TMDLS FOR CHLORIDE, COPPER, DISSOLVED OXYGEN, LEAD, PH, SULFATE, TDS, AND TURBIDITY IN THE BODCAU CREEK AND DORCHEAT BAYOU WATERSHEDS, ARKANSAS

FINAL
SEPTEMBER 27, 2012

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards, and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be allocated to point sources and nonpoint sources discharging to the waterbody. This report presents TMDLs that have been developed for chloride, copper, dissolved oxygen (DO), lead, pH, sulfate, total dissolved solids (TDS), and turbidity for 12 stream reaches in the Bodcau Creek and Dorcheat Bayou watersheds. A total of 30 TMDLs were developed as inidicated in Table ES.1.

Table ES.1. Stream reaches and pollutants for which TMDLs were developed.

Stream reach number	Stream name	Pollutants*								Priority
		Cl	Cu	DO	Pb	pH	SO4	TDS	Turb	
11140205-010	Little Bodcau Creek				●					**
11140205-007	Bodcau Creek				●					**
11140205-006	Bodcau Creek		●		●	●			●	Medium
11140205-002	Bodcau Creek		●		●	●			●	Medium
11140203-026	Dorcheat Bayou				●	●				Low
11140203-025	Beech Creek			●	●				●	**
11140203-024	Dorcheat Bayou					●				Low
11140203-923	Big Creek				●	●				**
11140203-023	Big Creek	●			●		●	●		**
11140203-022	Dorcheat Bayou				●	●	●			Low
11140203-021	Horsehead Creek				●	●				**
11140203-020	Dorcheat Bayou				●	●	●			Low
Total TMDLs for each pollutant:		1	2	1	11	8	3	1	3	--

* Cl = chloride, Cu = copper, DO = dissolved oxygen, Pb = lead, pH = pH, SO4 = sulfate, TDS = total dissolved solids, Turb = turbidity
** Priority has not yet been documented in a final 303(d) list.

Bodcau Creek and Dorcheat Bayou form adjacent watersheds in southwestern Arkansas. Both watersheds drain generally southward into Louisiana and eventually into the Red River. Tributaries of Bodcau Creek include Little Bodcau Creek. Tributaries of Dorcheat Bayou include

Beech Creek, Big Creek, and Horsehead Creek. The drainage areas of Bodcau Creek and Dorcheat Bayou are 415 square miles and 510 square miles, respectively, at the Louisiana state line. Both watersheds are in the Gulf Coastal Plain ecoregion and the primary land uses are forest and grassland.

A search of National Pollutant Discharge Elimination System (NPDES) permits yielded a total of 51 permits for various discharges within the two watersheds. This included 27 permits for stormwater discharges, 10 permits for municipal or domestic wastewater, six permits for industrial facilities, five permits for filter backwash at water treatment facilities, and three other miscellaneous permits.

The 12 reaches for which TMDLs were developed were considered to be impaired based on either the final 2008 303(d) list for Arkansas and/or Arkansas Department of Environmental Quality (ADEQ) monitoring data that were collected after 2008. The source of the impairment was unknown for the majority of the stream reaches. Surface erosion has been mentioned as a source of turbidity in Bodcau Creek. ADEQ attributes the pollutants of concern, particularly metals, primarily to anthropogenic sources, including stormwater runoff and land disturbance.

ADEQ had collected historical water quality data at ten locations along these impaired reaches. These data were tabulated and analyzed for basic statistics, seasonal patterns, and relationships between concentration and stream flow. For many cases, data patterns and relationships were not readily apparent due to variability of the data and limited numbers of values.

ES.1 Load Duration TMDLs

The load duration curve method was used to develop the TMDLs for chloride, copper, lead, sulfate, TDS, and turbidity. This method illustrates allowable loading at a wide range of stream flow conditions. The steps for applying this methodology for the TMDLs in this report were: 1) developing a flow duration curve, 2) converting the flow duration curve to load duration curves, 3) plotting observed loads with load duration curves, 4) calculating the TMDL and margin of safety (MOS), 5) calculating existing and allowable loads from diffuse sources,

6) calculating allowable loads for continuous point sources, and 7) calculating loads reserved for future growth.

The load duration curves were plotted with units of tons/day or pounds/day on the vertical axis and percent exceedance (unitless) on the horizontal axis. Each load duration curve was divided into five hydrologic ranges: high flows (0-10% exceedance), moist conditions (10-40% exceedance), mid-range flows (40-60% exceedance), dry conditions (60-90% exceedance), and low flows (90-100% exceedance). The TMDLs were set equal to the allowable loads for the minimum stream flow within each hydrologic range. An implicit MOS was established because the allowable loads are lower at the minimum flow within each hydrologic range rather than at the median flow for each range. The TMDLs for turbidity also include an implicit MOS by assuming that TSS is a conservative parameter and does not settle out of the water column.

Existing loads from diffuse sources were calculated based on ADEQ historical water quality data. The diffuse loads consist of 1) industrial, municipal, or construction stormwater that is regulated by a NPDES permit, and 2) nonpoint source inflows from all other areas that are not regulated by a NPDES permit. The total diffuse loading was divided between regulated stormwater and nonpoint source inflows based on drainage area. The loads from regulated stormwater were assigned to a WLA and the remaining diffuse loading was assigned to the LA.

The loading that was available for continuous point source discharges (i.e., the non-stormwater WLA) was as an effluent concentration for each pollutant multiplied by the sum of the design flows for the continuous point sources that discharge to that reach.

Any portion of the total allowable loading that exceeded the sum of the allocated loads was reserved for future growth of either nonpoint or point sources.

The load duration TMDLs are summarized in Tables ES.2 through ES.9.

ES.2 pH TMDLs

pH is an indication of whether water is acidic (pH < 7.0) or basic (pH > 7.0); its numeric value is equal to the negative logarithm of the concentration of hydrogen ions in the water. In order to calculate the pH after two sources of water mix together, both the pH and the alkalinity of each source must be known. Sufficient data were not available to calculate allowable values of pH and alkalinity for different sources of water entering the impaired stream reaches. Therefore, the pH TMDLs were expressed as an allowable pH value for all water entering the impaired stream reaches. All of the pH impairments addressed in this report were due to low pH values rather than high pH values. The TMDLs, WLAs, and LAs were expressed as a minimum allowable pH of 6.0 su (the minimum pH criterion in the water quality standards). Available effluent data suggest that point sources do not cause or contribute to the low pH impairments in these stream reaches, and no changes are recommended to the point source discharge permits. An implicit MOS was established through conservative assumptions. The pH TMDLs are summarized in Table ES.10.

ES.3 DO TMDL

The DO TMDL for Beech Creek upstream of Lake Columbia was developed using a steady state water quality model (LA-QUAL) to simulate DO concentrations in the stream based on oxygen demand from various sources. The model was calibrated to historical conditions when ADEQ's routine monitoring data showed low DO concentrations. The calibrated model was then used to simulate DO for summer and winter critical conditions as defined in the water quality standards. No point source discharges were included in the model because none of the four point source facilities in the Beech Creek watershed would discharge into Beech Creek during critical conditions for DO. Point source facilities in the Beech Creek watershed are still allowed to discharge at other times and into other streams that do not drain into Beech Creek upstream of Lake Columbia. In order for the model to show simulated DO concentrations in Beech Creek meeting water quality standards, the nonpoint source loads of oxygen demand had to be reduced by 53% for summer and 47% for winter. An implicit MOS was established for this DO TMDL through the use of conservative assumptions. Because the WLA for point sources was zero and the MOS was implicit, the LA for nonpoint sources was set equal to the total oxygen demand simulated by the model (i.e., the TMDL). The results of the DO TMDL calculations are summarized in Table ES.11.

Table ES.2. Summary of chloride TMDL.

Stream reach	Hydrologic range	Allowable loads of chloride (tons/day)					
		LA for non-regulated diffuse sources	**WLA for NPDES regulated stormwater**	**WLA for non-storm point sources**	**MOS**	**Future growth**	**TMDL**
Big Creek 11140203-023	Low flows	0.007093	0.000007	0.009	implicit	0.0006	0.0167
	Dry cond.	0.02547	0.00003	0.009	implicit	0.0003	0.0348
	Mid-range	0.5814	0.0006	0.009	implicit	0.0004	0.5914
	Moist cond.	1.650	0.002	0.009	implicit	1.380	3.041
	High flows	12.213	0.012	0.009	implicit	10.206	22.44

Table ES.3. Summary of dissolved copper TMDLs.

Stream reach	Hydrologic range	Allowable loads of dissolved copper (lbs/day)					
		LA for non-regulated diffuse sources	**WLA for NPDES regulated stormwater**	**WLA for non-storm point sources**	**MOS**	**Future growth**	**TMDL**
Bodcau Creek 11140205 -006	Low flows	0.003297	0.000003	0.03271	implicit	0.0029	0.03891
	Dry cond.	0.02163	0.00002	0.03487	implicit	0.00001	0.05653
	Mid-range	0.49436	0.00040	0.08612	implicit	0.00004	0.58092
	Moist cond.	2.57483	0.00207	0.08612	implicit	0.00001	2.66303
	High flows	19.0535	0.0153	0.08612	implicit	0.00008	19.155
Bodcau Creek 11140205 -002	Low flows	0.0040991	0.0000009	0.0005213	implicit	0.0036076	0.0082289
	Dry cond.	0.0269704	0.0000054	0.0005213	implicit	0.0000003	0.0274974
	Mid-range	0.616466	0.000124	0.0005213	implicit	0.0000007	0.617112
	Moist cond.	3.21035	0.00065	0.0005213	implicit	0.0003787	3.2119
	High flows	23.7552	0.0048	0.0005213	implicit	0.0044787	23.765

Table ES.4. Summary of dissolved lead TMDLs in Bodcau Creek watershed.

		Allowable loads of dissolved lead (lbs/day)					
Stream reach	**Hydrologic range**	**LA for non-regulated diffuse sources**	**WLA for NPDES regulated stormwater**	**WLA for non-storm point sources**	**MOS**	**Future growth**	**TMDL**
Little Bodcau Creek 11140205 -010	Low flows	0.0002895	0.0000005	0.00008	implicit	0.000004	0.000374
	Dry cond.	0.001018	0.000002	0.00008	implicit	0.00002	0.00112
	Mid-range	0.02356	0.00004	0.00008	implicit	0.00032	0.0240
	Moist cond.	0.1048	0.0002	0.00008	implicit	0.01992	0.125
	High flows	0.7758	0.0012	0.00008	implicit	0.14592	0.923
Bodcau Creek 11140205 -007	Low flows	0.0005197	0.0000003	0*	implicit	0	0.00052
	Dry cond.	0.001799	0.000001	0*	implicit	0.00002	0.00182
	Mid-range	0.03318	0.00002	0*	implicit	0.0084	0.0416
	Moist cond.	0.12894	0.00006	0*	implicit	0.088	0.217
	High flows	0.9525	0.0005	0*	implicit	0.649	1.602
Bodcau Creek 11140205 -006	Low flows	0.0009592	0.0000008	0.00509	implicit	0.00001	0.00606
	Dry cond.	0.003367	0.000003	0.00543	implicit	0.00001	0.00881
	Mid-range	0.07702	0.00007	0.01341	implicit	0	0.0905
	Moist cond.	0.4011	0.0004	0.01341	implicit	0.00009	0.415
	High flows	2.968	0.003	0.01341	implicit	0.00059	2.985
Bodcau Creek 11140205 -002	Low flows	0.0009998	0.0000002	0.000082	implicit	0.000198	0.00128
	Dry cond.	0.0039992	0.0000008	0.000082	implicit	0.000198	0.00428
	Mid-range	0.09598	0.00002	0.000082	implicit	0.000068	0.09615
	Moist cond.	0.4999	0.0001	0.000082	implicit	0.000418	0.5005
	High flows	3.702	0.0008	0.000082	implicit	0.000118	3.703

* Note: These WLAs are zero because currently there are not any non-storm point source discharges to this reach. Future discharges are allowable if they do not violate water quality standards.

Table ES.5. Summary of dissolved lead TMDLs for reaches 11140203-026 through -023.

Stream reach	Hydrologic range	Allowable loads of dissolved lead (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Dorcheat Bayou 11140203 -026	Low flows	0.0005997	0.0000003	0.0069	implicit	0	0.0075
	Dry cond.	0.0019992	0.0000008	0.0069	implicit	0	0.0089
	Mid-range	0.041983	0.000017	0.0069	implicit	0.0031	0.052
	Moist cond.	0.17293	0.00007	0.0069	implicit	0.0601	0.240
	High flows	1.2794	0.0006	0.0069	implicit	0.4431	1.73
Beech Creek 11140203 -025	Low flows	0.0001795	0.0000005	0.0023	implicit	0	0.00248
	Dry cond.	0.000638	0.000002	0.0023	implicit	0	0.00294
	Mid-range	0.01467	0.00004	0.0023	implicit	0	0.01701
	Moist cond.	0.0764	0.0002	0.0023	implicit	0	0.0789
	High flows	0.5655	0.0015	0.0023	implicit	0	0.5693
Big Creek 11140203 -923	Low flows	0.000297	0.000003	0.0177	implicit	0	0.0180
	Dry cond.	0.001191	0.000009	0.0177	implicit	0	0.0189
	Mid-range	0.02709	0.00021	0.0177	implicit	0	0.0450
	Moist cond.	0.1412	0.0011	0.0177	implicit	0	0.1600
	High flows	1.0450	0.0078	0.0177	implicit	0	1.0705
Big Creek 11140203 -023	Low flows	0.0001998	0.0000002	0.0009	implicit	0	0.0011
	Dry cond.	0.000999	0.000001	0.0009	implicit	0.0005	0.0024
	Mid-range	0.03257	0.00003	0.0009	implicit	0.0072	0.0407
	Moist cond.	0.1298	0.0002	0.0009	implicit	0.0781	0.209
	High flows	0.9641	0.0009	0.0009	implicit	0.5801	1.546

Table ES.6. Summary of dissolved lead TMDLs for reaches 11140203-022 through -020.

Stream reach	Hydrologic range	Allowable loads of dissolved lead (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Dorcheat Bayou 11140203-022	Low flows	0.0011	0*	0*	implicit	0	0.0011
	Dry cond.	0.0040	0*	0*	implicit	0	0.0040
	Mid-range	0.091	0*	0*	implicit	0	0.091
	Moist cond.	0.47	0*	0*	implicit	0	0.47
	High flows	3.23	0*	0*	implicit	0.27	3.50
Horsehead Creek 11140203-021	Low flows	0.0003697	0.0000003	0.01373	implicit	0	0.0141
	Dry cond.	0.001269	0.000001	0.01373	implicit	0	0.0150
	Mid-range	0.01958	0.00002	0.01373	implicit	0.00977	0.0431
	Moist cond.	0.13292	0.00008	0.01373	implicit	0.02027	0.167
	High flows	0.9864	0.0006	0.01373	implicit	0.14927	1.15
Dorcheat Bayou 11140203-020	Low flows	0.0015	0*	0*	implicit	0	0.0015
	Dry cond.	0.0052	0*	0*	implicit	0	0.0052
	Mid-range	0.118	0*	0*	implicit	0	0.118
	Moist cond.	0.615	0*	0*	implicit	0	0.615
	High flows	4.21	0*	0*	implicit	0.34	4.55

* Note: These WLAs are zero because there are currently no point source discharges to these reaches. Future discharges are allowable if they do not violate water quality standards.

Table ES.7. Summary of sulfate TMDLs.

Stream reach	Hydrologic range	Allowable loads of sulfate (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Big Creek 11140203-023	Low flows	0.01498	0.00002	0.0193	implicit	0.0001	0.0344
	Dry cond.	0.05255	0.00005	0.0193	implicit	0	0.0719
	Mid-range	0.8052	0.0008	0.0193	implicit	0.3957	1.221
	Moist cond.	1.6355	0.0015	0.0193	implicit	4.6227	6.279
	High flows	12.099	0.011	0.0193	implicit	34.2107	46.34
Dorcheat Bayou 11140203-022	Low flows	Loads not calculated (flows are less than critical flow of 4 cfs)					
	Dry cond.	0.173	0*	0*	implicit	0	0.173
	Mid-range	0.931	0*	0*	implicit	0.409	1.34
	Moist cond.	3.79	0*	0*	implicit	3.20	6.99
	High flows	25.2	0*	0*	implicit	26.5	51.7
Dorcheat Bayou 11140203-020	Low flows	Loads not calculated (flows are less than critical flow of 4 cfs)					
	Dry cond.	0.173	0*	0*	implicit	0	0.173
	Mid-range	1.21	0*	0*	implicit	0.54	1.75
	Moist cond.	4.93	0*	0*	implicit	4.16	9.09
	High flows	32.8	0*	0*	implicit	34.5	67.3

* Note: These WLAs are zero because there are currently no point source discharges to these reaches. Future discharges are allowable if they do not violate water quality standards.

Table ES.8. Summary of TDS TMDL.

Stream reach	Hydrologic range	Allowable loads of TDS (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Big Creek 11140203-023	Low flows	0.07293	0.00007	0.094	implicit	0	0.167
	Dry cond.	0.2497	0.0003	0.094	implicit	0.004	0.348
	Mid-range	4.535	0.005	0.094	implicit	1.276	5.91
	Moist cond.	15.186	0.014	0.094	implicit	15.106	30.4
	High flows	111.89	0.11	0.094	implicit	111.906	224

Table ES.9. Summary of turbidity TMDLs.

Stream reach	Hydrologic range	Allowable loads of TSS (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Bodcau Creek 11140205 -006	Low flows	0.01189	0.00001	0*	implicit	0.0632	0.0751
	Dry cond.	0.041966	0.000034	0*	implicit	0.067	0.109
	Mid-range	0.69944	0.00056	0*	implicit	0.42	1.12
	Moist cond.	3.9768	0.0032	0*	implicit	5.22	9.20
	High flows	35.571	0.029	0*	implicit	30.6	66.2
Bodcau Creek 11140205 -002	Low flows	0.014897	0.000003	0*	implicit	0.001	0.0159
	Dry cond.	0.05208	0.00002	0*	implicit	0.001	0.0531
	Mid-range	0.8718	0.0002	0*	implicit	0.319	1.191
	Moist cond.	4.969	0.001	0*	implicit	6.13	11.10
	High flows	44.291	0.009	0*	implicit	37.8	82.1
Beech Creek 11140203 -025	Low flows	0.002094	0.000006	0*	implicit	0.0007	0.0028
	Dry cond.	0.00907	0.00003	0*	implicit	0.0007	0.0098
	Mid-range	0.1087	0.0003	0*	implicit	0.115	0.224
	Moist cond.	0.6433	0.0017	0*	implicit	1.415	2.06
	High flows	8.209	0.021	0*	implicit	6.97	15.2

* Note: These WLAs are zero because currently there are not any non-storm discharges of inorganic suspended solids to these reaches. Future discharges are allowable if they do not violate water quality standards.

Table ES.10. Summary of pH TMDLs.

Stream reach	LA	WLA	MOS	TMDL
Bodcau Creek 11140205-006	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Bodcau Creek 11140205-002	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Dorcheat Bayou 11140203-026	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Dorcheat Bayou 11140203-024	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Big Creek 11140203-923	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Dorcheat Bayou 11140203-022	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Horsehead Creek 11140203-021	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su
Dorcheat Bayou 11140203-020	Nonpoint source inflows must have a pH between 6.0 su and 9.0 su	Point source discharges must have a pH between 6.0 su and 9.0 su	implicit	Inflows must have a pH between 6.0 su and 9.0 su

Table ES.11. Summary of DO TMDL for Beech Creek (11140203-025).

	Allowable oxygen demand for summer [A] (kg/day)	**Allowable oxygen demand for winter [A] (kg/day)**
LA for nonpoint sources	599.66	436.75
WLA for point sources	0 [B]	0 [B]
MOS	implicit	implicit
TMDL	599.66	436.75

Notes: A. The loads presented here are for critical conditions for flow and temperature. Additional assimilative capacity exists at higher flows and lower temperatures.

B. These WLAs are zero because Beech Creek does not currently receive point source effluent during critical conditions for DO. These zero values do not prohibit existing oxygen-demanding discharges during non-critical conditions, nor do they prohibit future oxygen-demanding discharges during critical conditions as long as the discharge does not violate water quality standards.

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LIST OF ABBREVIATIONS

ADEQ	Arkansas Department of Environmental Quality
APCEC	Arkansas Pollution Control and Ecology Commission
BMPs	best management practices
BOD	biochemical oxygen demand
CBOD	carbonaceous biochemical oxygen demand
CFR	Code of Federal Regulations
cfs	cubic feet per second
CPP	Continuing Planning Process
DO	dissolved oxygen
FTN	FTN Associates, Ltd.
$g/m^2/day$	grams per square meter per day
HCR	hydrograph controlled release
HUC	hydrologic unit code
ICIS	Integrated Compliance Information System
kg/day	kilograms per day
LA	load allocation
lbs/day	pounds per day
LDEQ	Louisiana Department of Environmental Quality
m	meters
m^3/sec	cubic meters per second
mg/L	milligrams per liter
MGD	million gallons per day
MOS	margin of safety
MRLC	Multi-Resolution Land Characterization
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
SOD	sediment oxygen demand
su	standard units (for pH)
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TSS	total suspended solids
UAA	use attainability analysis
µg/L	micrograms per liter
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	wasteload allocation
WQBEL	water quality based effluent limitation
WWTP	wastewater treatment plant

1.0 INTRODUCTION

This report presents total maximum daily loads (TMDLs) for chloride, copper, dissolved oxygen (DO), lead, pH, sulfate, total dissolved solids (TDS), and turbidity for various stream reaches in the Bodcau Creek and Dorcheat Bayou watersheds. TMDLs were developed for 12 stream reaches, all of which were impaired for one or more parameters based on monitoring data collected by the Arkansas Department of Environmental Quality (ADEQ). Table 1.1 presents information concerning these impairments from the final 2008 303(d) list for Arkansas (United States Environmental Protection Agency (USEPA) 2008) and from the ADEQ Integrated Water Quality Monitoring and Assessment Report (ADEQ 2008). The TMDLs in this report were developed in accordance with Section 303(d) of the Federal Clean Water Act and USEPA regulations at Title 40 Code of Federal Regulations (CFR) Part 130.7.

The purpose of a TMDL is to determine the pollutant loading that a water body can assimilate without exceeding the water quality standard for that pollutant. The TMDL is the sum of the waste load allocation (WLA), load allocation (LA), and a margin of safety (MOS). The WLA is the load allocated to point sources of the pollutant of concern. The LA is the load allocated to nonpoint sources, including natural background. The MOS is a percentage of the TMDL that takes into account any lack of knowledge concerning the relationship between pollutant loadings and water quality.

Table 1.1. Impairments being addressed by TMDLs in this report.

Reach Number	**Stream Name**	**Impaired Use**	**Pollutant(s) Causing Impairment** [1]	**Suspected Pollutant Source(s)**	**TMDL Priority**
11140203-026	Dorcheat Bayou	Aquatic Life	*Lead,* pH	Unknown	Low
11140203-025	Beech Creek	[2]	*Lead, Turbidity, Dissolved Oxygen (DO)*	[2]	[2]
11140203-024	Dorcheat Bayou	Aquatic Life	pH	Unknown	Low
11140203-923	Big Creek	Aquatic Life	Lead, *pH*	Unknown	Low
11140203-023	Big Creek	[2]	*Chloride, Lead, Sulfate, TDS*	[2]	[2]
11140203-022	Dorcheat Bayou	Aquatic Life, Agriculture & Industrial Water Supply	Lead, pH, Sulfate	Unknown	Low
11140203-021	Horsehead Creek	[2]	*Lead, pH*	[2]	[2]
11140203-020	Dorcheat Bayou	Aquatic Life, Agriculture & Industrial Water Supply	Lead, pH, Sulfate	Unknown	Low
11140205-007	Bodcau Creek	[2]	*Lead*	[2]	[2]
11140205-010	Little Bodcau Creek	[2]	*Lead*	[2]	[2]
11140205-006	Bodcau Creek	Aquatic Life	Copper, Lead, pH, Turbidity	Unknown, Surface Erosion [3]	Medium
11140205-002	Bodcau Creek	Aquatic Life	Copper, Lead, pH, Turbidity	Unknown, Surface Erosion [3]	Medium

[1] Pollutants listed in italics represent impairments that were not on the 2008 final 303(d) list, but were identified later based on more recent data and/or information.

[2] This information has not yet been documented in an Integrated Report or in a final 303(d) list.

[3] This category includes erosion from agricultural activities, construction activities, unpaved road surfaces, and in-stream erosion mainly from unstable stream banks.

