Percent
100
90
80
70
60
50
40
30
20
10
0
<0.062
0.062 - 0.125
0.125 - 0.25
0.25 - 0.5
0.5 - 1.0
1.0 - 2.0
2.0 - 4.0
4.0 - 5.7
5.7 - 8.0
8.0 - 11.3
11.9 - 16.0
16.0 - 22.6
22.6 - 32
32 - 45
45 - 64
64 - 90
90 - 128
128 - 180
180 - 256
256 - 362
362 - 512
512 - 1024
1024 - 2048
>2048
Silt/Clay
Sand
Gravel
Cobble
Boulder
Bedrock

Table 35.

Macroinvertebrates identified from the Poteau River and Jones Creek, Polk Co, AR, during the spring of 2015.

Taxa/Station I.D.	**Biotic Index***	**Trophic Group**	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
ARACHNOIDEA									
Acarina	---	PR	0	0	0	0	0	1	0
ANNELIDA									
Hirudinea	7.8	PR	6	1	5	0	10	15	0
Oligochaeta	7	GC	16	29	5	6	35	71	32
COLEOPTERA									
Agabus	5	PR	0	0	0	0	0	0	0
Ancyronyx	6.9	SC	0	0	0	0	4	0	0
Dubiraphia	6.4	GC	0	3	4	0	1	0	0
Peltodytes	8.5	SH	0	0	0	1	1	0	0
Stenelmis	5.4	SC	7	18	5	32	25	17	8
CRUSTACEA									
Orconectes	2.7	GC	2	1	0	1	0	0	0
Gammarus	6.9	GC	3	6	6	2	0	2	0
Isopoda	7.7	GC	0	3	0	0	0	0	0
Palaeomonetes	---	GC	0	0	0	0	0	0	0
DIPTERA									
Bezzia	--	--	0	0	0	0	0	0	0
Chironominae	8	GC	250	160	136	298	296	334	219
Orthocladiinae	8	GC	28	34	14	53	42	74	30
Tanypodinae	8	PR	5	6	4	8	7	7	2
Nemotelus	7.3	GC	0	0	0	0	0	1	0
Probezzia	6	PR	0	1	0	1	3	2	1
Simulium	4.4	FC	4	6	22	39	11	13	39
Tipula	7.7	SH	0	1	0	1	0	0	2
EPHEMEROPTERA									
Cloeon	7.4	GC	2	0	0	0	0	0	0
Baetis	6	GC	6	12	9	15	8	15	2
Caenis	7.6	GC	0	35	21	7	3	40	7
Attenella	1	GC	0	0	0	0	0	0	0
Paraleptophlebia	1.2	GC	0	0	0	1	0	0	0
Pseudocentroptiloides	5	GC	0	0	0	0	0	0	0
Pseudocleon	4	GC	4	0	12	2	1	0	1
Serratella	1.9	GC	0	0	4	0	0	3	4
Stenonema	3.4	SC	0	1	0	2	0	1	0
Tricorythodes	5.4	GC	0	0	0	5	4	24	4

Taxa/Station I.D.	**Biotic Index***	**Trophic Group**	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
GASTROPODA									
Hydrobidae	8	SC	0	0	0	0	0	0	0
Valvata	8	SC	0	0	0	1	0	0	0
Physa	9.1	SC	0	1	0	1	0	0	0
Planorbidae	---	SC	0	0	0	0	0	0	0
HEMIPTERA									
Belostoma	9.8	PR	0	0	0	0	0	0	0
Corixidae	6	PR	0	0	0	0	0	0	0
MEGALOPTERA									
Corydalus	5.6	PR	0	0	0	0	0	0	1
Sialis	7.5	PR	0	0	0	0	0	0	0
ODONATA									
Argia	8.7	PR	0	0	0	2	0	0	0
Didymops	5.5	PR	0	1	0	0	0	0	0
Enallagma	9	PR	1	5	5	0	0	3	0
Hetaerina	6.2	PR	0	0	0	0	0	0	0
Ischnura	9.4	PR	0	0	0	0	0	1	0
PLECOPTERA									
Acroneuria	1.4	PR	0	0	0	0	0	0	0
Neoperla	1.6	PR	0	12	2	0	2	2	2
Perlesta	0	PR	5	6	5	11	1	1	4
PELECYPODA									
Corbicula	6.3	FC	0	1	0	0	0	1	1
Sphaeridae	7.7	FC	0	2	0	0	1	8	0
TRICHOPTERA									
Brachycentrus	2.2	FC	0	0	0	5	0	0	1
Chematopsyche	6.6	FC	22	60	34	152	220	107	16
Ceraclea	2.3	GC	0	0	0	1	0	0	0
Chimarra	2.8	FC	0	0	1	0	0	1	0
Neotrichia	2	SC	0	0	0	0	0	0	0
Helicopsyche	0	SC	0	0	0	0	0	1	1
Hydropsyche	4	FC	0	0	0	0	0	0	0
Hydroptila	6.2	SC	0	0	0	0	0	0	0
Sum of Percentages			100	100	100	100	100	100	100
Total Abundance:			361	405	294	647	675	745	377
Species Richness:			15	24	18	24	19	24	20
Shannon-Wiener Diversity Index			1.31	2.13	2.03	1.75	1.58	1.93	1.60
Trophic Structure:			%	%	%	%	%	%	%