2.0 BACKGROUND INFORMATION

2.1 General Information

The study area for this report is the watersheds of Bodcau Creek and Dorcheat Bayou in southwestern Arkansas (see Figure A.1 in Appendix A). Bodcau Creek originates in southwestern Arkansas and flows generally towards the south and into Louisiana, where it eventually flows into the Red River. Dorcheat Bayou also originates in southwestern Arkansas, to the east of Bodcau Creek. It also flows generally towards the south into Louisiana and eventually into the Red River. Little Bodcau Creek is a tributary of Bodcau Creek. Beech Creek, Big Creek, and Horsehead Creek are tributaries of Dorcheat Bayou.

The drainage area of Bodcau Creek where it crosses the state line is approximately 415 square miles (United States Geological Survey (USGS) 1974). The drainage area of Dorcheat Bayou where it crosses the state line is approximately 510 square miles (USGS 1974). The Bodcau Creek and Dorcheat Bayou watersheds comprise ADEQ Planning Segment 1A and are in the Gulf Coastal Plain ecoregion. The Bodcau Creek and Dorcheat Bayou watersheds are adjacent and cover parts of Columbia, Hempstead, Lafayette, and Nevada counties in Arkansas.

2.2 Population

Population statistics for the counties containing a portion of the 11140203 or 11140205 Hydrologic Unit Code (HUC) watersheds were obtained from the US Census Bureau website and are shown in Tables 2.1 and 2.2. County population estimates are based on available 2011 data and urban population estimates are based on 2010 data.

Table 2.1. Population statistics for the 11140203 HUC (Dorcheat Bayou watershed).

County	2011 estimated population	Total estimated watershed population	Percent of total watershed population	Percent non-urban population	Percent urban population
Columbia	24,401	19,552	90.90%	46.18%	53.82%
Lafayette	7,516	724	3.36%	100.00%	0.00%
Nevada	9,017	1,234	5.74%	100.00%	0.00%
TOTAL	40,934	21,510	100.00%	--	--

Table 2.2. Population statistics for the 11140205 HUC (Bodcau Creek watershed).

County	2011 estimated population	Total estimated watershed population	Percent of total watershed population	Percent non-urban population	Percent urban population
Columbia	24,401	590	8.96%	100.00%	0.00%
Lafayette	7,516	3,758	57.12%	100.00%	0.00%
Nevada	9,017	1,234	18.75%	100.00%	0.00%
Hempstead	22,541	998	15.17%	100.00%	0.00%
TOTAL	63,475	6,579	100.00%	--	--

2.3 Land Use

Land use data for the Bodcau Creek and Dorcheat Bayou watersheds were obtained from the National Land Cover Database (NLCD), which was developed by the Multi-Resolution Land Characterization consortium (MRLC 2011). These data were based on satellite imagery from 2006 and they represent the most recent available data for this area. The spatial distribution of these land uses is shown on Figure A.2 (located in Appendix A) and land use percentages are shown in Table 2.3. These data show that forest and grassland/pasture together comprise over 87% of the study area. Based on the land use map (Figure A.2), most of the wetlands appear to occur along the river channels and adjacent lowlands.

Table 2.3. Land use for the Bodcau Creek and Dorcheat Bayou watersheds.

Land use category	Percentage of watershed
Open Water	1.8%
Developed Area	5.5%
Barren Land	0.0%
Forest	67.4%
Grassland/Pasture	20.0%
Cultivated Crops	0.1%
Wetlands	5.2%
TOTAL	100.0%

2.4 Stream Flow Data

The TMDLs in this report were developed using flow data from the USGS gaging station on Dorcheat Bayou near Springhill, Louisiana. Selected information for this gage is given in Table 2.4. The location of this gaging station is shown on Figure A.1 in Appendix A. This is the only USGS gaging station on either Bodcau Creek or Dorcheat Bayou with a long period of continuous daily flow data that includes recent years. Based on watershed similarities and proximity, the flow gage on Dorcheat Bayou was assumed to be representative of flows in Bodcau Creek and all of the tributaries for which TMDLs were developed.

Table 2.4. Information for USGS stream flow gaging station

Gage name and number	Descriptive location	Period of record	Drainage area (square miles)	7Q10 flow (cfs)
Dorcheat Bayou* near Springhill, LA (07348700)	Left bank on downstream side of bridge on State Highway 157	October 1957 to present	605	0.6

* Referred to as “Bayou Dorcheat” by USGS. “Dorcheat Bayou” is used here for consistency with the 303(d) list.

Basic information for the flow gage (location, period of record, and drainage area) was taken from a USGS Water Data Report (USGS 2011) and the 7Q10 flow was taken from a USGS low flow study of streams in Louisiana (USGS 2003). A 7Q10 flow is defined as the lowest 7-day average flow that is likely to occur one year out of every ten years on average. This flow statistic is the critical low flow at which water quality standards for certain parameters are applicable.

2.5 Water Quality Standards

Water quality standards for Arkansas waterbodies are listed in Regulation No. 2 (Arkansas Pollution Control and Ecology Commission (APCEC) 2011). Designated uses for the stream reaches addressed in this report are primary and secondary contact recreation; domestic, industrial, and agricultural water supply; and perennial Gulf Coastal fishery. The only exception to this is that the domestic water supply use has been removed from Horsehead Creek from the Albemarle unnamed tributary (AUT) to the mouth

2.5.1 Minerals

Section 2.511 of Regulation No. 2 provides both a narrative criterion and numeric criteria for dissolved minerals. The general narrative criterion is: “Mineral quality shall not be altered by municipal, industrial, other waste discharges or instream activities so as to interfere with designated uses.” The regulation also includes numeric criteria for dissolved minerals for each ecoregion and for specific streams. Table 2.5 shows dissolved minerals criteria that apply to stream reaches for which chloride, sulfate, or TDS TMDLs were developed.

Section 2.501 of Regulation No. 2 states that the numeric criteria are applicable “at all times except during periods when flows are less than the applicable critical flow.” Critical flow for dissolved minerals such as chloride, sulfate, and TDS is defined in Section 2.106 of Regulation No. 2. For site-specific dissolved minerals criteria that are listed with an asterisk in Regulation No. 2 (including the sulfate criterion for Dorcheat Bayou), the critical low flow is 4 cfs. For site-specific dissolved minerals criteria that are listed without an asterisk in Regulation No. 2 (including Big Creek), ADEQ has recently stated that they consider the critical low flow to be the 7Q10 flow.

Table 2.5. Numeric criteria used for dissolved minerals TMDLs.

Reach number	Stream name	Pollutant(s) causing impairment	Criteria used for TMDLs		
			Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
11140203-023	Big Creek	Chloride, Sulfate, TDS	20 [A]	41.3 [B]	200 [A]
11140203-022, 11140203-020	Dorcheat Bayou [C]	Sulfate	--	16 [A D]	--

[A] Site-specific criterion.
[B] Ecoregion criterion.
[C] Referred to as “Bayou Dorcheat” in Reg. 2. “Dorcheat Bayou” is used here for consistency with the 303(d) list.
[D] Based on critical background flow of 4 cfs (designated by an asterisk in Section 2.511 of Regulation No. 2).

2.5.2 Metals

Section 2.508 of Regulation No. 2 includes narrative and numeric criteria for dissolved metals, including copper and lead. The following narrative criterion for toxic substances applies to dissolved metals:

> “Toxic substances shall not be present in receiving waters, after mixing, in such quantities as to be toxic to human, animal, plant, or aquatic life or to interfere with the normal propagation, growth, and survival of the indigenous aquatic biota.”

The numeric criteria for dissolved copper and dissolved lead to protect from chronic toxicity are expressed as the following equations in Regulation No. 2:

Copper: $e^{[0.8545 * \ln(\text{hardness}) - 1.465]} * 0.960$
Lead: $e^{[1.273 * \ln(\text{hardness}) - 4.705]} * (1.46203 - [\ln(\text{hardness}) * 0.145712])$

The hardness used in this equation is usually the mean hardness for the ecoregion as listed in the CPP, unless there is a representative dataset of site-specific hardness measurements. For this study, ADEQ recommended that the ecoregion default hardness be used unless there were at least 20 hardness measurements during the most recent 10 years. Attachment VI of the CPP states that the mean hardness for the Gulf Coastal Plain ecoregion is 31 mg/L (ADEQ 2000). This value was compared to site-specific hardness data from the nine ADEQ water quality stations located on the stream reaches for which lead TMDLs were developed in this report (see Tables B.1 – B.9 in Appendix B). As shown in Table 2.6, only three stations (RED0027, UWBIG01, and RED0015A) had 20 or more hardness values during the most recent 10 years. At each of those three sites, the average of these site-specific hardness data was lower than 25 mg/L, which is the minimum hardness that is to be used for calculating metals criteria according to regulations at 40 CFR 131(c)(4)(i). Therefore, the minimum hardness value of 25 mg/L was used to calculate the criteria at these three sites. At the other six sites with less than 20 hardness values during the most recent years, the ecoregion default hardness of 31 mg/L was used (in accordance with ADEQ's recommendation for this study). The copper and lead criteria that were calculated using these hardness values for each impaired stream reach are listed in Table 2.6.

According to Section 2.106 of Regulation No. 2, critical low flow for protection of a perennial fishery is the 7Q10 flow. Criteria for copper and lead are for protection of aquatic life and are therefore applicable at all stream flows at or above the 7Q10 flow.

2.5.3 Dissolved Oxygen

Section 2.505 of Regulation No. 2 provides numeric criteria for dissolved oxygen. Beech Creek is subject to the dissolved oxygen criteria for "Typical Gulf Coastal" streams with a watershed between 10 square miles and 500 square miles. For these streams, the numeric dissolved oxygen criteria are 5.0 mg/L during the primary season (when water temperatures are 22°C or less), and 3.0 mg/L during the critical season (when water temperatures are greater than 22°C). Section 2.505 of Regulation No. 2 states that dissolved oxygen criteria are to be met at minimum stream flows for the primary season and at 7Q10 flow for the critical season.

Table 2.6. Hardness values and criteria for metals TMDLs.

Stream name and reach number	Water quality station	Data for last 10 years		Hardness used to calculate criteria (mg/L)	Criteria used for TMDLs	
		Number of values	Average site-specific hardness (mg/L)		Dissolved copper (µg/L)	Dissolved lead (µg/L)
Bodcau Creek (11140205-007)	RED0057	12	14	31	--	0.69
Little Bodcau Creek (11140205-010)	RED0056	11	20	31	--	0.69
Bodcau Creek (11140205-006 and 11140205-002)	RED0027	54	23	25	3.47	0.54
Dorcheat Bayou (11140203-026)	UWBDT02	17	22	31	--	0.69
Beech Creek (11140203-025)	UWBCH01	15	16	31	--	0.69
Big Creek (11140203-923)	UWBIG01	20	18	25	--	0.54
Big Creek (11140203-023)	UWBIG02	15	20	31	--	0.69
Dorcheat Bayou (11140203-022 and 11140203-020)	RED0015A	53	19	25	--	0.54
Horsehead Creek (11140203-021)	UWHHC01	16	34	31	--	0.69

2.5.4 Turbidity

Section 2.503 of Regulation No. 2 provides both a narrative criterion and numeric criteria that apply to siltation/turbidity. The general narrative criterion is: “There shall be no distinctly visible increase in turbidity of receiving waters attributable to municipal, industrial, agricultural, other waste discharges or instream activities”. The numeric turbidity criteria for typical Gulf Coastal streams are 21 NTU for base flows and 32 NTU for all flows. Regulation No. 2 also states that “the non-point source runoff shall not result in the exceedance of the instream all flows values in more than 20% of the ADEQ ambient monitoring network samples taken in not less than 24 monthly samples.”

2.5.5 pH

Section 2.504 of Regulation No. 2 provides both a narrative criterion and numeric criteria that apply to pH – "As a result of waste discharges, the pH of water in streams or lakes must not fluctuate in excess of 1.0 unit over a period of 24 hours and pH values shall not be below 6.0 or above 9.0."

2.5.6 Antidegradation

As specified in USEPA's regulations at 40 CFR 130.7(b)(2), applicable water quality standards include antidegradation requirements. Arkansas' antidegradation policy is listed in Sections 2.201 through 2.204 of Regulation No. 2. These sections impose the following requirements:

- Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected;
- Water quality that exceeds standards shall be maintained and protected unless allowing lower water quality is necessary to accommodate important economic or social development, although water quality must still be adequate to fully protect existing uses;
- For outstanding state or national resource waters, those uses and water quality for which the outstanding waterbody was designated shall be protected; and
- For potential water quality impairments associated with a thermal discharge, the antidegradation policy and implementing method shall be consistent with Section 316 of the Clean Water Act.

2.6 Nonpoint Sources

The 2008 Arkansas Integrated Report (ADEQ 2008) lists surface erosion as a suspected source for turbidity in Dorcheat Bayou and Bodcau Creek. For the remainder of the impairments addressed in this report, no specific pollutant sources were identified in the Integrated Report.

The pH impairments may be caused at least partially by soils with low pH. Many of the soils in the Dorcheat Bayou and Bodcau Creek watersheds have low pH (USDA 1984, USDA 1985).

2.7 Point Sources

For development of these TMDLs, “point sources” were defined to include continuous or non-stormwater discharges (e.g., treated municipal or domestic wastewater) as well as stormwater runoff that is regulated under the National Pollutant Discharge Elimination System (NPDES). Information for point source discharges in the study area was obtained by searching ADEQ’s online permits database and USEPA’s Integrated Compliance Information System (ICIS). This search yielded a total of 51 permitted discharges. Locations of the permitted facilities are shown on Figure A.3 and selected information for these facilities is listed in Table A.1 (in Appendix A). Table 2.7 summarizes the numbers and types of permits that were found according to the first impaired reach downstream of the discharge.

Many of the permits do not have numeric limits for parameters causing impairments. Some of the permits have limits are for pH (minimum of 6.0 su and maximum of 9.0 su). The Entergy Harvey Couch facility has water quality-based permit limits for copper and lead, and the Albemarle West Plant has water-quality based permit limits for lead. For both of these facilities, the permit limits for metals are based on meeting water quality standards with no upstream flow in the receiving stream. Permit limits for metals are expressed as total recoverable concentrations rather than dissolved concentrations.

Two facilities have oxygen demanding discharges within the overall watershed for Beech Creek, which is impaired for DO. However, these facilities are wet log storage facilities and it is highly unlikely that either one would discharge during hot, dry weather that characterizes critical conditions for DO. Also, one of these two facilities (Deltic Timber) discharges into an unnamed tributary that enters Lake Columbia before reaching Beech Creek. The current permit limits for Deltic Timber are based on a previously approved DO TMDL that addressed only the receiving stream for that facility (FTN 1999a, FTN 1999b).

Table 2.7. Numbers and types of NPDES permits in the study area.

First impaired reach downstream*	Stream name	Storm-water	Municipal or domestic wastewater	Filter backwash	Industrial	Other
11140205-007	Bodcau Creek	1	0	0	0	0
11140205-010	Little Bodcau Creek	2	1	0	0	0
11140205-006	Bodcau Creek	4	3	2	1	0
11140205-002	Bodcau Creek	1	1	0	0	0
11140203-026	Dorcheat Bayou	1	0	2	0	0
11140203-025	Beech Creek	2	0	0	2	0
11140203-024	Dorcheat Bayou	0	0	0	0	0
11140203-923	Big Creek	13	3	1	2	2
11140203-023	Big Creek	2	0	0	0	1
11140203-022	Dorcheat Bayou	0	0	0	0	0
11140203-021	Horsehead Creek	1	2	0	1	0
11140203-020	Dorcheat Bayou	0	0	0	0	0
Totals:		27	10	5	6	3

*Note: Discharges may not directly enter the reach listed here, but this represents the first impaired reach downstream of the discharge.

2.8 Previous Water Quality Studies

One previous water quality study that was identified for the study area was a report titled "TMDLs for Segments Listed for Mercury in Fish Tissue for Selected Arkansas Watersheds" (FTN 2002a). This report analyzes water quality data related to mercury and presents TMDLs for mercury fish consumption advisories in several Arkansas waterbodies, including Dorcheat Bayou. Due to the age of that report and its focus on mercury, no information from that report was used for the development of the TMDLs in this report.

Another previous water quality study was the DO TMDL that was developed for the receiving stream for the Deltic Timber Waldo Mill (FTN 1999a, FTN 1999b). The scope of the model and TMDL calculations was limited to the Deltic discharge and its receiving stream.

3.0 EXISTING WATER QUALITY

3.1 General Description of Data

Routine monitoring data for chloride, copper, lead, sulfate, TDS, turbidity, total suspended solids (TSS), and pH have been collected by ADEQ at nine sites in the study area. ADEQ monitoring sites are located on Bodcau Creek, Little Bodcau Creek, Dorcheat Bayou, Beech Creek, Big Creek, and Horsehead Creek. Locations of the monitoring sites are shown on Figure A.1 in Appendix A. Tables 3.1 – 3.6 provide summaries of these data for the parameters that are causing impairments at each site. Appendix B includes tabular listings of the individual data (Tables B.1 – B.11) as well as time series plots of the data (Figures B.1 – B.25).

Tables 3.1 – 3.6 summarize data for the entire period of record; however, the period of record normally used as an assessment period by ADEQ consists of the previous 5 years of data, usually starting April 1 and ending March 30 of the fifth year.

Table 3.1. Summary of relevant water quality data for the Bodcau Creek watershed.

	RED0057	RED0056	RED0027		
Site description	Bodcau Creek near Falcon, AR	Little Bodcau Creek near Piney Grove, AR	Bodcau Creek near Lewisville, AR		
Reach number	11140205-007	11140205-010	11140205-006		
Period of record	2/7/00 – 3/9/09	2/7/00 – 3/9/09	9/24/96 – 2/9/10	1/9/95 – 2/9/10	9/25/90 – 2/9/10
Parameter	Dissolved lead	Dissolved lead	Dissolved lead	Dissolved copper	pH
Number of values	16	14	67	94	205
Minimum	< 0.3 µg/L	< 0.1 µg/L	< 0.02 µg/L	< 0.5 µg/L	5.21
Maximum	1.27 µg/L	1.29 µg/L	3.76 µg/L	37.4 µg/L	8.56
Median	0.68 µg/L	0.55 µg/L	0.46 µg/L	1.94 µg/L	6.34
Criterion in standards	0.69 µg/L	0.69 µg/L	0.54 µg/L	3.47 µg/L	6.0 – 9.0 su
Number of excursions beyond criterion	8	6	26	14	55
Percent of excursions beyond criterion*	50.0%	42.9%	38.8%	14.9%	26.8%

*Note: Percentages of excursions were calculated for the entire period of record; therefore, these statistics are different than ADEQ's assessment results using only recent data.

Table 3.2. Summary of dissolved lead data for the Dorcheat Bayou watershed.

	UWBDT02	UWBCH01	UWBIG01	UWBIG02	RED0015A	UWHHC01
Site description	Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR	Beech Creek at Hwy 82 near Waldo, AR	Big Creek at Hwy 132 at Magnolia, AR	Big Creek NW of Macedonia on Columbia Co. Road 12	Dorcheat Bayou east of Taylor, AR	Horsehead Creek at Hwy 19, N of Walkerville, AR
Reach number	11140203-026	11140203-025	11140203-923	11140203-023	11140203-022	11140203-021
Period of record	5/14/96 – 3/17/09	5/14/96 – 3/17/09	6/20/94 – 3/17/09	2/12/07 – 3/17/09	11/19/96 – 2/9/10	5/14/96 – 3/17/09
Parameter	Diss. lead	Diss. lead	Diss. lead	Diss. lead	Diss. lead	Diss. lead
No. of values	18	15	21	15	64	17
Minimum	< 0.3 μg/L	< 0.3 μg/L	0.20 μg/L	0.18 μg/L	0.13 μg/L	< 0.3 μg/L
Maximum	1.51 μg/L	1.23 μg/L	1.50 μg/L	1.05 μg/L	1.28 μg/L	1.12 μg/L
Median	0.53 μg/L	0.74 μg/L	0.62 μg/L	0.41 μg/L	0.37 μg/L	0.45 μg/L
Criterion in standards	0.69 μg/L	0.69 μg/L	0.54 μg/L	0.69 μg/L	0.54 μg/L	0.69 μg/L
No. of values exceeding criterion	7	9	14	3	21	4
Percent of values exceeding criterion*	38.9%	60.0%	66.7%	20.0%	32.8%	23.5%

*Note: Percentages of values exceeding the water quality criteria were calculated for the entire period of record; therefore, these statistics are different than ADEQ's assessment results using only recent data.

Table 3.3. Summary of pH data for the Dorcheat Bayou watershed.

	UWBDT02	RED0065	UWBIG01	RED0015A	UWHHC01
Site description	Dorcheat Bayou at Hwy 82; 6 mi W of Waldo, AR	Dorcheat Bayou near Magnolia, AR	Big Creek at Hwy 132 at Magnolia, AR	Dorcheat Bayou east of Taylor, AR	Horsehead Creek at Hwy 19, N of Walkerville, AR
Reach number	11140203-026	11140203-024	11140203-923	11140203-022	11140203-021
Period of record	6/20/94 – 3/17/09	7/09/07 – 3/17/09	6/20/94 – 3/17/09	10/16/90 – 2/9/10	6/20/94 – 3/17/09
Parameter	pH	pH	pH	pH	pH
Number of values	32	11	35	196	25
Minimum	4.05	5.04	4.36	4.58	5.52
Maximum	7.63	6.59	7.70	8.56	7.29
Median	5.95	5.38	6.47	6.35	6.31
Number of values failing criteria	17	10	6	42	8
Percent of values failing criteria*	53.1%	90.9%	17.1%	21.4%	32.0%

*Note: Percentages of values failing the water quality criteria were calculated for the entire period of record; therefore, these statistics are different than ADEQ's assessment results using only recent data.

Table 3.4. Summary of chloride, sulfate, and TDS data for impaired reaches.

	UWBIG02			RED0015A
Site description	Big Creek NW of Macedonia on Columbia Co. Road 12			Dorcheat Bayou east of Taylor, AR
Reach number	11140203-023			11140203-022
Period of record	2/12/07 – 3/17/09			10/16/90 – 2/9/10
Parameter	Chloride	Sulfate	TDS	Sulfate
Number of values	14	14	14	201
Minimum	7.2 mg/L	5.81 mg/L	94 mg/L	1 mg/L
Maximum	55.5 mg/L	83.1 mg/L	284 mg/L	172 mg/L
Median	19.0 mg/L	21.3 mg/L	130 mg/L	9.7 mg/L
Criterion in standards	20 mg/L	41.3 mg/L	200 mg/L	16 mg/L
Number of values exceeding criterion	4	3	3	52
Percent of values exceeding criterion*	28.6%	21.4%	21.4%	25.9%

*Note: Percentages of values exceeding the water quality criteria were calculated for the entire period of record; therefore, these statistics are different than ADEQ's assessment results using only recent data.

Table 3.5. Summary of TSS and turbidity data for impaired reaches.

	RED0027	UWBCH01
Site description	Bodcau Creek near Lewisville, AR	Beech Creek at Hwy 82 near Waldo, AR
Reach number	11140205-006	11140203-025
Period of record	9/25/90 – 2/9/10	6/20/94 – 3/17/09
Turbidity		
Number of values	207	21
Minimum	3.3 NTU	5.45 NTU
Maximum	61.8 NTU	51 NTU
Median	11 NTU	24.3 NTU
Criterion in standards (for “all flows”)	32 NTU	32 NTU
Number of values exceeding criterion	14	4
Percent of values exceeding criterion*	6.8%	19.0%
TSS		
Number of values	201	19
Minimum	0.5 mg/L	2.5 mg/L
Maximum	40.5 mg/L	31.5 mg/L
Median	6.0 mg/L	12 mg/L

*Note: Percentages of values exceeding the water quality criteria were calculated for the entire period of record; therefore, these statistics are different than ADEQ’s assessment results using only recent data.

Table 3.6. Summary of DO data for Beech Creek.

	UWBCH01
Site description	Beech Creek at Hwy 82 near Waldo, AR
Reach number	11140203-025
Period of record	6/20/94 – 3/17/09
Number of values	21
Minimum	0.5 mg/L
Maximum	11.4 mg/L
Median	5.33 mg/L
Criteria in standards	3 mg/L in critical season, 5 mg/L in primary season
Number of values failing criterion	9
Percent of values failing criterion*	42.9%

*Note: Percentages of values failing the water quality criteria were calculated for the entire period of record; therefore, these statistics are different than ADEQ’s assessment results using only recent data.

3.2 Seasonal Patterns

Seasonal plots of the available water quality data related to the impairments addressed in this report are included in Appendix C (Figures C.1 through C.25).

For dissolved copper and dissolved lead (Figures C.1 – C.4, C.8, C.10, C.15, C.18, C.21, and C.24), measurements exceeded water quality standards during all seasons, but the highest measurements tended to occur during May through October.

For chloride, sulfate, and TDS (Figures C.17, C.19, C.20, and C.22), there were not enough data to confidently identify seasonal patterns.

For turbidity and TSS (Figures C.5, C.6, C.11, and C.12), there were a few higher values during the summer, but there were too few data to determine a consistent pattern.

The seasonal plots of pH (Figures C.7, C.9, C.14, C.16, C.23, and C.25) showed values below the minimum criterion (6.0 su) during all seasons. There were no seasonal patterns for the pH data.

As expected, the DO concentrations in Beech Creek (Figure C.13) exhibit a typical seasonal pattern, with highest concentrations occurring in the winter and the lowest concentrations occurring during summer (May through October).

3.3 Relationships between Concentration and Flow

The water quality parameters addressed in this TMDL report were plotted versus stream flow to visually examine any correlation between water quality and flow. These plots are included in Appendix D as Figures D.1 through D.25.

The plots of dissolved copper and dissolved lead versus flow (Figures D.1 – D.4, D.8, D.10, D.15, D.18, D.21, and D.24) did not show any consistent relationships between concentration and stream flow.

For chloride, sulfate, and TDS (Figures D.17, D.19, D.20, and D.22), the only exceedances of water quality standards in Big Creek at station UWBIG02 were at relatively low flows. The sulfate data for Dorcheat Bayou at station RED0015A show exceedances at a wider range of flows, but not at the highest flows.

The plots of turbidity and TSS versus stream flow (Figures D.5, D.6, D.11 and D.12) did not show any visually apparent relationship between concentration and stream flow, except that the highest turbidity values in Bodcau Creek at RED0027 occurred during periods of relatively lower flow.

The pH data (Figures D.7, D.9, D.14, D.16, D.23, and D.25) did not show any noticeable relationship with stream flow, except at the two stations with the most data (RED0027 and RED0015A). At these two stations, there is a slight trend towards lower pH values at higher flows.

The DO data for Beech Creek at UWBCH01 (Figure D.13) show low DO values occurring over a wide range of flows. Also, a wide range of DO values occurred at high flows, which is unusual because high flows in most streams tend to generate enough velocity and turbulence to keep the stream well aerated. However, high flows can also re-suspend organic matter that has previously settled along the stream bottom.

3.4 Relationships between Metals and pH

In aquatic environments, water pH can influence the bioavailability of metals as well as the partitioning of metals between dissolved and particulate forms. Low pH levels can increase metals solubility, which can result in higher measurements of dissolved metals. Low pH is a concern in the majority of the stream reaches with metals impairments being addressed in this report. Therefore, for those water quality monitoring sites on stream reaches impaired due to both pH and metals, the metals concentrations were plotted versus pH measurements to see if there are any visually apparent correlations between these two parameters. These plots are included in Appendix E (Figures E.1, E.2, E.4, and E.7 – E.9). In general, there were no noticeable correlations between dissolved metals and pH.

3.5 Relationships between Turbidity and TSS

Plots of turbidity versus TSS were developed for the monitoring sites that were impaired for turbidity (Figure E.3 for RED0027 and Figure E.6 for UWBCH01) plus one other site (Figure E.5 for UWBDT02). The purpose of these plots was to examine the correlation between turbidity values and TSS concentrations. Linear regressions were performed on the turbidity and TSS values for each of the water quality stations. The results of these regressions are summarized in Table 3.7. Separate regressions for base flow conditions and all flow conditions were not developed due to the limited number of data points available.

The regression analysis was also performed for Dorcheat Bayou at UWBDT02. Although there is no impairment for turbidity at UWBDT02, the regression results at this station were needed to establish a TSS target for Beech Creek because the UWBCH01 data showed practically no correlation between turbidity and TSS ($R^2 = 0.04$).

Table 3.7 Summary of results of turbidity and TSS regressions

Sampling Station	Regression Equation	Number of Data Points	Coefficient of Determination (R^2)	Significance Level (P value)	Used in TMDL?
RED0027	Turbidity = (1.0386 × TSS) + 7.1	197	0.41	7.9×10^{-24}	Yes
UWBCH01	Turbidity = (0.2917 × TSS) + 20.7	19	0.04	0.43	No
UWBDT02	Turbidity = (0.6765 × TSS) + 6.9	25	0.45	0.0002	Yes*

* Used for the turbidity TMDL for Beech Creek (11140203-025).

The strength of the linear relationship is measured by the coefficient of determination (R^2) calculated during the regression analysis (Zar 1996). The R^2 value is the percentage of the total variation in the logarithm of turbidity that is explained or accounted for by the fitted regression (logarithm TSS).

The perfect explanation of the measurement of turbidity to the measurement of TSS would require collecting and analyzing a large amount of research data. A number of the items affecting this perfect explanation of the relationship would need to be known. A partial list of the items affecting the relationship follows:

- Velocity of the water at the time of sampling;
- Algal and bacteria masses in the water column;
- Measured color of the water;
- Mass of the organic component of the TSS;

- Mass of the material passing through the filter during the TSS analysis;
- Grain size distribution of the inorganic portion of the TSS;
- Specific gravity of the different sizes of inorganic solids particles;
- Hydrographic conditions at the time of sampling;
- Number, magnitude, and lags of rainfall events represented by the sampling.

Collecting a large volume of research data would not change the fact that inorganic particles represented in the TSS measurements are the major contributors to the turbidity readings and are the major constituents reduced when sediment best management practices (BMPs) are applied to nonpoint sources. The BMPs used on nonpoint sources for sediment also reduce the load of many of the unexplained contributors in the regression. The effort to have a perfect explanation of turbidity may not result in a better selection of BMPs. The regressions presented above between TSS and turbidity are adequate for the preparation of these TMDLs. Stakeholder groups of knowledgeable persons from the watersheds may need additional information to set a plan of action for these turbidity TMDLs.

The statistical significance for each regression was evaluated by computing the "P value" for the slope for each regression. The P value is essentially the probability that the slope of the regression line is really zero. A low P value indicates that a non-zero slope calculated from the regression analysis is statistically significant. Generally, relationships with P values less than or equal to 0.05 are considered statistically significant. The P values in Table 3.7 show that the relationships between turbidity and TSS are statistically significant at RED0027 and UWBDT02 but not significant for UWBCH01. Because the UWBCH01 data exhibited a lack of statistical significance (high P value) and a lack of correlation (low R^2), the TSS target for the Beech Creek turbidity TMDL was calculated using the regression results from UWBDT02.

4.0 TMDLS FOR METALS, MINERALS, AND TURBIDITY

4.1 Seasonality and Critical Conditions

USEPA regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Also, both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards. Therefore, the historical data and analyses discussed in Section 3.0 were used to evaluate whether there were certain flow conditions or certain periods of the year that could be used to characterize critical conditions.

The metals, minerals, and turbidity TMDLs in this report were not developed for individual seasons because: 1) the water quality data do not show strong, consistent seasonal patterns; 2) none of the point source discharges have seasonal permit limits for metals, minerals, or turbidity; and 3) the assimilative capacities for metals, minerals, and turbidity do not vary with seasonal temperature changes (unlike parameters such as DO). Critical flow conditions were addressed by using the load duration curve methodology to develop these TMDLs. This methodology results in allowable loads calculated for a wide range of flows.

4.2 Water Quality Targets

The water quality targets for the chloride, copper, lead, sulfate, and TDS TMDLs in this report were simply the numeric criteria from the water quality standards as listed in Tables 2.5 and 2.6. Chloride, copper, lead, sulfate, and TDS can easily be expressed as mass, so there was no need to use surrogate parameters.

Turbidity is an expression of the optical properties in a water sample that cause light to be scattered or absorbed and may be caused by suspended matter, such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms (Standard Methods 1999). Turbidity cannot be expressed as a load as preferred for TMDLs. To achieve a load-based value, turbidity is often correlated with a surrogate parameter such as TSS that may be expressed as a load. In general, activities that generate varying amounts of suspended sediment will proportionally change or affect turbidity

(USEPA 1991). Research by Relyea et al. (2000) states "increased turbidity by sediments can reduce stream primary production by reducing photosynthesis, physically abrading algae and other plants, and preventing attachment of autotrophs to substrate surfaces."

The relationships between turbidity and TSS presented in Table 3.7 were used to develop target TSS concentrations (i.e., numeric endpoints for the TMDLs). The target TSS concentrations developed for these TMDLs are shown in Table 4.1.

Table 4.1 Summary of target TSS concentrations

Reach(es) for which turbidity TMDLs were developed	Sampling station for turbidity-TSS relationship	Flow category	Turbidity criterion (NTU)	Target TSS (mg/L)
Bodcau Creek (11140205-006 and -002)	RED0027	Base flow	21	13.4
		All flow	32	24
Beech Creek (11140203-025)	UWBDT02*	Base flow	21	21
		All flow	32	37

* UWBDT02 regression was used for Beech Creek because UWBCH01 regression was poor (see Section 3.5)

4.3 Methodology for TMDL Calculations

The methodology used for the metals, minerals, and turbidity TMDLs in this report is the load duration curve. Because loading capacity varies as a function of the flow present in the stream, these TMDLs represent a continuum of allowable loads (both point source and nonpoint source) over all flow conditions, rather than just a fixed load for one flow condition. This methodology is described in a USEPA guidance document titled "An Approach for Using Load Duration Curves in the Development of TMDLs" (USEPA 2007). The steps for how this methodology is applied for the TMDLs in this report can be summarized as follows:

1. Develop a flow duration curve (Section 4.4),
2. Convert the flow duration curve to load duration curve (Section 4.5),
3. Plot observed loads with the load duration curves (Section 4.6),
4. Calculate the TMDL and establish the MOS (Section 4.7),
5. Calculate existing and allowable loads from diffuse sources (Section 4.7.3),
6. Calculate allowable loads for non-stormwater point sources (Section 4.7.4), and
7. Calculate the loads reserved for future growth (Section 4.7.5).

In this report, flow duration curves and load duration curves were developed only for the impaired reaches that have observed water quality data. Developing flow duration curves and load duration curves for other impaired reaches would have been redundant because those curves would be the same as for the reaches with observed data except multiplied by the ratio of drainage areas. Therefore, TMDLs for other impaired reaches were calculated by taking the TMDL results from reaches with observed water quality data and adjusting them to account for differences in drainage area and numbers of NPDES permits for stormwater discharges.

4.4 Flow Duration Curves

Flow duration curves were developed using the long-term daily flow data for the USGS gage on Dorcheat Bayou near Springhill, Louisiana. Selected percentiles of the daily flow data were calculated. Ambient flows at the downstream end of each impaired reach were estimated by multiplying the flows at the gage by the ratio of drainage area for the reach and for the gage.

Each flow duration curve was then plotted as daily flow (cfs) versus percent exceedance (100% minus percentile ranking). These plots show both the ambient flow from the watershed (dashed line) and the total flow that would occur with ambient flow plus the continuous point sources discharging at their design flow rates (solid line). Each flow duration curve was divided into five hydrologic ranges: high flows (0-10% exceedance), moist conditions (10-40% exceedance), mid-range flows (40-60% exceedance), dry conditions (60-90% exceedance), and low flows (90-100% exceedance). These ranges were defined the same as in EPA's guidance document for load duration curves (EPA 2007). These flow duration curves for the individual reaches are shown in the appendices of this report as follows:

Appendix F	(Figure F.1):	reach 11140205-007
Appendix G	(Figure G.1):	reach 11140205-010
Appendix H	(Figure H.1):	reach 11140205-006
Appendix I	(Figure I.1):	reach 11140203-026
Appendix J	(Figure J.1):	reach 11140203-025
Appendix K	(Figure K.1):	reach 11140203-923
Appendix L	(Figure L.1):	reach 11140203-023
Appendix M	(Figure M.1):	reach 11140203-022
Appendix N	(Figure N.1):	reach 11140203-021

4.5 Load Duration Curves

For each TMDL, the flow values from the flow duration curves were multiplied by the appropriate target concentration of chloride, copper, lead, sulfate, TDS, or TSS (from Section 4.2) to make a duration curve of allowable loads. Each load duration curve is a plot of tons per day of chloride, sulfate, TDS, or TSS or pounds per day of copper or lead versus the percent exceedances from the flow duration curve. The calculations for these load duration curves are shown in Tables F.1, G.1, H.1, I.1, J.1, J.2, K.1, L.1, M.1, and N.1. The load duration curves are presented in the following appendices:

Appendix F: lead curve for reach 11140205-007 (RED0057)
Appendix G: lead curve for reach 11140205-010 (RED0056)
Appendix H: copper, lead, and TSS curves for reach 11140205-006 (RED0027)
Appendix I: lead curve for reach 11140203-026 (UWBDT02)
Appendix J: lead and TSS curves for reach 11140203-025 (UWBCH01)
Appendix K: lead curve for reach 11140203-923 (UWBIG01)
Appendix L: chloride, lead, sulfate, and TDS curves for reach 11140203-023 (UWBIG02)
Appendix M: lead and sulfate curves for reach 11140203-022 (RED0015A)
Appendix N: lead curve for reach 11140203-021 (UWHHC01)

The load duration curve shows the calculation of the TMDL at any flow rather than at a single critical flow. The official TMDL number may be reported as one or more discrete numbers, but the curve is provided to demonstrate the value of the acceptable loads at a wide range of flows. This will allow analysis of load cases in the future for different flow regimes.

4.6 Observed Loads

For each sampling site, observed loads were calculated by multiplying each observed concentration of chloride, copper, lead, sulfate, TDS, or TSS by the estimated flow at the downstream end of the reach on the sampling day. These observed loads were then plotted versus the percent exceedances of the flow on the sampling day and placed on the plot with the corresponding load duration curve. These plots with the load duration curves and observed loads are shown in the appendices of this report as listed in Section 4.5.

These plots provide visual comparisons between observed and allowable loads under different flow conditions. Observed loads that are plotted above the load duration curve (identified as "TMDL" curve in the legend) represent conditions where observed loads exceed the loads corresponding to the numeric criterion or target concentration. Observed loads below the load duration curve represent conditions where observed loads were less than loads corresponding to the numeric criterion or target concentration.

The load duration curve is beneficial when analyzing monitoring data with its corresponding flow information plotted as a load. This allows the monitoring data to be plotted in relation to its place in the flow continuum.

4.7 TMDL Calculations

The TMDLs are summarized in Tables 4.2 – 4.9. The methods used to calculate each element of the TMDLs are described below. The calculations for the TMDLs for the individual reaches are shown in the appendices of this report as follows:

Appendix F (Table F.2):	reach 11140205-007
Appendix G (Table G.2):	reach 11140205-010
Appendix H (Tables H.2 and H.3):	reaches 11140205-006 and 11140205-002
Appendix I (Table I.2):	reach 11140203-026
Appendix J (Table J.3):	reach 11140203-025
Appendix K (Table K.2):	reach 11140203-923
Appendix L (Table L.2):	reach 11140203-023
Appendix M (Tables M.2 and M.3):	reaches 11140203-022 and 11140203-020
Appendix N (Table N.2):	reach 11140203-021

4.7.1 TMDLs

The TMDLs were set equal to the allowable loads for the minimum flow within each hydrologic range. In other words, TMDLs were set to the allowable loads with an exceedance of 10% for high flows, 40% for moist conditions, 60% for mid-range flows, and 90% for dry conditions. For low flow conditions, the allowable loads were computed for 7Q10 flow conditions. For the sulfate TMDLs for Dorcheat Bayou, allowable loads were not calculated for the "low flows" hydrologic range because that represented flows that were less than the critical low flow of 4 cfs (see Section 2.5.1).

Table 4.2. Summary of chloride TMDL.

Stream reach	Hydrologic range	Allowable loads of chloride (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Big Creek 11140203-023	Low flows	0.007093	0.000007	0.009	implicit	0.0006	0.0167
	Dry cond.	0.02547	0.00003	0.009	implicit	0.0003	0.0348
	Mid-range	0.5814	0.0006	0.009	implicit	0.0004	0.5914
	Moist cond.	1.650	0.002	0.009	implicit	1.380	3.041
	High flows	12.213	0.012	0.009	implicit	10.206	22.44

Table 4.3. Summary of dissolved copper TMDLs.

Stream reach	Hydrologic range	Allowable loads of dissolved copper (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Bodcau Creek 11140205-006	Low flows	0.003297	0.000003	0.03271	implicit	0.0029	0.03891
	Dry cond.	0.02163	0.00002	0.03487	implicit	0.00001	0.05653
	Mid-range	0.49436	0.00040	0.08612	implicit	0.00004	0.58092
	Moist cond.	2.57483	0.00207	0.08612	implicit	0.00001	2.66303
	High flows	19.0535	0.0153	0.08612	implicit	0.00008	19.155
Bodcau Creek 11140205-002	Low flows	0.0040991	0.0000009	0.0005213	implicit	0.0036076	0.0082289
	Dry cond.	0.0269704	0.0000054	0.0005213	implicit	0.0000003	0.0274974
	Mid-range	0.616466	0.000124	0.0005213	implicit	0.0000007	0.617112
	Moist cond.	3.21035	0.00065	0.0005213	implicit	0.0003787	3.2119
	High flows	23.7552	0.0048	0.0005213	implicit	0.0044787	23.765

Table 4.4. Summary of dissolved lead TMDLs in Bodcau Creek watershed.

Stream reach	Hydrologic range	Allowable loads of dissolved lead (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Little Bodcau Creek 11140205-010	Low flows	0.0002895	0.0000005	0.00008	implicit	0.000004	0.000374
	Dry cond.	0.001018	0.000002	0.00008	implicit	0.00002	0.00112
	Mid-range	0.02356	0.00004	0.00008	implicit	0.00032	0.0240
	Moist cond.	0.1048	0.0002	0.00008	implicit	0.01992	0.125
	High flows	0.7758	0.0012	0.00008	implicit	0.14592	0.923
Bodcau Creek 11140205-007	Low flows	0.0005197	0.0000003	0*	implicit	0	0.00052
	Dry cond.	0.001799	0.000001	0*	implicit	0.00002	0.00182
	Mid-range	0.03318	0.00002	0*	implicit	0.0084	0.0416
	Moist cond.	0.12894	0.00006	0*	implicit	0.088	0.217
	High flows	0.9525	0.0005	0*	implicit	0.649	1.602
Bodcau Creek 11140205-006	Low flows	0.0009592	0.0000008	0.00509	implicit	0.00001	0.00606
	Dry cond.	0.003367	0.000003	0.00543	implicit	0.00001	0.00881
	Mid-range	0.07702	0.00007	0.01341	implicit	0	0.0905
	Moist cond.	0.4011	0.0004	0.01341	implicit	0.00009	0.415
	High flows	2.968	0.003	0.01341	implicit	0.00059	2.985
Bodcau Creek 11140205-002	Low flows	0.0009998	0.0000002	0.000082	implicit	0.000198	0.00128
	Dry cond.	0.0039992	0.0000008	0.000082	implicit	0.000198	0.00428
	Mid-range	0.09598	0.00002	0.000082	implicit	0.000068	0.09615
	Moist cond.	0.4999	0.0001	0.000082	implicit	0.000418	0.5005
	High flows	3.702	0.0008	0.000082	implicit	0.000118	3.703

* Note: These WLAs are zero because currently there are not any non-storm point source discharges to this reach. Future discharges are allowable if they do not violate water quality standards.

Table 4.5. Summary of dissolved lead TMDLs for reaches 11140203-026 through -023.

Stream reach	Hydrologic range	Allowable loads of dissolved lead (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Dorcheat Bayou 11140203 -026	Low flows	0.0005997	0.0000003	0.0069	implicit	0	0.0075
	Dry cond.	0.0019992	0.0000008	0.0069	implicit	0	0.0089
	Mid-range	0.041983	0.000017	0.0069	implicit	0.0031	0.052
	Moist cond.	0.17293	0.00007	0.0069	implicit	0.0601	0.240
	High flows	1.2794	0.0006	0.0069	implicit	0.4431	1.73
Beech Creek 11140203 -025	Low flows	0.0001795	0.0000005	0.0023	implicit	0	0.00248
	Dry cond.	0.000638	0.000002	0.0023	implicit	0	0.00294
	Mid-range	0.01467	0.00004	0.0023	implicit	0	0.01701
	Moist cond.	0.0764	0.0002	0.0023	implicit	0	0.0789
	High flows	0.5655	0.0015	0.0023	implicit	0	0.5693
Big Creek 11140203 -923	Low flows	0.000297	0.000003	0.0177	implicit	0	0.0180
	Dry cond.	0.001191	0.000009	0.0177	implicit	0	0.0189
	Mid-range	0.02709	0.00021	0.0177	implicit	0	0.0450
	Moist cond.	0.1412	0.0011	0.0177	implicit	0	0.1600
	High flows	1.0450	0.0078	0.0177	implicit	0	1.0705
Big Creek 11140203 -023	Low flows	0.0001998	0.0000002	0.0009	implicit	0	0.0011
	Dry cond.	0.000999	0.000001	0.0009	implicit	0.0005	0.0024
	Mid-range	0.03257	0.00003	0.0009	implicit	0.0072	0.0407
	Moist cond.	0.1298	0.0002	0.0009	implicit	0.0781	0.209
	High flows	0.9641	0.0009	0.0009	implicit	0.5801	1.546

Table 4.6. Summary of dissolved lead TMDLs for reaches 11140203-022 through -020.

Stream reach	Hydrologic range	Allowable loads of dissolved lead (lbs/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Dorcheat Bayou 11140203-022	Low flows	0.0011	0*	0*	implicit	0	0.0011
	Dry cond.	0.0040	0*	0*	implicit	0	0.0040
	Mid-range	0.091	0*	0*	implicit	0	0.091
	Moist cond.	0.47	0*	0*	implicit	0	0.47
	High flows	3.23	0*	0*	implicit	0.27	3.50
Horsehead Creek 11140203-021	Low flows	0.0003697	0.0000003	0.01373	implicit	0	0.0141
	Dry cond.	0.001269	0.000001	0.01373	implicit	0	0.0150
	Mid-range	0.01958	0.00002	0.01373	implicit	0.00977	0.0431
	Moist cond.	0.13292	0.00008	0.01373	implicit	0.02027	0.167
	High flows	0.9864	0.0006	0.01373	implicit	0.14927	1.15
Dorcheat Bayou 11140203-020	Low flows	0.0015	0*	0*	implicit	0	0.0015
	Dry cond.	0.0052	0*	0*	implicit	0	0.0052
	Mid-range	0.118	0*	0*	implicit	0	0.118
	Moist cond.	0.615	0*	0*	implicit	0	0.615
	High flows	4.21	0*	0*	implicit	0.34	4.55

* Note: These WLAs are zero because there are currently no point source discharges to these reaches. Future discharges are allowable if they do not violate water quality standards.

Table 4.7. Summary of sulfate TMDLs.

Stream reach	Hydrologic range	Allowable loads of sulfate (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Big Creek 11140203-023	Low flows	0.01498	0.00002	0.0193	implicit	0.0001	0.0344
	Dry cond.	0.05255	0.00005	0.0193	implicit	0	0.0719
	Mid-range	0.8052	0.0008	0.0193	implicit	0.3957	1.221
	Moist cond.	1.6355	0.0015	0.0193	implicit	4.6227	6.279
	High flows	12.099	0.011	0.0193	implicit	34.2107	46.34
Dorcheat Bayou 11140203-022	Low flows	Loads not calculated (flows are less than critical flow of 4 cfs)					
	Dry cond.	0.173	0*	0*	implicit	0	0.173
	Mid-range	0.931	0*	0*	implicit	0.409	1.34
	Moist cond.	3.79	0*	0*	implicit	3.20	6.99
	High flows	25.2	0*	0*	implicit	26.5	51.7
Dorcheat Bayou 11140203-020	Low flows	Loads not calculated (flows are less than critical flow of 4 cfs)					
	Dry cond.	0.173	0*	0*	implicit	0	0.173
	Mid-range	1.21	0*	0*	implicit	0.54	1.75
	Moist cond.	4.93	0*	0*	implicit	4.16	9.09
	High flows	32.8	0*	0*	implicit	34.5	67.3

* Note: These WLAs are zero because there are currently no point source discharges to these reaches. Future discharges are allowable if they do not violate water quality standards.

Table 4.8. Summary of TDS TMDL.

Stream reach	Hydrologic range	Allowable loads of TDS (tons/day)					
		LA for non-regulated diffuse sources	WLA for NPDES regulated stormwater	WLA for non-storm point sources	MOS	Future growth	TMDL
Big Creek 11140203-023	Low flows	0.07293	0.00007	0.094	implicit	0	0.167
	Dry cond.	0.2497	0.0003	0.094	implicit	0.004	0.348
	Mid-range	4.535	0.005	0.094	implicit	1.276	5.91
	Moist cond.	15.186	0.014	0.094	implicit	15.106	30.4
	High flows	111.89	0.11	0.094	implicit	111.906	224

Table 4.9. Summary of turbidity TMDLs.