Taxa/Station I.D.	Biotic Index*	Trophic Group	PR-0E	PR-0W	PR-0.5	PR-1	PR-2	PR-3	JC-1
Shredders (SH):			0.0	0.2	0.0	0.3	0.1	0.0	0.5
Scrapers (SC):			1.9	4.9	1.7	5.6	4.3	2.6	2.4
Filtering Collectors (FC):			7.2	17.0	19.4	30.3	34.4	17.4	15.1
Gathering Collectors (GC):			86.1	69.9	71.8	60.4	57.8	75.7	79.3
Predators (PR):			4.7	7.9	7.1	3.4	3.4	4.3	2.7
QA check %:			100	100	100	100	100	100	100
Dominant Orders:			%	%	%	%	%	%	%
Annelia			6	7	3	1	7	12	8
Gastropoda			0	0	0	0	0	0	0
Pelecypoda			0	1	0	0	0	1	0
Crustacea			1	2	2	0	0	0	0
Arachnoidea			0	0	0	0	0	0	0
Ephemeroptera			3	12	16	5	2	11	5
Odonata			0	1	2	0	0	1	0
Plecoptera			1	4	2	2	0	0	2
Hemiptera			0	0	0	0	0	0	0
Megaloptera			0	0	0	0	0	0	0
Trichoptera			6	15	12	24	33	15	5
Coleoptera			2	5	3	5	5	2	2
Diptera			80	51	60	62	53	58	78
QA check %:			100	100	100	100	100	100	100
Chironomidae (%)			78	49	52	55	51	56	67
EPT (%)			11	31	30	31	35	26	11
Ephemeroptera			3	3	4	6	4	5	5
Plecoptera			1	2	2	1	2	2	2
Trichoptera			1	1	2	3	1	3	3
EPT Richness			5	6	8	10	7	10	10
Biotic Index (Average)			6	6	6	6	6	6	5
Biotic Index (B.I.)			8	7	7	7	7	7	7
EPT Abundances			39	126	88	201	239	195	42
Chironomid Abundances			283	200	154	359	345	415	251

Table 36.

Macroinvertebrates identified from the Poteau River and Jones Creek, Polk Co, AR, during the fall of 2015.

Taxa/Station I.D.	Biotic Index*	Trophic Group	PR-0E	PR-0W	PR-0.5	PR-1	PR-2	PR-3	JC-1
ARACHNOIDEA									
Acarina	---	PR	0	0 0		1	0	0	0
ANNELIDA									
Hirudinea	7.8	PR	0	0 0		0	0	0	0
Lumbricidae	8	GC	0	0 3		0	0	0	0
Glossiphidae	7	PR	3	0 1		0	0	0	0
Haplotaxidae	9	GC	0	0 0		0	0	0	1
Tubificidae	9.2	GC	75	14	1	0	0	0	4
Oligochaeta	7	GC	0	0 0		0	0	0	0
COLEOPTERA									
Agabus	5	PR	0	0 0		0	0	0	0
Ancyronyx	6.9	SC	0	0 0		0	0	10	9
Dubiraphia	6.4	GC	0	11	3	11	1	12	7
Gyretes	3.7	GC	0	0 1		0	0	0	0
Lampryridae	--	PR	20	0	0	0	0	0	0
Macronychus	4.7	GC	0	1 8		0	10	1	0
Peltodytes	8.5	SH	1	1 0		1	2	2	1
Staphylinidae	8	PR	0	0 1		0	0	0	0
Stenelmis	5.4	SC	1	1 5		33	5	13	12
CRUSTACEA									
Orconectes	2.7	GC	0	0 0		0	0	0	0
Gammarus	6.9	GC	4	6	18	17	1	1	0
DIPTERA									
Anophles	9.1	FC	1	0 0		1	0	1	0
Bezzia	6	GC	0	0 3		0	0	0	0
Chaoborus	8.5	PR	1	0 1		0	0	0	0
Chironominae	8	GC	110	60	90	46	62	9	139
Culex	10	FC	0	0 0		0	0	1	0
Glutops	3	PR	0	0 0		0	0	1	0
Hybomitra	5	PR	0	0 0		0	0	1	0
Orthocladiinae	8	GC	18	7 13		23	9	3	24
Tanypodinae	8	PR	9	10	23	10	13	8	24
*Nemotelus**	7.3	GC	0	0 0		0	0	0	0

Taxa/Station I.D.	**Biotic Index***	**Trophic Group**	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
Probezzia	6	PR	23	1	3	2	0	0	3
Simulium	4.4	FC	0	0	0	0	4	1	2
Tipula	7.7	SH	0	0	0	0	0	0	0
EPHEMEROPTERA									
Cloeon	7.4	GC	0	0	0	0	0	0	0
Baetis	6	GC	0	0	0	0	4	14	0
Caenis	7.6	GC	5	160	2	60	6	6	66
Hexagenia	4.7	GC	0	0	1	0	0	1	1
Attenella	1	GC	0	0	0	0	0	0	0
Paraleptophlebia	1.2	GC	4	4	11	6	0	0	11
Pentagenia	6.4	GC	0	0	0	0	0	0	1
Stenacron	7.1	SC	1	0	3	0	0	0	0
Stenonema	3.4	SC	3	7	26	11	1	3	0
Tricorythodes	5.4	GC	0	0	0	1	51	35	8
GASTROPODA									
Hydrobidae	8	SC	0	0	0	0	0	0	0
Menetus	8.4	SC	0	0	0	0	0	0	0
Physa	9.1	SC	0	0	2	0	0	3	1
Planorbidae	7	SC	1	2	0	0	1	2	0
HEMIPTERA									
Belostoma	9.8	PR	0	0	0	0	0	0	0
Corixidae	6	PR	0	0	0	0	0	0	0
LEPIDOPTERA									
Cambridae	--	SH	1	0	0	0	0	0	0
MEGALOPTERA									
Corydalus	5.6	PR	0	0	0	0	0	1	2
Sialis	7.5	PR	0	0	0	0	0	0	0
ODONATA									
Argia	8.7	PR	0	0	4	1	4	10	4
Calopteryx	8.3	PR	0	0	0	0	1	0	0
Dromogomphus	6.3	PR	0	0	1	0	0	0	0
Enallagma	9	PR	1	0	22	16	8	21	8
Erythemis	7.7	PR	4	0	0	0	0	0	0
Libellula	9.8	PR	2	1	1	0	0	0	0
Hetaerina	6.2	PR	0	0	0	0	0	0	0
Ischnura	9.4	PR	0	0	4	0	0	2	2
Macromia	6.7	PR	0	0	0	0	0	1	0
Perithemis	10	PR	0	0	0	1	0	0	0
Progomphus	8.7	PR	0	2	1	2	0	0	1

Taxa/Station I.D.	**Biotic Index***	**Trophic Group**	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
Sympetrum	7.3	PR	0	0	0	3 0		0	0
PLECOPTERA									
Perlesta	0	PR	0	0	0	0 0		0	0
PELECYPODA									
Corbicula	6.3	FC	0	0	0	0 0		0	0
Sphaeridae	7.7	FC	2	0	1	0 4		1	0
TRICHOPTERA									
Brachycentrus	2.2	FC	0	0	0	0 0		0	0
Chematopsyche	6.6	FC	0	1	1	0	100	42	7
Chimarra	2.8	FC	0	0	0	0 4		38	0
Hydropsyche	4	FC	0	0	0	0 0		1	2
Hydroptila	6.2	SC	0	0	0	0 0		1	0
Oecetis	5.7	PR	0	0	0	0 1		5	1
Sum of Percentages			100	100	100	100	100	100	100
Total Abundance:			290	289	254	246	292	251	341
Species Richness:			22	17	29	19	21	32	25
Shannon-Wiener Diversity Index			1.9	1.5	2.4	2.3	2.1	2.7	2.1
Trophic Structure:			%	%	%	% %		%	%
Shredders (SH):			0.7	0.3	0.0	0.4 0.7		0.8	0.3
Scrapers (SC):			2.1	3.5	14.2	17.9	2.4	12.7	6.5
Filtering Collectors (FC):			1.0	0.3	0.8	0.4	38.4	33.9	3.2
Gathering Collectors (GC):			74.5	91.0	60.6	66.7	49.3	32.7	76.8
Predators (PR):			21.7	4.8	24.4	14.6	9.2	19.9	13.2
QA check %:			100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dominant Orders:			%	%	%	%	%	%	%
Annelia			26.9	4.8	2.0	0.0	0.0	0.0	1.5
Gastropoda			0.3	0.7	0.8	0.0	0.3	2.0	0.3
Pelecypoda			0.7	0.0	0.4	0.0	1.4	0.4	0.0
Crustacea			1.4	2.1	7.1	6.9	0.3	0.4	0.0
Arachnoidea			0.0	0.0	0.0	0.4	0.0	0.0	0.0
Ephemeroptera			4.5	59.2	16.9	31.7	21.2	23.5	25.5
Odonata			2.4	1.0	13.0	9.3	4.5	13.5	4.4
Plecoptera			0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hemiptera			0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lepidoptera			0.3	0.0	0.0	0.0	0.0	0.0	0.0
Megaloptera			0.0	0.0	0.0	0.0	0.0	0.4	0.6
Trichoptera			0.0	0.3	0.4	0.0	36.0	34.7	2.9
Coleoptera			7.6	4.8	7.1	18.3	6.2	15.1	8.5