		Allowable loads of TSS (tons/day)					
Stream reach	**Hydrologic range**	**LA for non-regulated diffuse sources**	**WLA for NPDES regulated stormwater**	**WLA for non-storm point sources**	**MOS**	**Future growth**	**TMDL**
Bodcau Creek 11140205 -006	Low flows	0.01189	0.00001	0*	implicit	0.0632	0.0751
	Dry cond.	0.041966	0.000034	0*	implicit	0.067	0.109
	Mid-range	0.69944	0.00056	0*	implicit	0.42	1.12
	Moist cond.	3.9768	0.0032	0*	implicit	5.22	9.20
	High flows	35.571	0.029	0*	implicit	30.6	66.2
Bodcau Creek 11140205 -002	Low flows	0.014897	0.000003	0*	implicit	0.001	0.0159
	Dry cond.	0.05208	0.00002	0*	implicit	0.001	0.0531
	Mid-range	0.8718	0.0002	0*	implicit	0.319	1.191
	Moist cond.	4.969	0.001	0*	implicit	6.13	11.10
	High flows	44.291	0.009	0*	implicit	37.8	82.1
Beech Creek 11140203 -025	Low flows	0.002094	0.000006	0*	implicit	0.0007	0.0028
	Dry cond.	0.00907	0.00003	0*	implicit	0.0007	0.0098
	Mid-range	0.1087	0.0003	0*	implicit	0.115	0.224
	Moist cond.	0.6433	0.0017	0*	implicit	1.415	2.06
	High flows	8.209	0.021	0*	implicit	6.97	15.2

* Note: These WLAs are zero because currently there are not any non-storm discharges of inorganic suspended solids to these reaches. Future discharges are allowable if they do not violate water quality standards.

For reaches without observed water quality data, the total allowable load (i.e., the TMDL) was calculated by taking the TMDL from the nearest reach with observed data and multiplying it by the ratio of the drainage area at the downstream end of the reach without observed data to the drainage area at the downstream end of the reach with observed data. Thus, TMDLs for reach 11140205-002 were calculated from the TMDLs for reach 11140205-006 and TMDLs for reach 11140203-020 were calculated from the TMDLs for reach 11140203-022. The results of these calculations are shown in the Appendices as indicated in Section 4.7.

4.7.2 MOS

Both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to include an MOS to account for any lack of knowledge concerning the relationship between pollutant loading and water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly through conservative assumptions used in establishing the TMDL. For the metals, minerals, and turbidity TMDLs in this report, an implicit MOS was established by setting each TMDL equal to the allowable load for the minimum flow within each hydrologic range rather than at the median flow for the range. This procedure is conservative because the allowable load is lowest at the minimum flow.

4.7.3 Loads from Diffuse Sources

Loads from diffuse sources consist of 1) industrial or municipal stormwater that is regulated by a NPDES permit, and 2) nonpoint source runoff or baseflow from all other areas that are not regulated by a NPDES permit. The total existing loads from diffuse sources were calculated for each hydrologic range using the same percent exceedance flows as for calculating the TMDLs. These ambient stream flows were multiplied by existing average concentrations from diffuse sources. The existing average concentrations for the different hydrologic ranges were estimated from historical water quality data for the ADEQ monitoring sites within the study area (Table 4.10). For each monitoring site, the water quality data were averaged within each of the hydrologic ranges, based on the stream flow rate on the sampling date.

Table 4.10 Average existing concentrations from diffuse sources

ADEQ monitoring site	Reach(es)	Parameter	Existing concentrations for diffuse sources (µg/L for metals; mg/L for others) [A]				
			High flows	Moist cond.	Mid-range	Dry cond.	Low flows
RED0057	11140205-007	Diss. lead	0.41	0.41	0.55	0.68	1.00
RED0056	11140205-010	Diss. lead	0.58	0.58	0.68	0.67	0.67
RED0027	11140205-006 and -002	Diss. copper	3.97	3.91	4.64	4.98	1.85
		Diss. lead	0.555	0.771	0.838	0.859	1.31
		TSS	12.9	10.7	9.8	21.5	31.5
UWBDT02	11140203-026	Diss. lead	0.51	0.51	0.65	0.72	1.12
UWBCH01	11140203-025	Diss. lead	0.93	0.93	0.93	0.93	0.93
		TSS	20.0	11.6	10.2	19.5	15.8
UWBIG01	11140203-923	Diss. lead	0.752	0.752	0.730	0.835	1.13
UWBIG02	11140203-023	Chloride	10.9	10.9	23.8	32.8	19.5
		Sulfate	10.8	10.8	27.7	81.1	58.2
		TDS	100	100	156	262	231
		Diss. lead	0.43	0.43	0.56	0.41	0.32
RED0015A	11140203-022 and -020	Sulfate	7.79	8.68	11.1	36.0	34.7 [B]
		Diss. lead	0.500	0.770	0.786	0.730	0.857
UWHHC01	11140203-021	Diss. lead	0.60	0.60	0.46	0.72	1.25

Notes: A. Units are µg/L for dissolved lead and dissolved copper. Units are mg/L for other parameters.
B. The RED0015A sulfate concentration for “low flows” is presented here for informational purposes but was not used in the TMDLs because the low flows hydrologic range represents flows less than the critical flow of 4 cfs for Dorcheat Bayou.

The allowable diffuse loads were calculated in the same manner as the existing diffuse loads except that the concentration used in the calculation was not allowed to exceed the criterion from the water quality standards. In other words, the ambient flow rate for each hydrologic range was multiplied by either the criterion or the average existing concentration in Table 4.10, whichever was lower, and a conversion factor. The results of these calculations are shown in the TMDL calculations Tables (rows labeled “Allowable load from diffuse sources”).

The allowable diffuse loads were then divided into WLAs for stormwater regulated by a NPDES permit and LAs for all other diffuse loading. Dividing the diffuse loading was necessary because EPA requires loads from stormwater regulated by a NPDES permit to be classified as a WLA rather than a LA (EPA 2002). The allowable diffuse loading was divided based on drainage area. Because information concerning drainage area was not available for most of the stormwater facilities, each facility with a regulated stormwater discharge was assumed to cover 40 acres. The WLA for regulated stormwater was then calculated as the total diffuse loading multiplied by the percentage of the total drainage area that was comprised of facilities with regulated stormwater discharges. The remainder of the total diffuse loading was assigned to the LA. These calculations are shown in the Appendices in the TMDL calculations tables.

The WLAs for regulated stormwater were not specified for individual facilities because there was not sufficient information available. EPA's latest guidance for stormwater WLAs recommends that "WLAs for NPDES-regulated stormwater discharges be disaggregated ... to the extent feasible based on available data and/or modeling projections" and that "these disaggregated WLAs should be defined as narrowly as available information allows ..." (EPA 2010). For this report, though, the WLAs for regulated stormwater were not disaggregated because there is no readily available information concerning either the quantity or quality of regulated stormwater discharges in the Bodcau Creek and Dorcheat Bayou watersheds.

4.7.4 Non-Stormwater Point Source Discharges

For the turbidity TMDLs, the WLAs for non-stormwater point source discharges were set to zero for facilities that were discharging primarily organic solids because the surrogate being used for turbidity (TSS) is considered to represent inorganic suspended solids (i.e., soil and sediment particles from erosion or sediment resuspension). The suspended solids in discharges such as municipal or domestic wastewater or filter backwash are assumed to consist primarily of organic solids rather than inorganic solids. Discharges of organic suspended solids from point sources are already addressed through the permitting of point sources to maintain water quality standards for DO.

For each of the metals and minerals TMDLs, the WLA for non-stormwater point source discharges was calculated as an effluent concentration multiplied by the sum of the design flows for the non-stormwater point sources for that reach, times a unit conversion factor. This resulted in constant effluent loads that do not vary with the amount of ambient inflow to the stream, except for reach 11140205-006 of Bodcau Creek. The City of Stamps wastewater treatment plant (WWTP) discharges into a tributary of reach 11140205-006 with an allowable effluent flow rate that varies with the flow rate in the stream (i.e., a hydrograph controlled release). Therefore, the non-stormwater WLA for that reach varies slightly for different hydrologic ranges. Each effluent concentration in the WLA calculations was set as high as possible without causing the sum of the allocated loads (non-regulated diffuse sources + NPDES-regulated stormwater + non-stormwater point sources) to exceed the TMDL for any of the hydrologic ranges for which loads were calculated. The effluent concentrations and allowable loads for non-stormwater point sources are summarized for each reach in Table 4.11; the details are shown in TMDL calculation tables in the Appendices. The allowable loads for individual non-stormwater point source discharges are shown in Appendix R.

4.7.5 Loads Reserved for Future Growth

For certain flow conditions, the total allowable loading to meet the criterion (i.e., the TMDL) exceeded the sum of the loading that was allocated to non-regulated diffuse sources, NPDES-regulated stormwater, and non-stormwater point source discharges. The portion of the allowable loading that exceeded the sum of the allocations was reserved for future growth of either nonpoint or point sources. The loads reserved for future growth are calculated in Tables F.2, G.2, H.2, H.3, I.2, J.3, K.2, L.2, M.2, M.3, and N.2. These calculations show that future growth is permissible in many situations, particularly during high flows and moist conditions.

Table 4.11 Effluent concentrations and loads for non-stormwater point sources [A]

Reach	Sum of design flows (MGD)	Parameter	Effluent concentration	Effluent load	Table in Appendix
11140203-023	0.1124	Chloride	20 mg/L	0.009 tons/day	L.2
11140203-023	0.1124	TDS	200 mg/L	0.094 tons/day	L.2
11140203-023	0.1124	Sulfate	41 mg/L	0.0193 tons/day	L.2
11140203-022	0	Sulfate	--	0	M.2
11140203-020	0	Sulfate	--	0	M.3
11140205-006	0 [B]	TSS	--	0	H.2
11140205-002	0 [B]	TSS	--	0	H.3
11140203-025	0 [B]	TSS	--	0	J.3
11140205-006	Variable [C]	Diss. copper	3.47 µg/L	0.03271 lbs/day – 0.08612 lbs/day [C]	H.2
11140205-002	0.018	Diss. copper	3.47 µg/L	0.0005213 lbs/day	H.3
11140205-007	0	Diss. lead	--	0	F.2
11140205-010	0.013	Diss. lead	0.73 µg/L	0.00008 lbs/day	G.2
11140205-006	Variable [C]	Diss. lead	0.54 µg/L	0.00509 lbs/day – 0.01341 lbs/day [C]	H.2
11140205-002	0.018	Diss. lead	0.54 µg/L	0.000082 lbs/day	H.3
11140203-026	1.2	Diss. lead	0.69 µg/L	0.0069 lbs/day	I.2
11140203-025	0.4	Diss. lead	0.68 µg/L	0.0023 lbs/day	J.3
11140203-923	3.9151	Diss. lead	0.54 µg/L	0.0177 lbs/day	K.2
11140203-023	0.1124	Diss. lead	0.95 µg/L	0.0009 lbs/day	L.2
11140203-022	0	Diss. lead	--	0	M.2
11140203-021	2.3845	Diss. lead	0.69 µg/L	0.0137 lbs/day	N.2
11140203-020	0	Diss. lead	--	0	M.3

Notes:
A. See Section 4.8 regarding implementation of these values in discharge permits.
B. Sum of design flows was zero for calculation of TSS loads because there were not any non-storm discharges of inorganic suspended solids for these reaches.
C. Effluent flow and load are variable due to hydrograph controlled release (HCR) by City of Stamps WWTP.

4.8 Implementation in NPDES Permits

This TMDL report provides allowable loadings but does not specify numeric permit limits because the permitting authority (ADEQ) will calculate limits where applicable when permits are issued, modified, or renewed. ADEQ can take into account detailed information such as specific discharge regimes of individual facilities to ensure that the discharges do not cause or contribute to a violation of water quality standards. USEPA regulations at 40 CFR 122.44(d)(1)(iii) require an NPDES permit to have numeric limits when the discharge has reasonable potential to cause or contribute to a violation of water quality standards. However, there are no state or federal regulations that require numeric limits if the discharge does not have reasonable potential to cause or contribute to a violation of water quality standards. Reasonable potential can be determined much more effectively during the permitting process rather than during development of the TMDL.

USEPA regulations at 40 CFR 122.44(d)(1)(vii)(B) require that permit limits be "consistent with the assumptions and requirements" of WLAs in approved TMDLs. If a discharge does not have reasonable potential to exceed the allowable load determined from a TMDL, numeric limits are not required in the NPDES permit for that discharge because the expected load would be less than (i.e., consistent with) the allowable load in the TMDL.

The NPDES permits that regulate stormwater in the Bodcau Creek and Dorcheat Bayou watersheds do not currently contain numeric limits for chloride, copper, lead, sulfate, TDS, or turbidity. USEPA's 2002 guidance concerning stormwater WLAs and permits stated that "most WQBELs [water quality based effluent limitations] for NPDES-regulated municipal and small construction storm water discharges will be in the form of BMPs [best management practices], and that numeric limits will be used only in rare instances" (USEPA 2002). Since that time, USEPA has issued revised guidance, stating the following:

> "EPA recommends that NPDES permitting authorities use numeric effluent limitations where feasible.... The permitting authority's decision as to how to express the WQBEL(s), either as numeric effluent limitations or BMPs, including BMPs accompanied by numeric benchmarks, should be based on an analysis of the specific facts and circumstances surrounding the permit, and/or the underlying WLA, including the nature of the stormwater discharge, available data, modeling results or other relevant information" (USEPA 2010).

Data and information that were identified during the development of these TMDLs were not considered sufficient for making any recommendations concerning permit requirements for stormwater discharges. The use of BMPs to control the discharge of pollutants from stormwater is consistent with EPA regulations at 40 CFR 122.44(k) and will likely be the most appropriate requirement for stormwater permits in the Bodcau Creek and Dorcheat Bayou watersheds. If numeric limits are necessary in stormwater permits, the limits should be expressed as concentration rather than mass. Mass limits are not appropriate for stormwater discharges because the effluent flow rate can vary over a wide range based on the amount of rainfall in a storm.

Future growth for point sources (i.e., growth of existing facilities or establishment of new point sources) is allowed by these TMDLs as long as the discharge does not cause or contribute to a downstream violation of water quality standards for chloride, copper, lead, sulfate, TDS, or turbidity. If a point source discharge increases its flow rate, the additional flow going into the stream increases the assimilative capacity of the stream; in this situation, the allowable load for the point source should be increased accordingly.

For copper and lead, the effluent concentrations and allowable loads are expressed in this report as dissolved values. These effluent concentrations and loads must be converted to total recoverable values before being used for permitting purposes.

5.0 TMDLS FOR PH

5.1 Seasonality and Critical Conditions

USEPA regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Also, both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards. Therefore, the historical data and analyses discussed in Section 3.0 were used to evaluate whether there were certain flow conditions or certain periods of the year that could be used to characterize critical conditions. Overall, however, there was no season or flow condition that could consistently be considered as critical for pH.

5.2 Water Quality Target

The water quality target for these pH TMDLs is a pH value between 6.0 su and 9.0 su (the numeric criteria in the water quality standards).

5.3 TMDL

The definition of a TMDL in 40 CFR 130.2(i) states that "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure[s]." It is generally not useful to express pH as a mass of hydrogen ions, and for this TMDL, no appropriate surrogate for pH was identified. Therefore, each pH TMDL in this report is expressed in the following statement: All inflows to the impaired reach must have a pH between 6.0 su and 9.0 su.

5.4 WLA

Table 5.1 shows a summary of effluent pH values for point sources discharging to stream reaches impaired for pH. The data that are summarized are monthly minimum values reported by permittees on discharge monitoring reports (DMRs). These effluent pH values are rarely less than 6.0 su. Therefore, these point sources do not cause or contribute to the low pH impairments in these stream reaches, and no changes are recommended to the point source discharge permits.

The WLA for each pH TMDL in this report is expressed as the following statement: All point source discharges must have a pH between 6.0 su and 9.0 su.

Table 5.1. Summary of effluent pH values reported by point sources.

Reach number	Permit number	Data for October 2008 – September 2011		
		Number of monthly values	Lowest monthly minimum value (su)	Highest monthly minimum value (su)
11140203-021	AR0038857	36	6.2	7.3
11140203-021	AR0046973	35	6.4	7.2
11140203-021	ARG550213	No data available		
11140203-026	ARG640064	No data available		
11140203-026	ARG640092	No data available		
11140203-923	AR0000434	34	6.2	9.6
11140203-923	AR0021555	1	7.0	7.0
11140203-923	AR0043508	31	5.9	7.1
11140203-923	AR0043613	36	5.3	7.0
11140203-923	AR0047635	36	6.2	8.1
11140203-923	AR0051489	No data available		
11140203-923	ARG640069	6	6.4	6.9
11140205-002	AR0051004	No data available		
11140205-006	AR0000493	34	6.0	7.3
11140205-006	AR0035696	32	5.6	7.0
11140205-006	AR0045535	9	6.1	10.8
11140205-006	AR0048305	2	7.1	8.8
11140205-006	ARG640031	No data available		
11140205-006	ARG640078	9	7.4	9.2

5.5 Load Allocation

Low pH values in the impaired stream reaches appear to be primarily the result of low pH inputs (<6.0 su) from nonpoint sources in the watersheds. In mass balance calculations, when pH levels of nonpoint source inflows are at least 6.0 su, pH levels in the stream reaches will also be at least 6.0 su. Therefore, the load allocation for each of these pH TMDLs is the following statement: All nonpoint source inflows must have a pH between 6.0 su and 9.0 su.

For the pH TMDLs, there was no separation of loading from diffuse sources between regulated stormwater (point source) and non-regulated diffuse inflows (nonpoint source) because pH cannot be expressed as a quantitative load. The WLA for point sources and the LA for nonpoint sources are both expressed with the identical requirement of a pH between 6.0 su and 9.0 su.

5.6 Margin of Safety

Both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to include an MOS to account for any lack of knowledge concerning the relationship between pollutant loading and water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly through conservative assumptions used in establishing the TMDL. For each of these pH TMDLs, an implicit MOS was established by using the following conservative assumptions/procedures:

- The increases in pH from photosynthesis by algae and aquatic macrophytes were not included in these TMDLs. Excluding this effect causes pH requirements for all inflows to be slightly more stringent; therefore, this procedure is conservative.
- Point source discharges were assumed to be at the minimum required pH value (6.0 su) rather than at typical pH values. This assumption causes the pH requirements for nonpoint source inflows to be slightly more stringent; therefore, this is a conservative assumption.

5.7 Future Growth

Compliance with these pH TMDLs is based on keeping pH values in the impaired stream reaches above 6.0 su (the minimum pH criterion in the water quality standards). The assimilative capacity of these streams will vary with changes in input flow and water quality (e.g., alkalinity). Future growth for existing or new sources entering these streams is not limited by these TMDLs as long as the combined effect of all sources does not cause instream pH to be lower than 6.0 su or higher than 9.0 su.

6.0 TMDL FOR DISSOLVED OXYGEN

6.1 Configuration of Water Quality Model

In order to evaluate the linkage between pollutant sources and water quality, a computer simulation model was used for the DO TMDL for Beech Creek. The model used for this TMDL was version 9.05 of LA-QUAL (LDEQ 2010). This model was selected because it includes the relevant physical, chemical, and biological processes, and it has been used successfully for other DO TMDLs in Arkansas and adjacent states (including a DO TMDL for Dorcheat Bayou in Louisiana). The LA-QUAL model was set up to simulate ammonia nitrogen, carbonaceous biochemical oxygen demand (CBOD), and DO in Beech Creek starting at Columbia County Road 60 (approximately 2.7 miles northwest of Waldo) and extending downstream to Lake Columbia. The portion of Beech Creek downstream of Lake Columbia was not included in the model because the DO impairment in Beech Creek was based only on water quality data collected upstream of Lake Columbia (station UWBCH01). Beech Creek was represented in the model as a single reach (17.2 kilometers long) that was divided into four elements.

6.2 Calibration of Water Quality Model

6.2.1 Calibration Period and Calibration Targets

Historical data from the ADEQ ambient monitoring site on Beech Creek (UWBCH01) were used to calibrate the model. The two conditions that typically characterize critical periods for DO are high temperatures and low flows. High temperatures decrease DO saturation values and increase rates for oxygen demanding processes (CBOD decay, nitrification, and sediment oxygen demand (SOD)). Low flows cause stream reaeration rates to be lower. The purpose of selecting a critical period for calibration is so that the model will be calibrated as accurately as possible for making projection simulations for critical conditions.

Based on the occurrence of DO concentrations below 5.0 mg/L at UWBCH01, the calibration period was selected to be June 20, 1994 through September 14, 1994 (two consecutive sampling dates). The calibration targets were set to the averages of the ADEQ water quality measurements at UWBCH01 during the calibration period (Table 6.1).

Table 6.1. Calibration targets for Beech Creek DO model.

	DO (mg/L)	5-day BOD (mg/L)	Ultimate CBOD (mg/L)	Ammonia nitrogen (mg/L)
Value on 6/20/1994	2.2	3.4	7.82*	0.256
Value on 9/14/1994	1.0	2.6	5.98*	0.323
Calibration target (average)	1.6	3.0	6.90*	0.290

* Ultimate CBOD is calculated as 5-day BOD times an assumed CBODu to 5-day BOD ratio of 2.3.

6.2.2 Temperature Correction of Kinetics (Data Type 4)

No temperature correction factors were specified in the model input file; therefore, the model used its default values.

6.2.3 Hydraulics Data

The hydraulics were specified in the input for the LA-QUAL model using the power functions (width = $a * Q^b + c$ and depth = $d * Q^e + f$). Estimation of site-specific exponents (b and e) would require multiple sets of field data for depth and width at different flow conditions, but no field data were available. Therefore, the exponents were set equal to values published by Leopold et al (1964) that were averages of data from 158 USGS gaging stations. These exponents are 0.12 for width and 0.45 for depth. After establishing the exponents, the multipliers (a and d) were back-calculated based on estimated typical values of depth and width in Beech Creek. The constants (c and f) were not used and were set to zero.

The typical width of Beech Creek was estimated from aerial imagery to be 6 meters (m). The depth of Beech Creek was estimated using information from a LA-QUAL model for Dorcheat Bayou in Louisiana, where two reaches of a tributary to Dorcheat Bayou (Mile Creek) have widths similar to the Beech Creek estimated width (i.e., 5.4 m and 5.8 m) (FTN 2008). The average ratio of modeled depth to width for Mile Creek was 0.05. Beech Creek depth was estimated by multiplying this ratio by the estimated typical width. The resulting estimated depth for Beech Creek was 0.3 m.

The resulting power functions that were used in the model for width and depth were:

Width, m = 9.068 × (Flow, m^3/sec) ^ 0.12
Depth, m = 1.412 × (Flow, m^3/sec) ^ 0.45

6.2.4 Initial Conditions (Data Type 11)

For constituents not being simulated, LA-QUAL assumes a constant value equal to the value specified in the initial conditions. Temperature is not being simulated in the model, but is important to the DO processes that are being simulated. The temperature in the initial conditions was set to the average of temperatures measured at ADEQ station UWBCH01 during the calibration period (25.75°C). For other constituents not being simulated, the initial values were set to zero.

Initial values for DO and ammonia are used by the model only as starting points for the iterative solution algorithm. These inputs were set to the average of measurements at ADEQ station UWBCH01 during the calibration period (DO = 1.6 mg/L and ammonia = 0.29 mg/L).

6.2.5 Water Quality Kinetics (Data Types 12 and 13)

Kinetic rates used in LA-QUAL include the reaeration rate, CBOD decay rate, nitrification rate, sediment oxygen demand (SOD), and benthic ammonia source rate.

The values for reaeration, CBOD decay, and nitrification rates were based on values used in previous models for similar streams, including Bayou de L'Outre (FTN 2002b), Corney Bayou (FTN 2002c), and Bayou Dorcheat (FTN 2008). Reaeration was specified in the model using the Louisiana equation. The CBOD decay rate and the nitrification rate were both set to 0.20/day.

The SOD and the benthic ammonia source rate were treated as calibration parameters; their values were adjusted until the model output was similar to the calibration target values. In the calibrated model, SOD was set to 5.5 g/m2/day, and the benthic ammonia source rate was set to 0.012 g/m2/day. The value used for SOD was unusually high; this may be an indication that the reaeration was slightly overestimated because the SOD was calibrated to a value that allows the DO sinks to balance the DO source (reaeration).

6.2.6 Nonpoint Source Mass Loads (Data Type 19)

The LA-QUAL model allows the user to specify nonpoint source loads that enter the stream as a mass (i.e., kg/day) rather than a flow with an associated concentration. These mass loads can represent resuspended load from the bottom sediments, dissolution of constituents from organic debris, or other sources. The mass load of CBOD was treated as a calibration parameters; its value was adjusted until the model output was similar to the calibration target value of ultimate CBOD. In the calibrated model, the mass load of ultimate CBOD was set to 60 kg/day.

The three calibration parameters were adjusted in a specific order based on the interactions between state variables in the model. First, the benthic ammonia source rate was adjusted until the predicted ammonia nitrogen concentrations were similar to the target concentration. Then the CBOD loads were adjusted until the predicted concentrations of ultimate CBOD were similar to the target concentration. Finally, the SOD rate was adjusted until the predicted DO concentrations were similar to the target concentration. The DO was calibrated last because all of the other state variables affect DO.

6.2.7 Headwater and Incremental Flow Rates (Data Types 15 and 20)

Inflows were estimated from USGS flow data for Dorcheat Bayou near Springhill, Louisiana (USGS Gage No. 07348700). The average flow at this gage during the calibration period (1.857 m^3/sec) was divided by the gage drainage area (1,567 square kilometers) to calculate a flow per unit area of 0.00119 m^3/sec per square kilometer. The headwater inflow rate (0.032 m^3/sec) was estimated by multiplying this flow per unit area by the drainage area upstream of the model headwater (26.6 square kilometers). The flow at the downstream end of the model (0.097 m^3/sec) was estimated by multiplying the flow per unit area by the drainage area at the downstream end of the model (82.2 square kilometers).The incremental inflow rate (0.065 m^3/sec) was estimated by subtracting the headwater inflow from the flow at the downstream end of the model.

6.2.8 Headwater and Incremental Water Quality (Data Types 16 and 21)

Concentrations of DO, ultimate CBOD, and ammonia nitrogen were specified in the model for the headwater and the incremental inflow. The concentrations for both the headwater and the incremental inflows were set to the averages of the values measured during the calibration period at ADEQ station UWBCH01 (Table 6.1).

6.2.9 Point Source Wasteloads (Data Types 24 and 25)

As noted in Section 2.7, there are four NPDES permits for discharges in the Beech Creek watershed. Two of these permits are for the Deltic Timber mill at Waldo (one permit for wet deck discharges and one permit for stormwater). Discharges from Deltic Timber drain into an unnamed tributary that flows directly into an arm of Lake Columbia without entering the modeled reach. For the other two permits, the discharges drain into the simulated portion of Beech Creek, but neither facility is likely to discharge during critical conditions for DO (hot, dry weather). One of these permits is a stormwater discharge on the west side of Waldo (Ludwig, Inc.) and the other is a wet deck facility several miles north of Waldo (Quad Hardwoods). Based on available information about these facilities and their discharges, it appears that all four facilities have negligible effect on the DO impairment in Beech Creek. Therefore, no point source discharges were simulated in the model.

6.2.10 Model Results for Calibration

The model was calibrated assuming that water quality in Beech Creek was relatively uniform along the length of the simulated reach. This assumption was made because observed data were available for only location (UWBCH01) and there was no evidence to suggest that water quality in Beech Creek would be expected to have large spatial variations (i.e., no point source discharges during low flows). Therefore, the model was calibrated to try to achieve spatially uniform water quality. Table 6.2 shows a comparison of simulated and observed values for the calibration. A printout of the LA-QUAL output file for the calibration is presented in Appendix O.

Table 6.2. Comparison of simulated and observed concentrations for calibration.

Ammonia nitrogen (mg/L)		Ultimate CBOD (mg/L)		DO (mg/L)	
Range of simulated values	Observed	Range of simulated values	Observed	Range of simulated values	Observed
0.24 – 0.29	0.29	6.03 – 7.33	6.90 *	1.58 – 1.74	1.60

* The value of 6.90 mg/L is the average 5-day BOD (3.0 mg/L) times an assumed CBODu to 5-day BOD ratio (2.3).

6.3 Water Quality Model Projection

6.3.1 Critical Conditions and Seasonality

EPA's regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Also, both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards. These requirements were satisfied by running the model for summer conditions to meet the 3.0 mg/L DO criterion and for winter conditions to meet the 5.0 mg/L DO criterion. As discussed in the following sections, the water temperatures and stream flow rates were input to the model with values that characterize critical conditions for DO in accordance with requirements in Regulation No. 2.

6.3.2 Temperature Inputs

Regulation No. 2 specifies that seasonal DO criteria must be met at the maximum temperature criterion for that season. The maximum temperature limit specified in Section 2.502 of Regulation No. 2 is 30°C for typical Gulf Coastal streams. Therefore, for the summer projection, 30°C was used as the water temperature for initial conditions, headwater inflows, and incremental inflows.

In Regulation No. 2, the primary season is defined as the period when water temperatures are 22°C or less. Therefore, for the winter projection, water temperatures for initial conditions, headwater inflows, and incremental inflows were set to 22°C.

6.3.3 Water Quality Kinetics

The CBOD decay rate (0.20/day) and the nitrification rate (0.20/day) were unchanged from the calibration simulation.

The SOD and benthic ammonia source rate represent loads of oxygen demanding material and were therefore reduced along with other sources of oxygen demand so that the predicted DO would meet the criteria. For these two parameters, values were taken from the calibration simulation and reduced by a certain percentage for each season. The percent reduction for each season was established iteratively by adjusting its value until the resulting oxygen demand allowed the predicted DO values to comply with the instream criteria. Table 6.3 shows the percent reduction for each season and resulting model input values that were calculated using the percent reduction.

Table 6.3. Projection input values calculated from percent reduction.

Parameter	Value from calibration	Value in summer projection	Value in winter projection
Percent reduction	--	53%	47%
SOD	5.50 $g/m^2/day$	2.585 $g/m^2/day$	2.915 $g/m^2/day$
Benthic ammonia source	0.012 $g/m^2/day$	0.0056 $g/m^2/day$	0.0064 $g/m^2/day$
Ultimate CBOD mass loads	60.0 kg/day	28.2 kg/day	31.8 kg/day
Ultimate CBOD for inflows [A]	6.90 mg/L [B]	3.243 mg/L	3.657 mg/L
Ammonia nitrogen for inflows [A]	0.29 mg/L	0.136 mg/L	0.154 mg/L
DO for inflows [A]	1.60 mg/L (19.6% saturation)	4.704 mg/L [C] (62.2% saturation)	5.019 mg/L [C] (57.4% saturation)

Notes: A. These values were used for both the headwater inflow and the incremental inflow.
B. 6.90 mg/L is the average 5-day BOD (3.0 mg/L) times an assumed CBODu to 5-day BOD ratio (2.3).
C. See Section 6.3.5 for explanation of how the inflow DO was increased for the projections.

6.3.4 Headwater and Incremental Flow Rates

The flow rates for the headwater and incremental inflow were unchanged from the calibration simulation because 1) the flow was relatively low during the calibration period, and 2) the model does not include any point source discharges for which the amount of dilution in the stream is critical. The plot of DO versus stream flow in Beech Creek (Figure D.13) showed that low DO values occur not only at very low flows, but also at somewhat higher flows.

6.3.5 Headwater and Incremental Water Quality

For the projection simulations, the inflow concentrations of ultimate CBOD and ammonia nitrogen were taken from the calibration simulation and reduced by the percent reduction for each season. The values used in the projection simulations are shown in Table 6.3

The DO concentrations for the projection simulations were increased because it was assumed that decreases in loads of oxygen demand throughout the watershed would cause headwater and incremental DO values to improve. This calculation was based on the assumption that 0% reduction of oxygen demand throughout the watershed would correspond to the same DO percent saturation as for the calibration run (1.60 mg/L at 25.75°C is equivalent to 19.6% saturation), and 100% reduction of oxygen demand in the watershed would correspond with 100% saturation for DO. The inflow DO for each season was then interpolated between 19.6% saturation and 100% saturation using this assumption. The values used in the projection simulations are shown in Table 6.3.

6.3.6 Nonpoint Source Loads

For the projection simulation, the nonpoint source mass load of ultimate CBOD was taken from the calibration simulation and reduced by the percent reduction for each season. The values used in the projection simulations are shown in Table 6.3.

6.3.7 Model Results for Projections

The projection simulations showed that nonpoint source oxygen demand in Beech Creek must be reduced by 53% in summer and 47% in winter to meet the DO criteria of 3.0 mg/L for summer and 5.0 mg/L for winter. Graphical and tabular output from the projection simulations is included in Appendix P.

6.4 TMDL Calculations

TMDLs for summer and winter were calculated for Beech Creek based on the projection simulation results. These TMDLs were calculated as the sum of oxygen demand from the following sources:

- Headwater inflow:
  Oxygen demand, kg/day = carbonaceous demand + nitrogenous demand
  Carbonaceous demand, kg/day = flow, m^3/sec × CBODu, mg/L × 86.4
  Nitrogenous demand, kg/day = flow, m^3/sec × ammonia, mg/L × 86.4 × 4.33

- Incremental inflow:
  Oxygen demand, kg/day = carbonaceous demand + nitrogenous demand
  Carbonaceous demand, kg/day = flow, m^3/sec × CBODu, mg/L × 86.4
  Nitrogenous demand, kg/day = flow, m^3/sec × ammonia, mg/L × 86.4 × 4.33

- Mass load of ultimate CBOD:
  Oxygen demand, kg/day = value that is input to model

- SOD:
  Oxygen demand, kg/day = model input value, g/m^2/day ×
  temperature correction factor, unitless ×
  stream length, km × 1000 m/km ×
  stream width, m × 0.001 kg/g

- Benthic source of ammonia:
  Oxygen demand, kg/day = model input value, g/m^2/day of ammonia × 4.33 ×
  stream length, km × 1000 m/km ×
  stream width, m × 0.001 kg/g

In the equations above, the value of 4.33 is used as the grams of oxygen demand for each gram of ammonia nitrogen. The stoichiometric value of this ratio is 4.57, but LA-QUAL's default value is 4.33. The temperature correction factor for SOD was calculated as 1.065^(T-20), where T is the water temperature.

The WLA for point sources was set to zero because there are no point sources whose discharges enter the modeled portion of Beech Creek during critical periods. All of the oxygen demand that was simulated in the model was from nonpoint sources rather than point sources.

An implicit MOS was established for this DO TMDL through the use of conservative assumptions, including the use of conservative values of the CBOD decay rate and the nitrification rate and a high value of SOD.

Because the WLA was zero and the MOS was implicit, the LA for nonpoint sources was set equal to the total oxygen demand simulated by the model (i.e., the TMDL).

The results of the DO TMDL calculations are summarized in Table 6.4. A printout of the spreadsheet with the actual calculations is shown in Appendix Q.

Table 6.4. Summary of seasonal DO TMDL for Beech Creek (11140203-025).

	Allowable oxygen demand for summer [A] (kg/day)	**Allowable oxygen demand for winter [A] (kg/day)**
LA for nonpoint sources	599.66	436.75
WLA for point sources	0 [B]	0 [B]
MOS	implicit	implicit
TMDL	599.66	436.75

Notes: A. The loads presented here are for critical conditions for flow and temperature. Additional assimilative capacity exists at higher flows and lower temperatures.
B. These WLAs are zero because Beech Creek does not currently receive point source effluent during critical conditions for DO. These zero values do not prohibit existing oxygen-demanding discharges during non-critical conditions, nor do they prohibit future oxygen-demanding discharges during critical conditions as long as the discharge does not violate water quality standards.

7.0 OTHER RELEVANT INFORMATION

7.1 Ambient Monitoring

In accordance with Section 106 of the Federal Clean Water Act and under its own authority, ADEQ has established a comprehensive program for monitoring the quality of the state's surface waters. ADEQ collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for long-term trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters, which are issued as a single document titled *Arkansas Integrated Water Quality Monitoring and Assessment Report.*

7.2 Reasonable Assurances

The focus of this section is to identify the most appropriate structural and non-structural best management practices (BMPs) and control technologies to reduce the pollutants of concern from nonpoint sources throughout the watershed.

Nonpoint sources can include urban as well as non-urban activities. Mineral and turbidity nonpoint sources can include anthropogenic activities such as land disturbances which in turn contribute to the weathering of newly exposed materials. BMPs such as cover crops, grassed waterways, and riparian buffers keep land covered and soil in place making it less susceptible to erosive forces such as wind and water. BMPs constructed to prevent sediment erosion will reduce the mineral and turbidity loadings by preventing those constituents from entering streams.

Implementation, including the BMPs listed in the table below, can reduce mineral and turbidity loadings. The implementation of BMPs within the Bodcau and Dorcheat watersheds will reasonably assure that reductions in those loadings will occur, allowing the waterbodies to meet allocations.

Table 7.1. Pollutants and sources addressed by various BMPs.

	Pollutant	Point Sources					Nonpoint Sources					
Implementation Activities	**Sediment**	**WWTPs and Industrial Facilities**	**CSOs**	**Regulated Stormwater Sources**	**CAFOs**	**Illicitly Connected “Straight Pipe” Systems**	**Cropland**	**Pastures and Livestock Operations**	**CFOs and AFOs**	**Streambank Erosion**	**Onsite Wastewater Treatment Systems**	**Wildlife/Domestic Pets**
Inspection and maintenance	X	X	X	X	X						X	
Outreach and education and training	X	X	X	X	X	X	X	X	X	X	X	X
Conservation tillage/residue management	X						X					
Cover crops	X						X			X		
Filter strips	X			X	X		X	X	X	X		
Grassed waterways	X				X		X		X	X		
Riparian buffers	X				X		X	X	X	X		X
Stream fencing (animal exclusion)	X							X				
Grazing land management	X							X		X		
Conservation easements	X											
Levee or dike modification or removal	X											
Constructed wetland	X	X				X	X					X
Critical area planting	X							X		X		
Terrace	X						X					

8.0 PUBLIC PARTICIPATION

Federal regulations at 40 CFR 130.7(c)(1)(ii) specify that TMDLs shall be subject to public review as defined in the state's CPP. In accordance with this requirement, ADEQ conducted a public review period to seek comments and relevant information from the public concerning the draft TMDLs in this report. The public review period was initiated on July 28, 2012 and concluded on August 27, 2012. This report was available on ADEQ's web site throughout the public review period. ADEQ received one public comment concerning these TMDLs during the public review period. No changes to the TMDLs were necessary to address the comment. ADEQ developed a response to the comment and sent it to the entity that submitted the comment.

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APPENDIX A

Watershed Maps and List of Point Sources

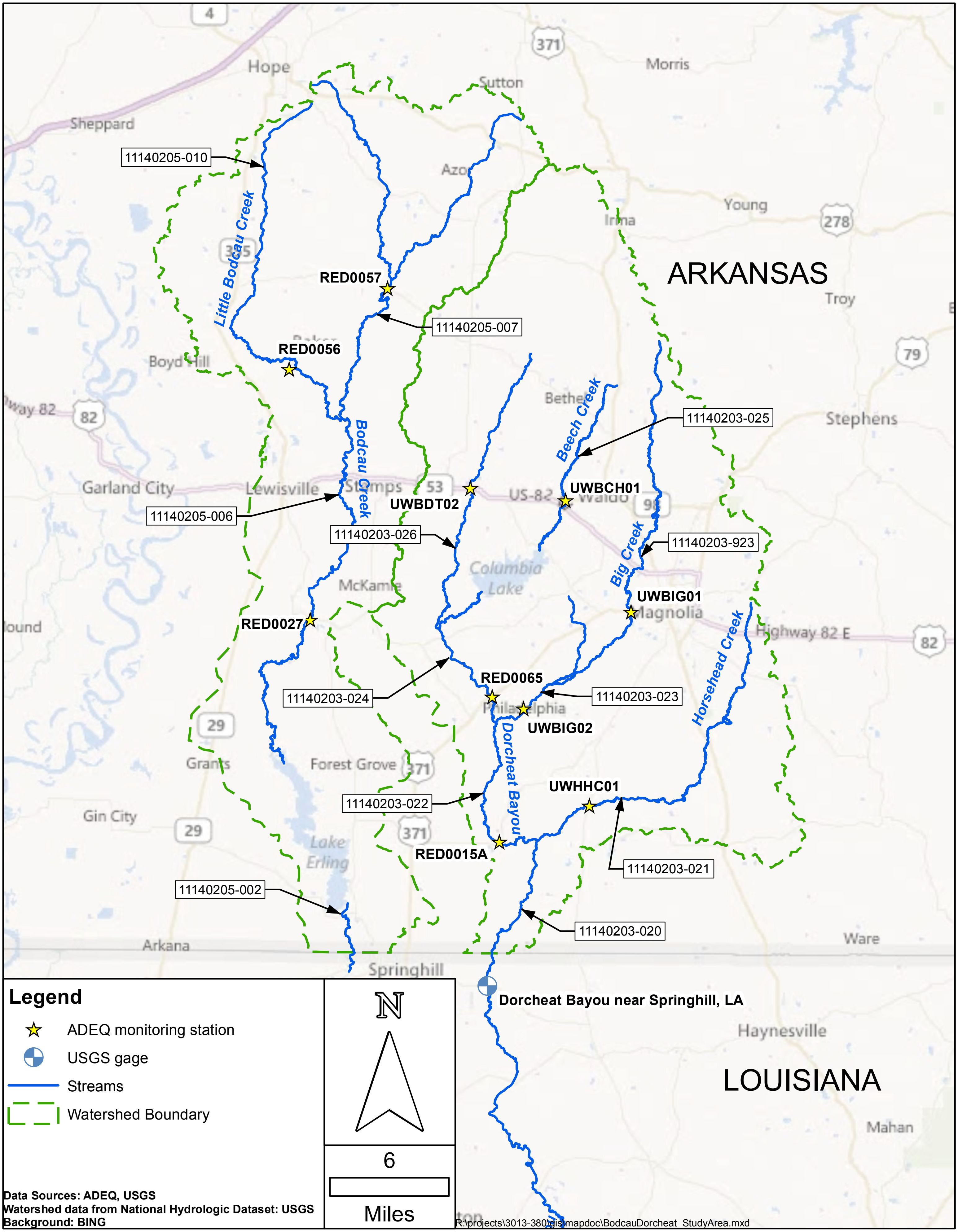

Figure A.1. Study Area Map

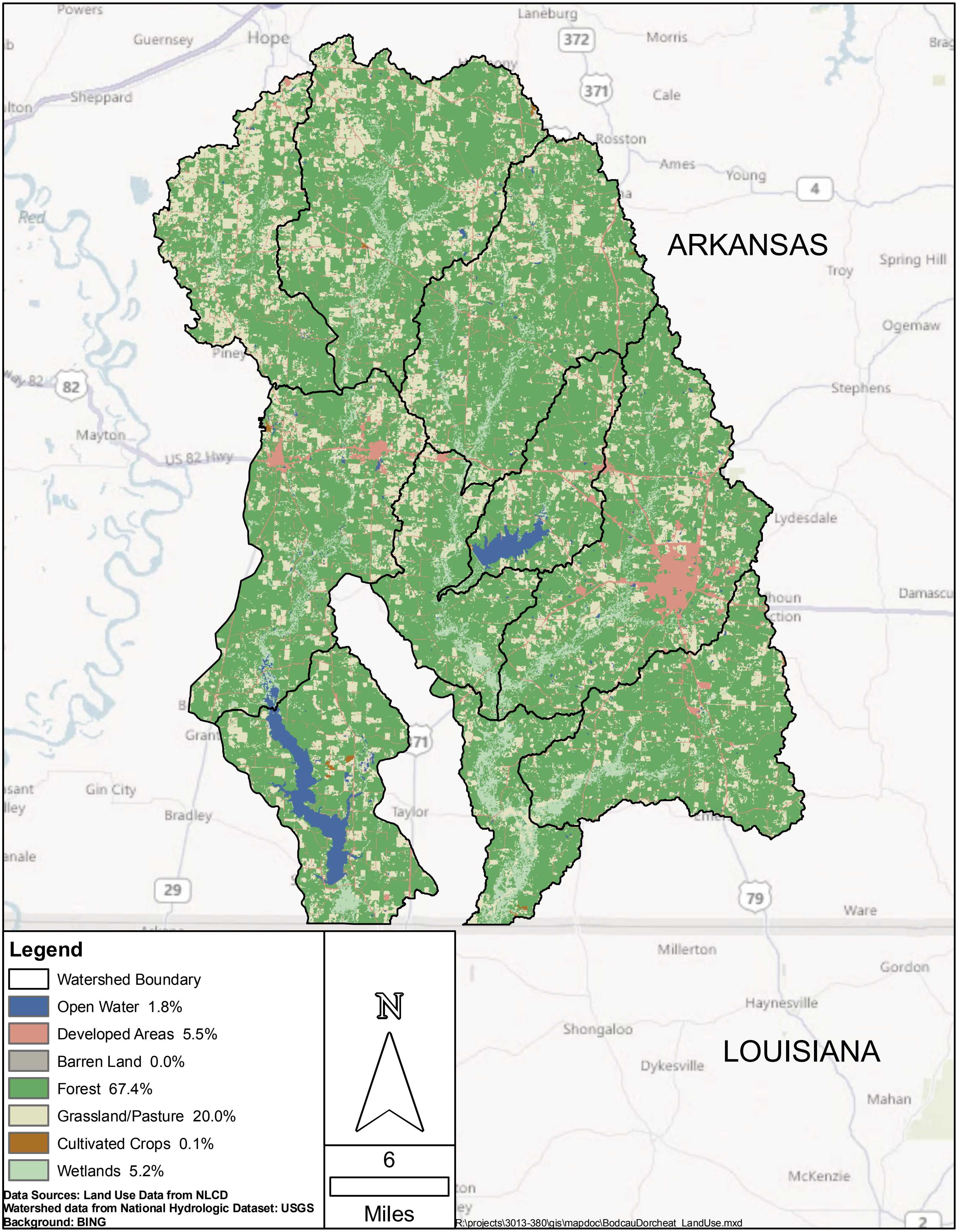

Figure A.2. Land Use Map

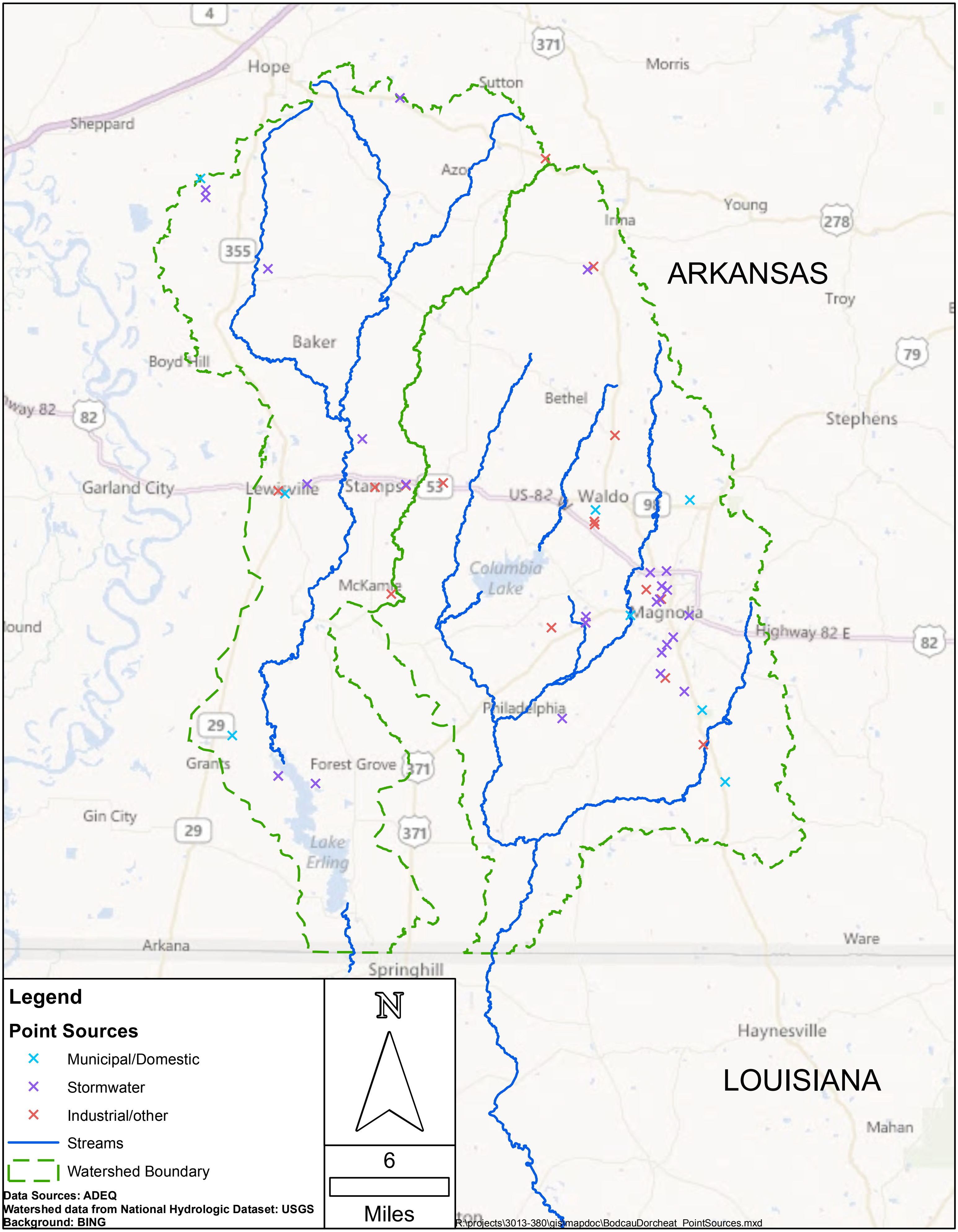

Figure A.3. Point Source Map

Table A.1. Inventory of Permitted Discharges in the Study Area
for Chloride, Copper, Lead, TDS, and Turbidity TMDLs
in the Bodcau Creek and Dorcheat Bayou Watersheds