Taxa/Station I.D.	**PR-0E**	**PR-0W**	**PR-0.5**	**PR-1**	**PR-2**	**PR-3**	**JC-1**
Diptera	55.9	27.0	52.4	33.3	30.1	10.0	56.3
QA check %:	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Chironomidae (%)	47.2	26.6	49.6	32.1	28.8	8.0	54.8
EPT (%)	4.5	59.5	17.3	31.7	57.2	58.2	28.4
Emphemeroptera	4.0	3.0	5.0	4.0	4.0	5.0	5.0
Plecoptera	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trichoptera	0.0	1.0	1.0	0.0	3.0	5.0	3.0
EPT Richness	4.0	4.0	6.0	9.0	7.0	10.0	8.0
Biotic Index (Average)	6.6	6.8	7.0	6.7	6.6	6.6	6.9
Biotic Index (B.I.)	7.3	7.5	7.0	7.1	6.8	6.2	7.4

Table 37.

Spring 2015															
Bioassessment Metric	PR-0E	PR-0W	PR-0.5	PR-1	JC-1	PR-0E vs PR-2	PR-0W vs PR-2	PR-0.5 vs PR-2	PR-1 vs PR-2	JC-1 vs PR-2	PR-0E vs PR-3	PR-0W vs PR-3	PR-0.5 vs PR-3	PR-1 vs PR-3	JC-1 vs PR-3
Taxa Richness	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0
Hilsenhoff Biotic Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Ratio of EPT and Chironomid Abundances	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0
Percent Contribution of Dominant Taxa	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EPT Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	2.0	2.0	6.0	6.0	6.0	6.0	6.0
Community Loss Index	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0
Sum	30.0	32.0	30.0	30.0	30.0	30.0	26.0	28.0	22.0	26.0	30.0	28.0	30.0	30.0	30.0
% Comparison To Reference	--	--	--	--	--	100.0	81.3	93.3	73.3	86.7	100.0	87.5	100.0	100.0	100.0
						Comparable to References	Supporting	Comparable to References	Partially Supporting	Supporting	Comparable to References	Supporting	Comparable to References	Comparable to References	Comparable to References

Table 38.

Fall of 2015															
Bioassessment Metric	PR-0E	PR-0W	PR-0.5	PR-1	JC-1	PR-0E vs PR-2	PR-0W vs PR-2	PR-0.5 vs PR-2	PR-1 vs PR-2	JC-1 vs PR-2	PR-0E vs PR-3	PR-0W vs PR-3	PR-0.5 vs PR-3	PR-1 vs PR-3	JC-1 vs PR-3
Taxa Richness	6.0	6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Hilsenhoff Biotic Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Ratio of EPT and Chironomid Abundances	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Percent Contribution of Dominant Taxa	2.0	0.0	2.0	4.0	0.0	2.0	2.0	2.0	2.0	2.0	6.0	6.0	6.0	6.0	6.0
EPT Index	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	2.0	4.0	6.0	6.0	6.0	6.0	6.0
Community Loss Index	6.0	6.0	6.0	6.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Sum	32.0	30.0	32.0	34.0	30.0	30.0	32.0	28.0	28.0	28.0	36.0	36.0	36.0	36.0	36.0
% Comparison To Reference	--	--	--	--	--	93.8	106.7	87.5	82.4	93.3	112.5	120.0	112.5	105.9	120.0
						Comparable to References	Comparable to References	Supporting	Supporting	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References	Comparable to References