Sorted by "First Impaired Reach Downstream" and then by "Facility Name"

Permit Number	Facility Name	Type of Discharge	Flow Rate (MGD)	Receiving Waterbody	First Impaired Reach Downstream	Permit Expiration Date	Existing Permit Limits Relevant to Impairment
ARR153250	Arkansas Hwy Dept. Job #030348	Runoff from construction	n.a.	Little Bodcau Creek, Bodcau Creek	11140205-010	10/31/16	none
ARR153430	Capps Broiler Farm	Runoff from construction	n.a.	Unnamed Tributary, Flat Bois d'Arc Creek, Little Bodcau Creek, Bodcau Creek	11140205-010	10/31/16	none
AR0046345	Springhill School	Domestic wastewater	0.013	Unnamed Tributary, Flat Bois d'Arc Creek, Little Bodcau Creek, Bodcau Creek	11140205-010	12/31/12	none
ARR153453	Arkansas Hwy Dept. Job #030386	Runoff from construction	n.a.	Bodcau Creek	11140205-007	10/31/16	none
AR0045535	Canfield Baptist Assembly	Domestic wastewater	0.014	Unnamed Tributary, Mill Branch, Heirs Branch, Lake Erling, Bodcau Creek	11140205-006	10/31/12	pH 6-9 su
AR0035696	City of Lewisville	Municipal wastewater	0.2	Battle Creek, Steel Creek, Bodcau Creek, Lake Erling, Bodcau Creek	11140205-006	1/31/14	pH 6-9 su
ARG640078	City of Lewisville	Water plant filter backwash	0.0035	Steel Creek, Bodcau Creek	11140205-006	11/30/16	pH 6-9 su
AR0048305	City of Stamps	Municipal wastewater	0.149 [A]	Unnamed Ditch, Bodcau Creek, Lake Erling, Bodcau Creek	11140205-006	11/30/12	pH 6-9 su
ARG640031	City of Stamps	Water plant filter backwash	< 0.5	Unnamed Tributary, Crooked Branch, Bodcau Creek	11140205-006	11/30/16	pH 6-9 su
AR0000493	Entergy Arkansas-Harvey Couch	Cooling tower blowdown	0.382	Unnamed Tributary, Lake June, Crooked Branch, Bodcau Creek	11140205-006	5/31/14	Copper 12 µg/L, Lead 3.8 µg/L,
ARR00A689	Entergy Arkansas-Harvey Couch	Runoff (gas elec. generation)	n.a.	Unnamed Tributary, Lake June, Crooked Branch, Bodcau Creek	11140205-006	6/30/14	none
ARR000486	R-N-R Recycling	Runoff (metal recycling)	n.a.	Bodcau Creek	11140205-006	6/30/14	none
ARR000713	Smith Equipment/ Dickson Barrow	Runoff (sand & gravel mining)	n.a.	Bodcau Creek	11140205-006	6/30/14	none
ARR000567	Turner Borrow Pit Site	Runoff (sand & gravel mining)	n.a.	Bodcau Creek	11140205-006	6/30/14	none

Table A.1. (continued)

Permit Number	Facility Name	Type of Discharge	Flow Rate (MGD)	Receiving Waterbody	First Impaired Reach Downstream	Permit Expiration Date	Existing Permit Limits Relevant to Impairment
AR0051004	Eagle View Subdivision	Municipal wastewater	0.018	Unnamed Ditch, Unnamed Tributary, Lake Erling, Bodcau Creek	11140205-002	5/31/14	pH 6-9 su
ARR153303	Eagle View Subdivision	Runoff from construction	n.a.	Lake Erling, Bodcau Creek	11140205-002	10/31/16	none
ARG640092	City of Buckner	Water plant filter backwash	< 0.7	Dorcheat Bayou	11140203-026	11/30/16	pH 6-9 su
ARG640064	City of Willisville	Water plant filter backwash	0.5 - 1.0	Brushy Creek, Dorcheat Bayou	11140203-026	11/30/16	pH 6-9 su
ARR153520	Ted Waters Broiler Farm	Runoff from construction	n.a.	Brushy Creek, Dorcheat Bayou	11140203-026	10/31/16	none
AR0047953	Deltic Timber-Waldo	Wet deck discharge (sawmill)	variable [B]	Unnamed Tributary, Lake Columbia, Beech Creek, Dorcheat Bayou	11140203-025	3/31/15	BOD 50 mg/L, DO 2 mg/L
ARR000744	Deltic Timber-Waldo	Runoff (sawmill)	n.a.	Unnamed Tributary, Beech Creek	11140203-025	6/30/14	none
ARR00A972	Ludwig, Inc	No-Exposure Certification	n.a.	Unnamed Tributary, Beech Creek, Dorcheat Bayou	11140203-025	6/30/14	none
AR0048054	Quad Hardwood Products	Wet deck discharge (sawmill)	variable [B]	Unnamed Tributary, Beech Creek, Lake Columbia, Beech Creek, Dorcheat Bayou	11140203-025	6/30/12	COD 50 mg/L
AR0047635	Albemarle-West Plant	Non-contact cooling water, boiler blowdown, sanitary waste- water, stormwater	0.452 [C]	Unnamed Tributary, Dismukes Creek, Big Creek, Dorcheat Bayou	11140203-923	4/30/15	pH 6-9 su
ARR00A588	Albemarle-West Plant	Runoff (chemical production)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
AR0000434	Amfuel-Magnolia	Non-contact cooling water and stormwater	0.0381 [C]	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/13	pH 6-9 su
ARR00B815	Amfuel-Magnolia	Runoff (rubber manufacturing)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR00C153	Baker Petrolite/ Magnolia	Runoff (oil & gas services)	n.a.	Nations Creek, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
AR0043613	City of Magnolia	Municipal wastewater	2.5	Big Creek, Dorcheat Bayou	11140203-923	12/31/15	pH 6-9 su

Table A.1. (continued)

Permit Number	Facility Name	Type of Discharge	Flow Rate (MGD)	Receiving Waterbody	First Impaired Reach Downstream	Permit Expiration Date	Existing Permit Limits Relevant to Impairment
ARR00C419	City of Magnolia	No-Exposure Certification	n.a.	Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
AR0021555	City of McNeil	Municipal wastewater	0.2	O'Rear Creek, Green Creek, Big Creek, Dorcheat Bayou	11140203-923	1/31/15	pH 6-9 su
AR0043508	City of Waldo	Municipal wastewater	0.35	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/13	pH 6-9 su
ARG160039	Columbia County Landfill	Sanitary landfill runoff	0.239	Nations Creek, Big Creek, Dorcheat Bayou	11140203-923	2/28/15	unknown
ARR00C131	Evonik Foams, Inc	Runoff (foam manufacturing)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR00B367	Hixson Lumber-Magnolia	Runoff (wood treatment)	n.a.	Nations Creek, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR00B420	Jack B Kelly, Inc.	Runoff (vehicle maintenance)	n.a.	Nations Creek, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARG640069	Magnolia Municipal Water Systm	Water plant filter backwash	0.136	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	11/30/16	pH 6-9 su
ARR00A305	Peace Flooring Company, Inc	Runoff (sawmill)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR153681	S. Ark. Telephone Co. New Fiber Route	Runoff from construction	n.a.	Big Creek, Dorcheat Bayou	11140203-923	10/31/16	none
ARR00A892	Sapa Extrusions, Inc	Runoff (aluminum fabrication)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR000628	Southern Aluminum Mfg, Inc	No-Exposure Certification	n.a.	Barlow Branch, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
ARR000380	Transit Mix/ Plant #2045	Runoff (concrete production)	n.a.	Unnamed Tributary, Barlow Branch, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	pH 6-9 su
ARR00B379	Unit Structures, LLC	Runoff (wood manufacturing)	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-923	6/30/14	none
AR0051489	W2 Oil, Inc	Runoff (org. chem. manufacturing)	n.a.	Unnamed Tributary, Nations Creek, Big Creek, Dorcheat Bayou	11140203-923	4/30/15	pH 6-9 su
ARG670662	Albemarle/ Brineline M-4730	Pipeline hydrostatic testing	0.1124	Unnamed Tributary, Atkinson Branch, Big Creek, Dorcheat Bayou	11140203-023	6/30/13	none
ARR153385	Bonanza Creek/ Dorcheat Field	Runoff from construction	n.a.	Unnamed Tributary, Big Creek, Dorcheat Bayou	11140203-023	10/31/16	none

Table A.1. (continued)

Permit Number	Facility Name	Type of Discharge	Flow Rate (MGD)	Receiving Waterbody	First Impaired Reach Downstream	Permit Expiration Date	Existing Permit Limits Relevant to Impairment
ARR000805	Bonanza Creek/ Dorcheat Gas	No-Exposure Certification	n.a.	Chaffin Branch, Big Creek, Dorcheat Bayou	11140203-023	6/30/14	none
AR0038857	Albemarle-South	Non-contact cooling water, sanitary waste-water, stormwater	2.38 [C]	Unnamed Tributary, Horsehead Creek, Dorcheat Bayou	11140203-021	10/31/10 [D]	pH 6-9 su
ARG550213	Brister Baptist Church	Domestic wastewater	<0.001	Unnamed Tributary, Horsehead Creek, Dorcheat Bayou	11140203-021	6/30/14	pH 6-9 su
ARR00B689	CMC Steel-Arkansas	Runoff (steel fabrication)	n.a.	Unnamed Tributary, Hurricane Creek, Horsehead Creek, Dorcheat Bayou	11140203-021	6/30/14	none
AR0046973	Magnolia Country Club	Domestic wastewater	0.0035	Unnamed Tributary, Horsehead Creek, Dorcheat Bayou	11140203-021	12/31/13	pH 6-9 su

Notes:

A. Effluent is discharged according to a hydrograph controlled release. Effluent flow rates are allowed to exceed the design flow during high stream flows.

B. These facilities are wet decks with variable, intermittent discharges. For the lead TMDL calculations, an effluent flow of 0.2 MGD was used based on DMR data for Deltic Timber.

C. Design flow is highest monthly average flow during the most recent 24 months of available DMR data on ECHO web site (Oct 2009 - Sep 2011).

D. Permit has expired but is being administratively continued while the permit renewal is being developed by ADEQ.

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APPENDIX B

Tabular Listings and Time Series Plots of Water Quality Data

Table B.1 Historical Water Quality Data for Bodcau Creek near Falcon, AR (RED0057)

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)
RED0057	2/7/2000	< 0.3	11	6.61
RED0057	4/24/2000	0.79	18	6.97
RED0057	6/19/2000	< 0.3	11	5.81
RED0057	8/28/2000	0.97	21	6.78
RED0057	7/16/2007	0.46	14	5.73
RED0057	9/24/2007	1.27	25	6.66
RED0057	11/5/2007	0.72	14	6.88
RED0057	2/25/2008	0.39	11	6.2
RED0057	4/21/2008	0.64	10	6.05
RED0057	6/23/2008	0.95	19	6.44
RED0057	7/14/2008	1.00	12	6.2
RED0057	8/4/2008	0.77	15	6.7
RED0057	10/27/2008	0.57	11	6.03
RED0057	12/15/2008	< 0.3	12	5.53
RED0057	2/9/2009	0.39	12	
RED0057	3/9/2009	0.88	16	6.11

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

Summary:

Period of Record	2/07/00 - 3/09/09		
No. of Values	16	16	15
Minimum	< 0.3	10	5.53
Maximum	1.27	25	6.97
Median	0.68	13	6.20
Hardness to use for metals criteria (see below)	--	31.0	--
Criterion from standards	0.69	N/A	6.0 - 9.0
No. of values failing criterion	8	N/A	3
% of values failing criterion	50.0%	N/A	20.0%

Begin and end dates for most recent 10 yrs of hardness data:	7/16/07 - 3/09/09	
Number of values for most recent 10 yrs of hardness data:	12	
Average for most recent 10 yrs (use if 20 or more values) =	14	<--don't use
Ecoregion default hardness (use if less than 20 values) =	31	<-- use this

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Table B.2 Historical Water Quality Data for Little Bodcau Creek near Piney Grove, AR

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)
RED0056	2/7/2000	< 0.3	10
RED0056	4/25/2000	0.78	26
RED0056	6/19/2000	< 0.3	15
RED0056	7/16/2007	0.50	20
RED0056	9/24/2007	< 0.10	22
RED0056	11/5/2007	0.28	21
RED0056	2/25/2008	0.40	15
RED0056	4/21/2008	0.80	15
RED0056	6/23/2008	0.70	23
RED0056	7/14/2008	1.24	24
RED0056	10/27/2008	0.96	19
RED0056	12/15/2008	0.40	16
RED0056	2/9/2009	0.59	18
RED0056	3/9/2009	1.29	23

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

Summary:

Period of Record	2/7/00 - 3/9/09	
No. of Values	14	14
Minimum	< 0.10	10
Maximum	1.29	26
Median	0.55	19.5
Hardness to use for metals criteria (see below)	--	31.0
Criterion from standards	0.69	N/A
No. of values exceeding criterion	6	N/A
% of values exceeding criterion	42.9%	N/A

Begin and end dates for most recent 10 yrs of hardness data: 2/07/00 - 3/09/09

Number of values for most recent 10 yrs of hardness data: 11

Average for most recent 10 yrs (use if 20 or more values) = 20 <--don't use

Ecoregion default hardness (use if less than 20 values) = 31 <-- use this

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Table B.3 Historical Water Quality Data for Bodcau Creek near Lewisville, AR

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)
RED0027	9/25/1990			< 25	24	< 2	6.77
RED0027	10/16/1990	8.0	7.6	< 25	34	< 2	6.51
RED0027	11/6/1990	14.0	7.4	< 25	34	< 2	6.21
RED0027	12/11/1990	4.0	5.0	< 25	28	< 2	6.26
RED0027	1/22/1991	4.0	6.5	< 25	12	< 2	6.03
RED0027	2/19/1991	12.0	19.0	< 25	16	< 2	6.34
RED0027	3/26/1991	6.0	7.0	< 25	18	< 2	6.45
RED0027	4/16/1991		8.3	< 25	12	< 2	5.99
RED0027	5/21/1991	18.0	17.0	< 25	18	< 2	6.24
RED0027	6/18/1991	12.0	15.0	< 25	26	< 2	6.79
RED0027	7/16/1991	13.0	23.0	< 25	24	< 2	6.54
RED0027	8/20/1991	12.0	21.0	< 25	30	2	6.91
RED0027	9/17/1991	16.0	6.5	< 25	26	< 2	6.82
RED0027	10/15/1991	8.0	21.0	< 25	30	< 2	7.02
RED0027	11/12/1991	7.0	9.4	< 25	18	< 2	6.10
RED0027	12/10/1991	4.0	6.8	< 25	18	< 2	6.14
RED0027	1/21/1992	8.0	12.0	< 25	20	< 2	6.99
RED0027	2/25/1992	8.0	8.1	< 25	20	< 2	7.32
RED0027	3/17/1992	6.0	8.7	< 25	16	< 2	
RED0027	4/21/1992	6.0	5.1	< 25	24	< 2	6.16
RED0027	5/19/1992	6.0	6.8	< 25	18	< 2	6.31
RED0027	6/16/1992	18.0	11.0	< 25	22	< 2	6.17
RED0027	7/21/1992	6.0	4.2	< 25	24	< 2	6.23
RED0027	8/18/1992	26.0	30.0	< 4		< 2	6.41
RED0027	9/15/1992	20.0	20.0	< 4	35.6	< 2	6.93
RED0027	10/13/1992	14.0	18.0	< 4	27.6	< 2	6.76
RED0027	11/9/1992	8.0	14.0	< 4	30	< 2	6.31
RED0027	12/8/1992	4.0	4.9	< 4	40.4	< 2	5.97
RED0027	1/26/1993	3.0	12.0	< 4	16.1	< 2	5.78
RED0027	2/23/1993	5.0	12.0	< 4	19.5	< 2	5.89
RED0027	3/23/1993	6.0	11.0		24.2		5.46
RED0027	5/4/1993	8.0	12.0		18.1		6.95
RED0027	5/17/1993	8.0	14.0		19.9		
RED0027	6/29/1993	11.5	9.8		37.1		6.49
RED0027	7/13/1993	32.0	49.0		50.4		6.55
RED0027	8/10/1993	16.0	16.0		30.1		6.41
RED0027	9/7/1993	30.0	46.0		39.9		6.53
RED0027	10/12/1993	10.0	26.0		21.6		7.02
RED0027	11/9/1993	5.0	15.0		27.1		7.30
RED0027	12/21/1993	7.5	8.5		41.8		7.13
RED0027	1/25/1994	6.5	7.9				6.54

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)
RED0027	2/14/1994	11.0	5.0		16.8		7.83
RED0027	3/14/1994	18.5	12.0		21.9		6.68
RED0027	4/18/1994	9.0	8.4	< 4	13.8	< 2	6.99
RED0027	5/23/1994	6.5	9.1	< 4	26.7	< 2	7.37
RED0027	6/27/1994	13.5	16.0	< 4	25.8	< 2	
RED0027	7/18/1994	5.0	8.4	< 4	14.1	< 2	7.20
RED0027	8/15/1994	11.5	12.0	< 4	27	< 2	7.78
RED0027	9/26/1994	10.5	25.0	< 4	16.5	< 2	7.35
RED0027	10/24/1994	4.5	7.7	< 4	21.2	< 2	7.49
RED0027	11/29/1994	0.5	6.1	< 4	16	< 2	6.97
RED0027	12/20/1994	10.5	11.0	< 4	8	< 2	7.09
RED0027	1/9/1995		10.0	< 2	16	3.2	6.83
RED0027	2/13/1995	5.5	10.0	< 2	13.9	< 2	7.15
RED0027	3/27/1995	8*	8.2	2.08	13	< 2	6.61
RED0027	4/24/1995	16.5	19.0	2.80	15.3	26*	7.26
RED0027	5/22/1995	6.0	12.0	3.04	16	2.4	6.56
RED0027	6/19/1995	10.5	12.0	4.68	21	2.4	7.05
RED0027	7/18/1995	20.5	26.0	< 2	16	< 2	
RED0027	8/7/1995	27.5	46.0	4.00	20	< 2	6.61
RED0027	9/18/1995	40.5	5.4	< 2	14	< 2	7.20
RED0027	10/16/1995	17.5	40.0	< 2	21	< 2	6.78
RED0027	11/14/1995	14.5	38.0	2.70	21	< 2	7.00
RED0027	11/28/1995	9.0	30.0	< 2	24	< 2	7.51
RED0027	1/2/1996	4.0	9.0	< 2	24	< 2	6.88
RED0027	2/13/1996	15.5	17.0	< 2	25		6.83
RED0027	3/5/1996	9.0	13.0	< 2	27	< 2	6.85
RED0027	4/2/1996	3.0	3.4	< 2	21	< 2	7.12
RED0027	5/14/1996	2.5	5.6	< 2	20	< 2	6.85
RED0027	6/11/1996	3.0	4.7	< 2	22	< 2	7.45
RED0027	7/16/1996	11.0	9.7	< 2	24	< 2	6.97
RED0027	8/20/1996	2.5	6.6				7.11
RED0027	9/24/1996	4.5	7.9	37.4	14	< 0.4	7.52
RED0027	10/22/1996	9.0	7.5				7.91
RED0027	11/19/1996	0.5	5.5	< 2	21	0.54	8.06
RED0027	1/28/1997	4.0	11.0	< 2	10	< 0.4	7.72
RED0027	2/25/1997	3.0	12.0				
RED0027	3/25/1997	97.0*	12.0	< 2	14		7.27
RED0027	4/14/1997	6.0	11.0				7.05
RED0027	5/12/1997	8.0	9.8	6.50	16*		5.95
RED0027	6/16/1997	6.5	9.1				7.52
RED0027	7/14/1997	9.0	32.0	3.00	16		7.17
RED0027	8/25/1997	18.0	43.0				8.56
RED0027	9/15/1997	20.0	30.0	2.80	22		7.87

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)
RED0027	10/21/1997	6.5	18.0				6.46
RED0027	11/18/1997	1.0*	9.0	2.50	26		5.21
RED0027	12/16/1997	0.5	7.9				6.31
RED0027	1/27/1998	0.5	9.2	< 2	10		5.81
RED0027	2/17/1998		11.0				5.66
RED0027	3/3/1998	1.5	11.0	< 2	7		5.91
RED0027	4/7/1998	5.5	12.0				6.19
RED0027	5/5/1998	4.5	12.0	< 2	13		6.70
RED0027	6/2/1998	23.5	19.0				6.09
RED0027	7/21/1998	32.5	60.0	1.07	26.1	1.67	7.21
RED0027	8/11/1998	38.0	57.0				7.11
RED0027	9/22/1998	4.0	5.5	2.03	20	< 0.3	6.77
RED0027	10/27/1998	0.5	7.4				
RED0027	11/17/1998	2.5	7.8	1.31	17	0.36	6.12
RED0027	12/21/1998	3.0	9.4				5.98
RED0027	1/26/1999	3.0	11.0	1.55	13	0.4	6.03
RED0027	2/16/1999	4.0	10*				6.78
RED0027	3/23/1999	3.5	11.0	1.58	11	0.44	6.02
RED0027	4/27/1999	3.5*	8.1				6.46
RED0027	5/18/1999	4.5	14.0	1.29	14	0.59	5.97
RED0027	6/29/1999	4.5*	8.5				7.32
RED0027	7/27/1999	10.0	15.0	1.21	28	0.37	5.55
RED0027	8/31/1999	13.5	26.0				6.08
RED0027	9/28/1999	8.0	6.8	1.13	20	< 0.3	6.87
RED0027	12/14/1999	1.5					5.23
RED0027	1/18/2000	2.5	3.5	0.60	27	< 0.3	6.67
RED0027	2/15/2000	2.0	3.9				6.94
RED0027	3/21/2000	4.5	7.4	< 0.5	24	< 0.3	6.54
RED0027	4/18/2000	2.0	6.0				6.14
RED0027	5/23/2000	5.0	8.0	2.08	14	0.62	6.09
RED0027	6/20/2000		6.9				5.95
RED0027	7/25/2000	16.5	30.0	3.44	20	3.76	6.45
RED0027	8/29/2000	15.5					7.02
RED0027	9/26/2000	9.5	28.0	1.30	21	0.68	6.23
RED0027	11/14/2000	3.0	5.6	1.99	33.1	< 0.3	6.40
RED0027	12/18/2000	1.2	6.7				6.46
RED0027	1/29/2001	1.8	3.3	1.65	9	< 0.3	6.23
RED0027	2/26/2001	5.3	3.6				6.18
RED0027	3/27/2001	4.8	6.1	1.89	13	0.53	6.03
RED0027	4/16/2001	5.0	7.8				5.90
RED0027	5/22/2001	5.75*	8.9	1.61	16	0.76	5.83
RED0027	6/19/2001	5.0	9.0				6.21
RED0027	7/17/2001	6.0	11.0	1.30	20	< 0.4	6.24

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)
RED0027	8/21/2001	8.5	17.0				6.83
RED0027	9/18/2001	2.0	53.0	2.25	25	< 0.4	6.47
RED0027	10/23/2001	3.5	8.2				
RED0027	11/19/2001	4.5	6.5	1.72		0.41	6.53
RED0027	12/11/2001	0.5	8.4				5.63
RED0027	1/2/2002	0.5	7.1	1.16	12	< 0.4	6.18
RED0027	2/19/2002	1.0	8.6				5.66
RED0027	3/19/2002	4.2	14.0	3.15	11	< 0.4	5.85
RED0027	4/16/2002	6.3	7.7				5.67
RED0027	5/21/2002	6.5	14.0	3.31	14	0.41	6.79
RED0027	6/4/2002	3.3	14.0				5.97
RED0027	7/1/2002	5.0	10.0	5.26	20	< 0.4	6.04
RED0027	8/6/2002	12.8	19.0				6.03
RED0027	9/3/2002	10.5	20.4	2.6	21	0.8	6.14
RED0027	10/1/2002	10.5	29.0				6.38
RED0027	11/5/2002	10.0	16.0	2.13	19	< 0.4	5.83
RED0027	12/3/2002	4.5	15.9				5.83
RED0027	1/7/2003	0.5	11.0	1.96	11	< 0.4	5.34
RED0027	2/4/2003	0.5	4.8				5.77
RED0027	3/3/2003	1.8	14.1	3.14	9	< 0.4	5.49
RED0027	4/8/2003	3.5	10.9				6.34
RED0027	5/6/2003	7.0	55.6	2.71	15	0.85	6.27
RED0027	6/10/2003	8.8	18.0				6.14
RED0027	7/15/2003	4.3	12.6	2.23	16	1.41	5.91
RED0027	8/12/2003	11.8	24.0				6.38
RED0027	9/23/2003	11.0	22.9	1.20	14	0.91	6.76
RED0027	10/21/2003	8.8	27.5				6.24
RED0027	11/18/2003	7.0	18.5	1.36	20	0.43	6.68
RED0027	12/16/2003	0.5	13.3				6.29
RED0027	1/27/2004	10.0	28.5	2.99	22	< 0.4	5.86
RED0027	2/24/2004	5.5	17.2				5.87
RED0027	3/30/2004	4.5	24.1	1.92	22	0.79	6.39
RED0027	4/27/2004	6.8	8.2				6.21
RED0027	5/25/2004	5.0	13.3	1.42	20	0.89	6.38
RED0027	6/29/2004	5.5	13.6				5.86
RED0027	7/27/2004	7.2	16.3	< 0.5	22	0.96	6.69
RED0027	8/17/2004	16.2	46.4				6.73
RED0027	9/21/2004	10.8	34.5	1.32	19	1.87	6.67
RED0027	10/26/2004	7.0	7.2				6.20
RED0027	11/16/2004	1.2	7.4	2.03	20	0.61	5.49
RED0027	12/7/2004	9.2					5.89
RED0027	1/25/2005	1.8	10.6	1.71	12	0.16	6.48
RED0027	2/22/2005	3.0	13.2				6.37

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)
RED0027	3/29/2005	25.5	28.1	1.42	16	0.5	6.36
RED0027	4/26/2005	8.2	18.5				6.06
RED0027	5/16/2005	13.2	20.1	2.82	18	1.02	6.83
RED0027	6/28/2005	22.2	52.4				7.49
RED0027	7/26/2005	8.8	25.2	1.07	20	< 0.1	6.77
RED0027	8/30/2005	18.8	61.8				6.70
RED0027	9/27/2005	13.7	26.4	1.98	17	0.74	6.77
RED0027	1/31/2006	3.2	12.1				6.96
RED0027	3/14/2006	2.5	8.4	5.26	23	0.47	6.68
RED0027	4/11/2006	9.2	8.0				6.03
RED0027	5/16/2006	2.8	7.7	7.86	20	2.33	6.11
RED0027	1/23/2007	0.5	9.0	2.48	13	0.22	6.37
RED0027	2/20/2007	1.0	8.7				5.61
RED0027	3/27/2007	6.2	12.5	2.22	21	0.68	6.06
RED0027	4/24/2007	1.8	9.7				5.41
RED0027	5/15/2007	4.2	10.9	1.97	27	1.14	6.08
RED0027	6/12/2007	7.0	14.1				6.98
RED0027	7/17/2007	4.2	6.9	2.39	25	0.51	5.87
RED0027	1/15/2008	1.5	5.9	2.84	124	0.41	5.44
RED0027	2/12/2008	1.2	16.0				5.60
RED0027	3/11/2008	0.5	10.7	6.48	26	0.54	5.55
RED0027	4/1/2008	6.0	11.2				5.86
RED0027	5/6/2008	4.0	12.2	4.83	52	1.18	5.95
RED0027	6/17/2008	8.0	14.1				6.33
RED0027	9/1/2008	7.0	12.5	3.87	27	0.73	6.16
RED0027	12/8/2008	0.5	7.7				5.99
RED0027	1/5/2009	0.5	8.8	3.35	40	0.45	5.78
RED0027	2/3/2009	1.0	9.8				5.88
RED0027	3/2/2009	1.5	9.5	1.20	63	0.58	6.09
RED0027	3/31/2009	4.0	10.7	5.15	18	0.46	5.62
RED0027	4/14/2009	2.5	8.8				6.06
RED0027	4/27/2009	3.0	11.5	6.10	25	0.75	5.74
RED0027	5/26/2009	17.5	26.0	5.89	19	0.78	5.95
RED0027	6/15/2009	5.0	8.2	5.65	27	< 0.02	6.19
RED0027	8/4/2009	5.0	13.0				5.27
RED0027	9/14/2009	15.0	22.9	1.95	25	< 0.02	5.63
RED0027	9/29/2009	3.5	8.4	2.26	19	0.46	5.90
RED0027	10/27/2009	3.0	26.1				5.31
RED0027	11/17/2009	2.5	10.7	1.35	18	0.67	5.78
RED0027	12/8/2009	2.5	14.2				5.75
RED0027	1/26/2010	3.0	16.7	3.13	13	0.44	5.77
RED0027	2/9/2010	3.0	21.7	1.42	10	0.32	5.61

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Dissolved Copper (µg/L)	Hardness (mg/L)	Dissolved Lead (µg/L)	pH (su)

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

* Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore these values are not used in statistics or graphs.

Summary:

Period of Record	9/25/90 - 2/9/10 (except for copper and lead)					
No. of Values	201	207	94	142	67	205
Minimum	0.5	3.3	< 0.5	7	< 0.02	5.21
Maximum	40.5	61.8	37.4	124	3.76	8.56
Median	6.0	11.0	1.94	20	0.46	6.34
Hardness calculation value	--	--	--	25	--	--
Criterion from standards	N/A	32	3.47	N/A	0.54	6 - 9
No. of values exceeding criterion	N/A	14	14	N/A	26	55
% of values exceeding criterion	N/A	6.8%	14.9%	N/A	38.8%	26.8%

Period of record for dissolved copper statistics: 1/09/95 - 2/09/10
Period of record for dissolved lead statistics: 9/24/96 - 2/09/10

Begin and end dates for most recent 10 yrs of hardness data: 2/15/00 - 2/09/10
Number of values for most recent 10 yrs of hardness data: 54
Average for most recent 10 yrs (use if 20 or more values) = 23 <--don't use
Minimum hardness for calculating metals criteria (per CPP) = 25 <-- use this
Ecoregion default hardness (use if less than 20 values) = n.a. <--don't use

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\RED0027 BODCAU CREEK.XLSX

Table B.4 Historical Water Quality Data for Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)
UWBDT02	6/20/1994	< 2	41	6.49
UWBDT02	9/14/1994	< 2	31	6.63
UWBDT02	1/9/1995	< 2	11	6.53
UWBDT02	4/3/1995	< 2	9	6.05
UWBDT02	7/25/1995	< 2	34	6.49
UWBDT02	10/9/1995	< 2	61	5.77
UWBDT02	2/26/1996	< 2	9	5.83
UWBDT02	5/14/1996	< 0.4	27	6.24
UWBDT02	10/8/1996	0.88*	16	6.04
UWBDT02	5/12/1997		18*	6.20
UWBDT02	6/16/1997			6.98
UWBDT02	7/14/1997		86	4.05
UWBDT02	8/25/1997			7.63
UWBDT02	9/15/1997		33	7.24
UWBDT02	10/18/1999	1.02*	26	6.30
UWBDT02	2/7/2000	< 0.3	15	5.68
UWBDT02	4/24/2000	0.50	28	5.94
UWBDT02	6/19/2000	0.32	13	5.36
UWBDT02	8/28/2000	0.81	23	7.04
UWBDT02	9/18/2000	1.51	17	7.00
UWBDT02	7/9/2007	0.55	17	5.78
UWBDT02	10/8/2007	1.23	24	6.69
UWBDT02	1/14/2008	0.58	23	5.49
UWBDT02	2/11/2008	0.43	15	5.63
UWBDT02	4/7/2008	0.46	10	5.51
UWBDT02	6/2/2008	0.78	20	5.81
UWBDT02	7/22/2008	1.18	33	5.96
UWBDT02	8/26/2008	1.00	21	5.43
UWBDT02	10/14/2008	1.06	12	5.45
UWBDT02	12/9/2008	< 0.3	58	4.22
UWBDT02	2/24/2009	0.36	38	4.59
UWBDT02	3/17/2009	0.36	14	4.47

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

* Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore this value is not used in statistics or graphs.

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)

Summary:

Period of Record	6/20/94 - 3/17/09 (except for lead)			
No. of Values	18	29	32
Minimum	< 0.3	9	4.05
Maximum	1.51	86	7.63
Median	0.53	23	5.95
Hardness to use for metals criteria (see below)	--	31.0	--
Criterion from standards	0.69	N/A	6 - 9
No. of values exceeding criterion	7	N/A	17
% of values exceeding criterion	38.9%	N/A	53.1%

Period of record for dissolved lead statistics: 5/14/96 - 3/17/09

Begin and end dates for most recent 10 yrs of hardness data: 2/07/00 - 3/17/09
Number of values for most recent 10 yrs of hardness data: 17
Average for most recent 10 yrs (use if 20 or more values) = 22 <--don't use
Ecoregion default hardness (use if less than 20 values) = 31 <-- use this

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWBDT02 DORCHEAT BAYOU.XLSX

Table B.5 Historical Water Quality Data in Beech Creek at Hwy 82 near Waldo, AR for TSS, turbidity, hardness, and lead

Site ID	Date Collected	TSS (mg/L)	Turbidity (NTU)	Hardness (mg/L)	Dissolved Lead (µg/L)
UWBCH01	6/20/1994	31.5	14.0	35	< 2
UWBCH01	9/14/1994	15.0	10.0	18	< 2
UWBCH01	1/9/1995		15.0	9	< 2
UWBCH01	4/3/1995	9.5	24.0	5	< 2
UWBCH01	5/14/1996	20.0	25.0	9	0.80
UWBCH01	10/8/1996	6.5	18.0	10	0.86*
UWBCH01	10/18/1999	19.5	51.0	15	2.39*
UWBCH01	4/24/2000	11.0	12.0	19	0.82
UWBCH01	6/19/2000		28.0	10	0.83
UWBCH01	7/9/2007	20.0	36.9	16	0.81
UWBCH01	1/14/2008	3.0	18.7	11	0.49
UWBCH01	2/11/2008	2.5	32.5	15	0.52
UWBCH01	4/7/2008	12.5	31.4	12	0.74
UWBCH01	6/2/2008	13.0	39.7	14	0.81
UWBCH01	6/3/2008	4.5	5.5	34	< 0.30
UWBCH01	7/22/2008	16.5	26.2	20	1.23
UWBCH01	8/26/2008	12.0	24.3	16	0.71
UWBCH01	10/14/2008	8.5	18.0	26	1.05
UWBCH01	12/9/2008	6.0	26.1	10	0.68
UWBCH01	2/24/2009	6.0	22.3	13	0.58
UWBCH01	3/17/2009	13.5	24.6	11	0.55

Notes:
- Statistics were computed using half of reporting limit for values below the reporting limit.
- Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore these values were not used in statistics or graphs.

Summary:

Period of Record	6/20/94 - 3/17/09			5/14/96 - 3/17/09
No. of Values	19	21	21	15
Minimum	2.5	5.45	5	< 0.30
Maximum	31.5	51	35.4	1.23
Median	12	24.3	14	0.74
Hardness to use for metals criteria (see below)	--	--	31	--
Criterion from standards	N/A	32	N/A	0.69
No. of values exceeding criterion	N/A	4	N/A	9
% of values exceeding criterion	N/A	19.0%	N/A	60.0%

Begin and end dates for most recent 10 yrs of hardness data:	10/18/99 - 3/17/09	
Number of values for most recent 10 yrs of hardness data:	15	
Average for most recent 10 yrs (use if 20 or more values) =	16	<--don't use
Ecoregion default hardness (use if less than 20 values) =	31	<-- use this

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Table B.6 Historical Water Quality Data in Beech Creek at Hwy 82 near Waldo, AR for BOD5, ammonia, TKN, DO, and temperature

Site ID	Date Collected	5-day BOD (mg/L)	Ammonia as N (mg/L)	Total Kjeldahl Nitrogen (mg/L)	DO (mg/L)	Water Temperature (°C)
UWBCH01	6/20/1994	3.40	0.256	0.276	2.20	28.0
UWBCH01	9/14/1994	2.60	0.323	0.246	1.00	23.5
UWBCH01	1/9/1995	1.20	0.054		11.40	
UWBCH01	4/3/1995		0.122	0.132	6.90	15.6
UWBCH01	5/14/1996		0.614	0.440	0.50	20.0
UWBCH01	10/8/1996		< 0.05	0.202	1.20	18.1
UWBCH01	10/18/1999	5.85	1.020	0.543	2.30	16.5
UWBCH01	4/24/2000	2.74	0.306	0.217	3.40	18.8
UWBCH01	6/19/2000	2.62	0.032	0.125	5.33	24.2
UWBCH01	7/9/2007		0.050	1.160	5.54	25.9
UWBCH01	1/14/2008		< 0.03	0.959	7.70	8.4
UWBCH01	2/11/2008		< 0.03	0.900	9.09	10.1
UWBCH01	4/7/2008		< 0.03	0.884	8.18	16.6
UWBCH01	6/2/2008		0.143	1.240	2.12	25.4
UWBCH01	6/3/2008		0.037	0.265	6.24	24.4
UWBCH01	7/22/2008		0.630	2.520	1.17	26.1
UWBCH01	8/26/2008		0.080	1.180	3.28	24.8
UWBCH01	10/14/2008		0.041	1.280	1.62	23.5
UWBCH01	12/9/2008		0.046	0.973	8.21	9.6
UWBCH01	2/24/2009		0.042	0.557	10.30	8.5
UWBCH01	3/17/2009		0.050	0.634	9.08	11.0

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

Summary:

Period of Record	6/20/94 - 3/17/09				
No. of Values	6	21	20	21	20
Minimum	1.2	< 0.03	0.125	0.5	8.4
Maximum	5.85	1.02	2.52	11.4	28
Median	2.68	0.05	0.596	5.33	19.4
Criterion from standards	--	--	--	see below*	--
No. Values > criterion	--	--	--	9	--
% Values > criterion	--	--	--	42.9%	--

* DO criterion for Beech Creek is 3 mg/L for critical season (water temp is 22°C or less) and 5 mg/L for primary season (water temp is above 22°C)

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Table B.7 Historical Water Quality Data for Dorcheat Bayou near Magnolia, AR (RED0065)

Site ID	Date Collected	pH (su)
RED0065	7/9/2007	5.78
RED0065	1/14/2008	5.36
RED0065	2/11/2008	5.38
RED0065	4/7/2008	5.75
RED0065	6/2/2008	5.59
RED0065	7/22/2008	6.59
RED0065	8/26/2008	5.30
RED0065	10/14/2008	5.32
RED0065	12/9/2008	5.18
RED0065	2/24/2009	5.44
RED0065	3/17/2009	5.04

Summary:

Period of Record	7/9/07 - 3/17/09
No. of Values	11
Minimum	5.04
Maximum	6.59
Median	5.38
Criterion from standards:	
Minimum	6.0
Maximum	9.0
No. Values failing criterion	10
% Values failing criterion	90.9%

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\RED0065 DORCHEAT BAYOU.XLSX

Table B.8 Historical Water Quality Data for Big Creek at Hwy 132 at Magnolia, AR

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)
UWBIG01	6/20/1994	< 2	37	6.76
UWBIG01	9/14/1994	3.50	23	6.70
UWBIG01	1/9/1995	< 2	11	7.70
UWBIG01	4/3/1995	< 2	9	6.47
UWBIG01	7/25/1995	< 2	23	6.82
UWBIG01	10/9/1995	< 2	264	4.36
UWBIG01	2/26/1996	< 2	21	6.84
UWBIG01	5/14/1996	1.50	18	6.54
UWBIG01	10/8/1996	1*	8	6.63
UWBIG01	5/12/1997		13*	6.70
UWBIG01	6/16/1997			6.90
UWBIG01	7/14/1997		20	6.26
UWBIG01	8/25/1997			7.03
UWBIG01	9/15/1997		60	7.35
UWBIG01	10/18/1999	0.3*	30	7.34
UWBIG01	2/7/2000	0.80	18	6.25
UWBIG01	4/24/2000	0.67	15	6.26
UWBIG01	6/19/2000	0.56	9	5.75
UWBIG01	8/28/2000	0.68	32	6.85
UWBIG01	9/18/2000	0.37	31	6.80
UWBIG01	2/12/2007	0.20	13	6.44
UWBIG01	4/23/2007	0.56	13	6.28
UWBIG01	7/9/2007	0.66	15	6.23
UWBIG01	10/8/2007	0.22	26	6.72
UWBIG01	11/26/2007	0.54	19	6.19
UWBIG01	1/14/2008	0.51	16	5.70
UWBIG01	2/11/2008	0.47	14	5.73
UWBIG01	4/7/2008	0.63	12	5.90
UWBIG01	6/2/2008	1.08	15	6.45
UWBIG01	7/22/2008	1.03	22	6.57
UWBIG01	8/26/2008	0.77	20	6.32
UWBIG01	10/14/2008	0.96	30	6.48
UWBIG01	12/9/2008	0.56	22	6.08
UWBIG01	2/24/2009	0.62	15	6.28
UWBIG01	3/17/2009	0.52	12	5.45

Notes:
- Statistics were computed using half of reporting limit for values below the reporting limit.
- Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore these values were not used in statistics or graphs.

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)

Summary:	Period of Record	5/14/96 - 3/17/09	6/20/94 - 3/17/09	
	No. of Values	21	32	35
	Minimum	0.20	8	4.36
	Maximum	1.50	264	7.7
	Median	0.62	18.5	6.47
	Hardness to use for metals criteria (see below)	--	25	
	Criterion from standards	0.54	N/A	6 - 9
	No. of values exceeding criterion	14	N/A	6
	% of values exceeding criterion	66.7%	N/A	17.1%

Begin and end dates for most recent 10 yrs of hardness data:	2/07/00 - 3/17/09	
Number of values for most recent 10 yrs of hardness data:	20	
Average for most recent 10 yrs (use if 20 or more values) =	18	<--don't use
Minimum hardness for calculating metals criteria (per CPP) =	25	<-- use this
Ecoregion default hardness (use if less than 20 values) =	n.a.	<--don't use

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWBIG01 BIG CREEK.XLSX

Table B.9 Historical Water Quality Data for Big Creek NW of Macedonia on Columbia Co. Road 12

Site ID	Date Collected	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)
UWBIG02	2/12/2007	17.9	23.6	104.0	0.18	17
UWBIG02	4/23/2007	14.3	20.0	128.0	0.69	17
UWBIG02	7/9/2007	9.1	6.8	97.5	0.58	16
UWBIG02	10/8/2007	19.7	81.3	277.0	0.25	18
UWBIG02	11/26/2007	32.8	81.1	262.0	0.41	26
UWBIG02	1/14/2008				0.4	19
UWBIG02	2/11/2008	18.7	22.6	116.0	0.42	19
UWBIG02	4/7/2008	7.2	5.8	104.0	0.57	13
UWBIG02	6/2/2008	19.9	23.6	166.0	1.05	21
UWBIG02	7/22/2008	19.2	35.0	185.0	0.38	30
UWBIG02	8/26/2008	12.9	14.9	141.0	0.7	21
UWBIG02	10/14/2008	55.5	83.1	284.0	0.44	38
UWBIG02	12/9/2008	23.4	17.1	124.0	0.38	18
UWBIG02	2/24/2009	21.8	12.7	131.0	0.41	22
UWBIG02	3/17/2009	9.2	6.9	94.0	0.38	12

Summary:

Period of Record	2/12/07 - 3/17/09				
No. of Values	14	14	14	15	15
Minimum	7.21	5.81	94	0.18	12
Maximum	55.5	83.1	284	1.05	38
Median	19.0	21.3	130	0.41	19
Hardness to use for metals criteria (see below)	--	--	--	--	31.0
Criterion from standards	20	41.3	200	0.69	N/A
No. of values exceeding criterion	4	3	3	3	N/A
% of values exceeding criterion	28.6%	21.4%	21.4%	20.0%	N/A

Begin and end dates for most recent 10 yrs of hardness data:	2/12/07 - 3/17/09	
Number of values for most recent 10 yrs of hardness data:	15	
Average for most recent 10 yrs (use if 20 or more values) =	20	<--don't use
Ecoregion default hardness (use if less than 20 values) =	31	<-- use this

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWBIG02 BIG CREEK.XLSX

Table B.10 Historical Water Quality Data for Dorcheat Bayou east of Taylor, AR

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)
RED0015A	10/16/1990	7	< 2	70	5.77
RED0015A	11/6/1990	4	< 2	8	5.34
RED0015A	12/11/1990	1	< 2	52	5.68
RED0015A	1/22/1991	6	< 2	20	5.95
RED0015A	2/19/1991	8	< 2	20	6.13
RED0015A	3/26/1991	10	< 2	24	6.10
RED0015A	4/16/1991	8	< 2	10	6.02
RED0015A	5/21/1991	8	< 2	18	6.10
RED0015A	6/18/1991	7	< 2	24	6.15
RED0015A	7/16/1991	9	< 2	38	6.54
RED0015A	8/20/1991	7	< 2	4	7.29
RED0015A	11/12/1991	17	< 2	22	6.16
RED0015A	12/10/1991	7.16	< 2	22	6.16
RED0015A	1/21/1992	6.9	< 2	38	6.70
RED0015A	2/25/1992	7.37	< 2	22	6.99
RED0015A	3/17/1992	13.6	< 2	18	
RED0015A	4/21/1992	4.62	< 2	54	5.81
RED0015A	5/19/1992	8	< 2	38	5.96
RED0015A	6/16/1992	7.71	< 2	20	6.30
RED0015A	7/21/1992	9.95	2	34	6.56
RED0015A	8/18/1992	5.75	< 2		6.04
RED0015A	9/15/1992	2.25	< 2	24	6.69
RED0015A	10/13/1992	8.12	< 2	24.8	6.45
RED0015A	11/9/1992	7	< 2	18	6.22
RED0015A	12/8/1992	6.12	< 2	25	6.03
RED0015A	1/26/1993	11.3	< 2	12.2	5.56
RED0015A	2/23/1993	10.2	< 2	14.9	5.91
RED0015A	3/23/1993	11.1		24.5	5.17
RED0015A	5/4/1993	11.1		24.5	6.94
RED0015A	5/17/1993	10.3		24.5	
RED0015A	6/29/1993	10.6		38.5	6.46
RED0015A	7/13/1993			53	6.80
RED0015A	8/10/1993	17.1		35.1	6.14
RED0015A	9/7/1993	14.2		28.6	6.96
RED0015A	10/12/1993	74.4		17.7	7.29
RED0015A	11/9/1993	24.1		27.1	6.79
RED0015A	12/21/1993	11.3		45.8	7.16
RED0015A	1/25/1994	9.14			7.00
RED0015A	2/14/1994	8.82		23.2	7.80
RED0015A	3/14/1994	8		14.4	6.87
RED0015A	4/18/1994	8.3	< 2	24	7.21
RED0015A	5/23/1994	10.9	< 2	20.4	7.24

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)
RED0015A	6/27/1994	24.9	< 2	30.3	
RED0015A	7/18/1994	9	< 2	17.4	6.92
RED0015A	8/15/1994	15.8	< 2	19.8	7.05
RED0015A	9/26/1994	25.3	< 2	18	7.14
RED0015A	10/24/1994	14.4	< 2	23.4	6.73
RED0015A	11/29/1994	12.3	< 2	23	6.88
RED0015A	12/20/1994	7.92	< 2	10	6.69
RED0015A	1/9/1995		5.1	16	6.94
RED0015A	2/13/1995	9.1	< 2	13.53	7.54
RED0015A	3/27/1995	12.1	< 2	15	6.71
RED0015A	4/24/1995	7.6	6*	16.2	6.95
RED0015A	5/22/1995	8.9	< 2	17	6.69
RED0015A	6/19/1995	16.8	< 2	24	6.76
RED0015A	7/18/1995	9.8	< 2	33	
RED0015A	8/7/1995	6.3	< 2	32	6.90
RED0015A	9/18/1995	11.5	< 2	26	7.06
RED0015A	10/16/1995	37.6	< 2	29	6.73
RED0015A	11/14/1995	35.8	< 2	26	7.47
RED0015A	11/28/1995	34.2	< 2	29	7.49
RED0015A	1/2/1996	61.8	< 2	35	6.74
RED0015A	2/13/1996	37.7		33	6.99
RED0015A	3/5/1996	32.5	< 2	29	6.71
RED0015A	4/2/1996	22.1	< 2	28	7.12
RED0015A	5/14/1996	26.9	< 2	27	6.97
RED0015A	6/11/1996	17.1	< 2	19	7.39
RED0015A	7/16/1996	14.7	< 2	15	6.78
RED0015A	8/20/1996	17.4			6.95
RED0015A	10/22/1996	13.7			8.39
RED0015A	11/19/1996	14.4	0.58	19	8.21
RED0015A	12/17/1996	17.8			7.76
RED0015A	1/28/1997	10.8	< 0.4	11	8.12
RED0015A	2/25/1997	7.9			
RED0015A	5/12/1997	12.6		14*	6.40
RED0015A	6/16/1997	13.7			6.70
RED0015A	7/14/1997	13		23	6.70
RED0015A	8/25/1997	17			7.26
RED0015A	9/15/1997	99.5		33	7.51
RED0015A	10/21/1997	105			6.46
RED0015A	11/18/1997	16.171		25	6.20
RED0015A	12/16/1997	12.41			7.07
RED0015A	1/27/1998	5.73		11	6.35
RED0015A	2/17/1998	4.23			5.23
RED0015A	5/5/1998	12.06		25	6.32
RED0015A	6/2/1998	36.8			6.56

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)
RED0015A	7/21/1998	1.88	0.6	34.5	7.01
RED0015A	8/11/1998	5.97			6.75
RED0015A	9/22/1998	20.6	0.37	29	6.76
RED0015A	10/27/1998	23.6			
RED0015A	11/17/1998	15.6	< 0.3	21	6.35
RED0015A	12/21/1998	10.6			6.03
RED0015A	1/26/1999	14.1	0.3	16	5.86
RED0015A	2/16/1999	5.9			5.60
RED0015A	3/23/1999	5.77	0.48	13	5.96
RED0015A	4/27/1999	8.39			6.45
RED0015A	5/18/1999	8.62	0.62	18	6.26
RED0015A	6/29/1999	15.4			7.56
RED0015A	7/27/1999	6.4	< 0.3	34	6.56
RED0015A	8/31/1999	5.74			6.81
RED0015A	12/14/1999	122			6.21
RED0015A	1/18/2000	121.6	< 0.3	34	6.76
RED0015A	2/15/2000	35.94			7.21
RED0015A	3/21/2000	11	< 0.3	18	6.22
RED0015A	4/18/2000	12.1			6.34
RED0015A	5/23/2000	3.33	0.33	11	5.75
RED0015A	6/20/2000	4.55			6.02
RED0015A	11/14/2000	28.04	< 0.3	23.2	6.23
RED0015A	12/18/2000	7.44			6.07
RED0015A	1/29/2001	5.5	< 0.3	9	6.08
RED0015A	2/26/2001	4.59			6.03
RED0015A	3/27/2001	4.08	0.41	12	5.82
RED0015A	4/16/2001	3.89			6.02
RED0015A	5/22/2001	6.42	0.78	14	5.74
RED0015A	6/19/2001	7.56			6.28
RED0015A	7/17/2001	8.78	< 0.4	18	6.35
RED0015A	8/21/2001	9.77			6.83
RED0015A	9/18/2001	6.42	< 0.4	21	6.87
RED0015A	10/23/2001	4.48			
RED0015A	11/19/2001	23.05	0.57		6.71
RED0015A	12/11/2001	5.33			6.05
RED0015A	1/2/2002	4.18	< 0.4	13	5.38
RED0015A	2/19/2002	6.3			5.66
RED0015A	3/19/2002	3.52	< 0.4	10	6.02
RED0015A	4/16/2002	3.39			5.75
RED0015A	5/21/2002	3.18	0.44	13	6.09
RED0015A	6/4/2002	3.96			6.05
RED0015A	7/1/2002	28.06	0.52	23	6.40
RED0015A	8/6/2002	13.6			6.21
RED0015A	9/3/2002	29.4	< 0.4	21	6.57

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)
RED0015A	11/5/2002	49.3	< 0.4	22	6.64
RED0015A	12/3/2002	80			6.92
RED0015A	1/7/2003	8.34	< 0.4	14	5.92
RED0015A	2/4/2003	18.5			6.20
RED0015A	3/3/2003	5.65	< 0.4	9	6.20
RED0015A	4/8/2003	9.21			6.66
RED0015A	5/6/2003	8.88	1.1	19	6.24
RED0015A	6/10/2003	6.44			6.11
RED0015A	7/15/2003	6.42	0.91	19	6.38
RED0015A	8/12/2003	172			7.06
RED0015A	9/23/2003	85.5	< 0.4	22	7.38
RED0015A	10/21/2003	112			6.88
RED0015A	11/18/2003	76.4	< 0.4	23	6.86
RED0015A	12/16/2003	152			5.34
RED0015A	1/27/2004	20.3	0.5	19	6.60
RED0015A	2/24/2004	10.8			5.14
RED0015A	3/30/2004	4.78	< 0.4	22	6.35
RED0015A	4/27/2004	13.6			6.39
RED0015A	5/25/2004	9.9	0.76	33	6.32
RED0015A	6/29/2004	3.09			5.96
RED0015A	7/27/2004	9.68	1.28	31	6.84
RED0015A	8/17/2004	17.8			7.03
RED0015A	9/21/2004	70.4	< 0.4	25	7.21
RED0015A	10/26/2004	21.7			5.87
RED0015A	11/16/2004	9.75	0.42	20	5.78
RED0015A	12/7/2004	4.62			5.74
RED0015A	1/25/2005	5.46	0.16	12	5.99
RED0015A	2/22/2005	6.83			5.78
RED0015A	3/29/2005	4.72	0.31	14	6.19
RED0015A	4/26/2005	6.02			6.32
RED0015A	5/16/2005	12.6	0.87	21	6.73
RED0015A	6/28/2005	18			7.65
RED0015A	7/26/2005	60.9	0.14	34	7.20
RED0015A	8/30/2005	47.5			8.56
RED0015A	9/27/2005	97.4	0.23	30	6.74
RED0015A	1/31/2006	30.1			6.17
RED0015A	3/14/2006	17.7	0.35	29	7.32
RED0015A	4/11/2006	14			6.59
RED0015A	5/16/2006	8.02	0.66	19	6.28
RED0015A	1/23/2007	6.96	0.18	11	4.58
RED0015A	2/12/2007	11.5	0.13	16	6.35
RED0015A	2/20/2007	10.3			5.36
RED0015A	3/27/2007	7.34	0.64	25	6.27
RED0015A	4/23/2007	5.62	0.76	16	6.26

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)
RED0015A	4/24/2007	5.9			5.49
RED0015A	5/15/2007	4.27	0.8	16	6.09
RED0015A	6/12/2007	12			6.76
RED0015A	6/18/2007	9.29	0.84	21	6.68
RED0015A	7/17/2007	3.31	0.51	18	5.96
RED0015A	11/26/2007	54.7	0.44	30	6.34
RED0015A	1/15/2008	15.2	0.37	21	6.37
RED0015A	2/12/2008	13			6.03
RED0015A	3/11/2008	6.46	0.32	14	5.86
RED0015A	4/1/2008	7.73			6.17
RED0015A	5/6/2008	4.67	1.27	17	6.29
RED0015A	6/17/2008	19.7			7.03
RED0015A	9/1/2008	12.1	0.61	25	6.41
RED0015A	9/30/2008	5.35			6.13
RED0015A	11/4/2008	6.74	0.94	18	6.23
RED0015A	12/8/2008	8.69			6.26
RED0015A	1/5/2009	4.68	0.42	19	6.06
RED0015A	2/3/2009	6.21			6.55
RED0015A	3/31/2009	3.83	0.35	12	5.32
RED0015A	4/14/2009	5.07			6.05
RED0015A	5/26/2009	3.25	0.83	16	5.73
RED0015A	6/15/2009	6.34			6.35
RED0015A	8/4/2009	13.1			5.86
RED0015A	9/29/2009	2.48	0.63	19	5.84
RED0015A	10/27/2009	1.71			5.52
RED0015A	11/17/2009	2.73	0.64	17	5.56
RED0015A	12/8/2009	3.1			5.57
RED0015A	1/26/2010	3.35	0.39	10	5.70
RED0015A	2/9/2010	3.23	< 0.3	10	5.83

Note: Statistics were computed using half of reporting limit for values below the reporting limit.

* Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore this value is not used in statistics or graphs.

Site ID	Date Collected	Sulfate (mg/L)	Dissolved Lead (µg/L)	Hardness (mg/L)	ph (su)

Summary:	Period of Record	10/16/90 - 2/9/10 (except for lead)			
	No. of Values	201	64	134	196
	Minimum	1	0.13	4	4.58
	Maximum	172	1.28	70	8.56
	Median	9.7	0.37	21	6.35
	Hardness calculation value	--	--	25	--
	Criterion from standards	16	0.54	N/A	6 - 9
	No. of values failing criterion	52	21	N/A	42
	% of values failing criterion	25.9%	32.8%	N/A	21.4%

Period of record for dissolved lead statistics: 11/19/96 - 2/09/10

Begin and end dates for most recent 10 yrs of hardness data: 2/15/00 - 2/09/10
Number of values for most recent 10 yrs of hardness data: 53
Average for most recent 10 yrs (use if 20 or more values) = 19
Minimum hardness for calculating metals criteria (per CPP) = 25
Ecoregion default hardness (use if less than 20 values) = n.a.

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\RED0015A DORCHEAT BAYOU.XLSX

Table B.11 Historical Water Quality Data for Horsehead Creek at Hwy 19 N of Walkerville, AR

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)
UWHHC01	6/20/1994	< 2	60	6.39
UWHHC01	9/14/1994	< 2	26	6.87
UWHHC01	1/9/1995	< 2	34	6.09
UWHHC01	4/3/1995	< 2	41	5.98
UWHHC01	7/25/1995	< 2	74	7.08
UWHHC01	10/9/1995	2.60	92	7.29
UWHHC01	2/26/1996	< 2	68	6.46
UWHHC01	5/14/1996	0.70	51	6.20
UWHHC01	10/8/1996	1.4*	42	5.52
UWHHC01	2/7/2000	< 0.3	54	6.55
UWHHC01	4/24/2000	0.45	35	6.41
UWHHC01	6/19/2000	< 0.3	51	5.97
UWHHC01	8/28/2000	0.56	53	7.05
UWHHC01	7/9/2007	0.47	18	5.55
UWHHC01	10/8/2007	0.99	27	6.89
UWHHC01	1/14/2008	0.19	53	5.78
UWHHC01	2/11/2008	0.34	44	5.91
UWHHC01	4/7/2008	0.52	20	5.88
UWHHC01	6/2/2008	0.53	44	6.56
UWHHC01	7/22/2008	1.12	25	6.69
UWHHC01	8/26/2008	< 0.3	< 1	6.65
UWHHC01	10/14/2008	0.69	41	6.29
UWHHC01	12/9/2008	0.42	20	6.31
UWHHC01	2/24/2009	< 0.3	42	6.20
UWHHC01	3/17/2009	0.33	23	5.59

Note: values below detection limits are treated as being one-half of detection limit.

* Values with asterisk were flagged in original data received from ADEQ as failing ADEQ's QC criteria; therefore this value is not used in statistics or graphs.

Site ID	Date Collected	Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)

Summary:

		Dissolved Lead (µg/L)	Hardness (mg/L)	pH (su)
Summary:	Period of Record	5/14/96 - 3/17/09	6/20/94 - 3/17/09	
	No. of Values	17	25	25
	Minimum	< 0.3	< 1	5.52
	Maximum	1.12	92	7.29
	Median	0.45	42	6.31
	Hardness to use for metals criteria (see below)	--	31.0	--
	Criterion from standards	0.69	N/A	6 - 9
	No. of values exceeding criterion	4	N/A	8
	% of values exceeding criterion	23.5%	N/A	32.0%

Begin and end dates for most recent 10 yrs of hardness data:	2/07/00 - 3/17/09	
Number of values for most recent 10 yrs of hardness data:	16	
Average for most recent 10 yrs (use if 20 or more values) =	34	<--don't use
Ecoregion default hardness (use if less than 20 values) =	31	<-- use this

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWHHC01 HORSEHEAD CREEK.XLSX

Figure B.1 Time Series Plot of Lead in Bodcau Creek near Falcon, AR (RED0057)

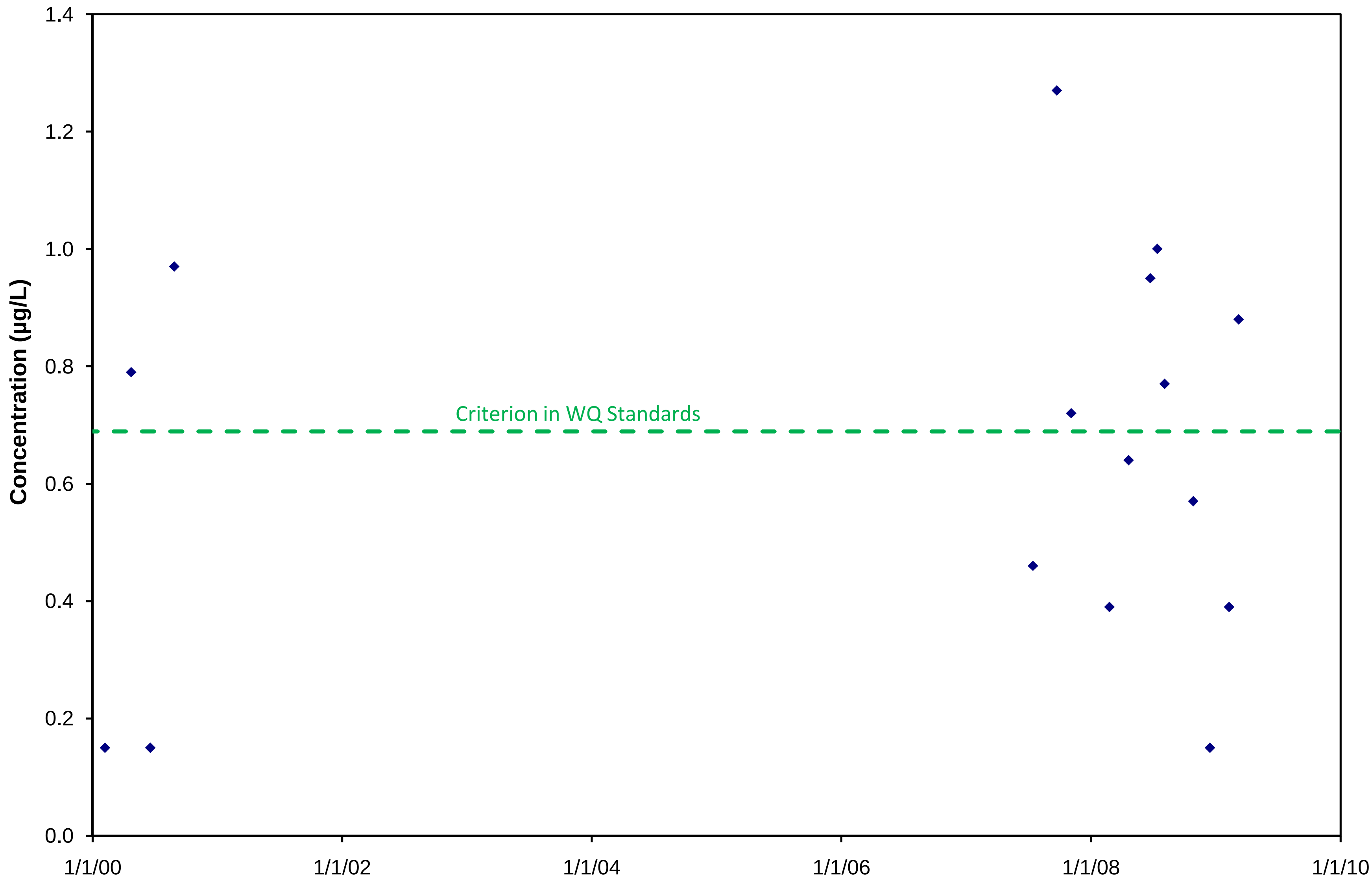


Figure B.2 Time Series Plot of Dissolved Lead in Little Bodcau Creek near Piney Grove, AR (RED0056)

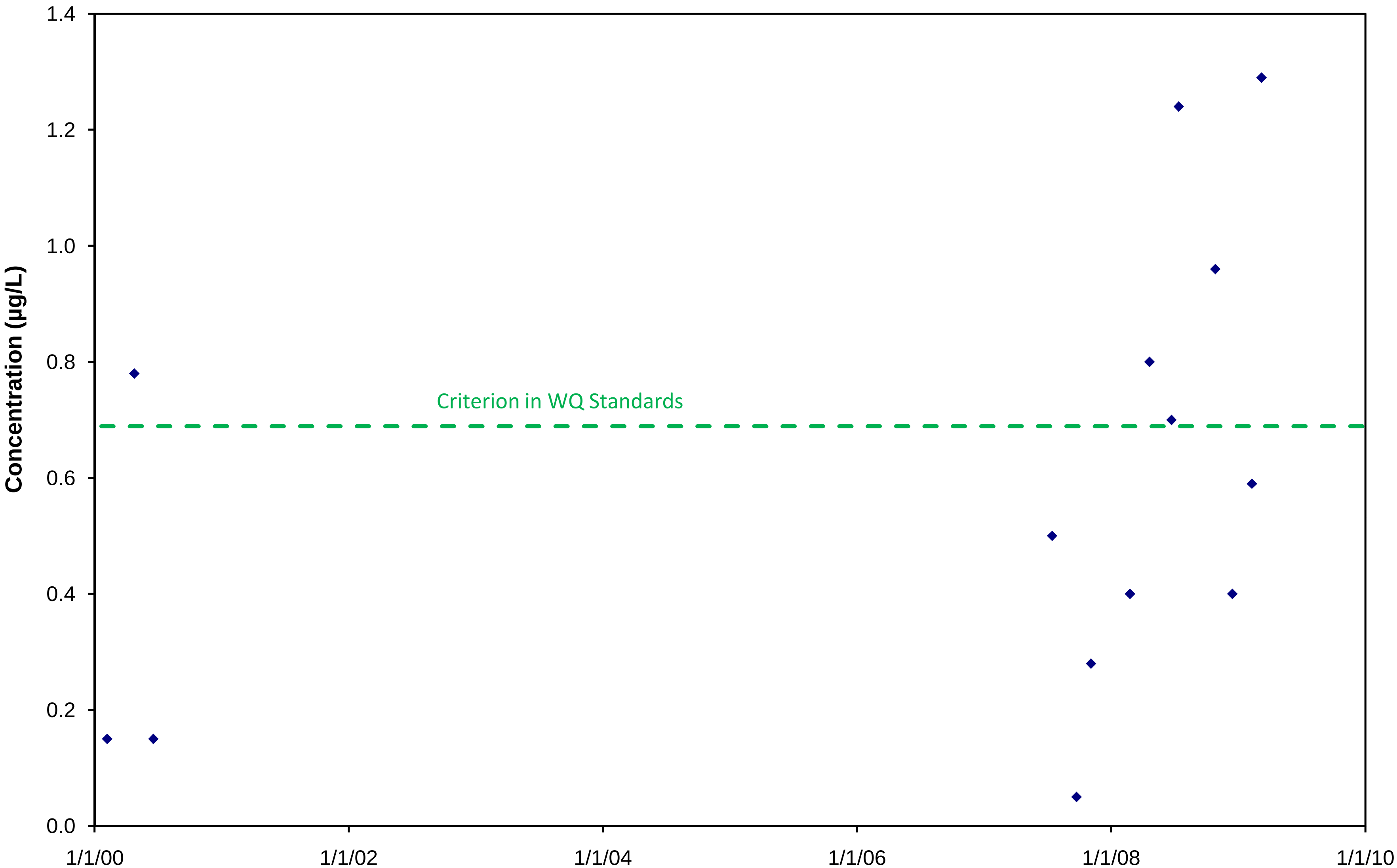


Figure B.3 Time Series Plot of Dissolved Copper in Bodcau Creek near Lewisville (RED0027)

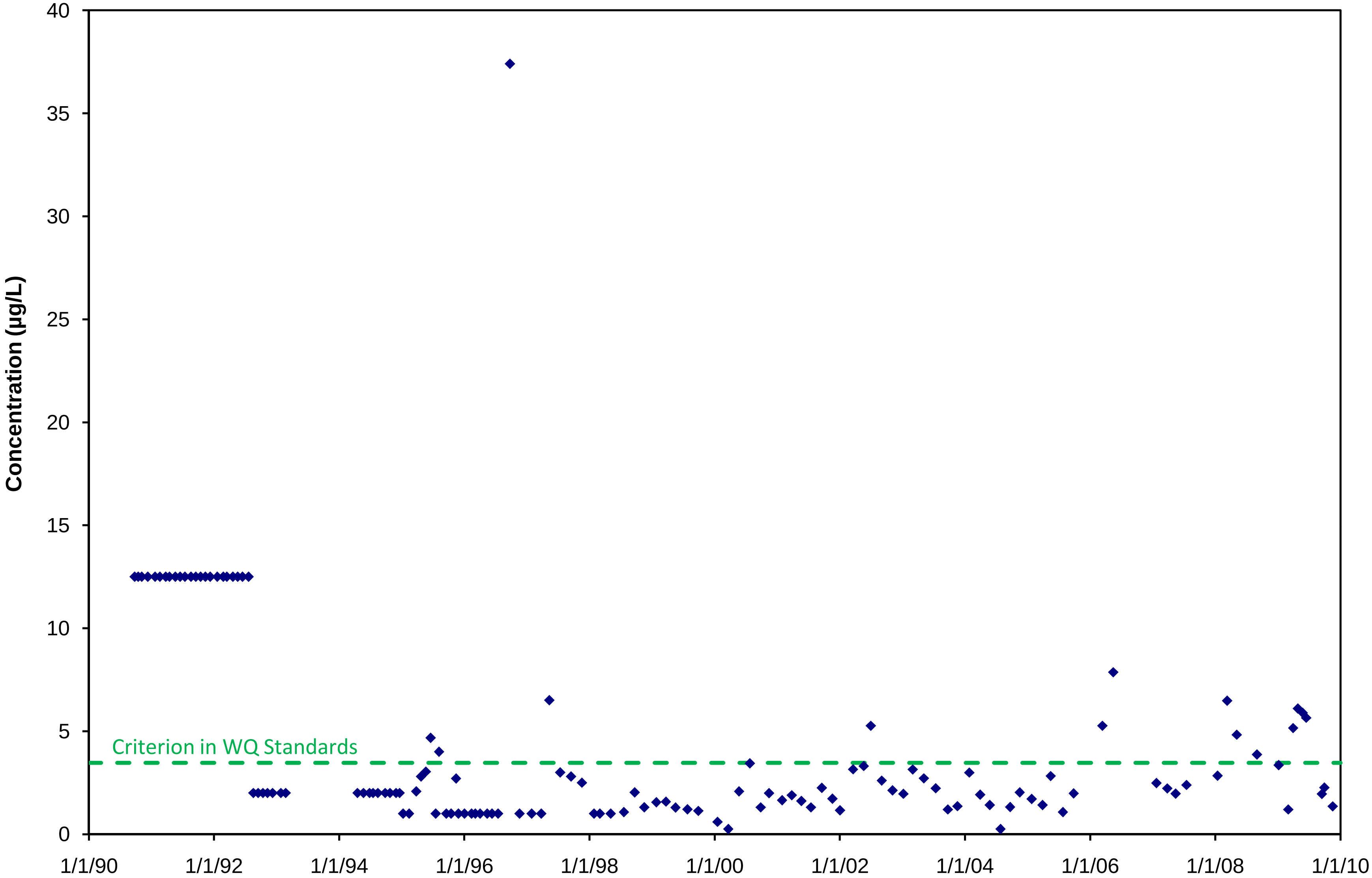


Figure B.4 Time Series Plot of Dissolved Lead in Bodcau Creek near Lewisville (RED0027)

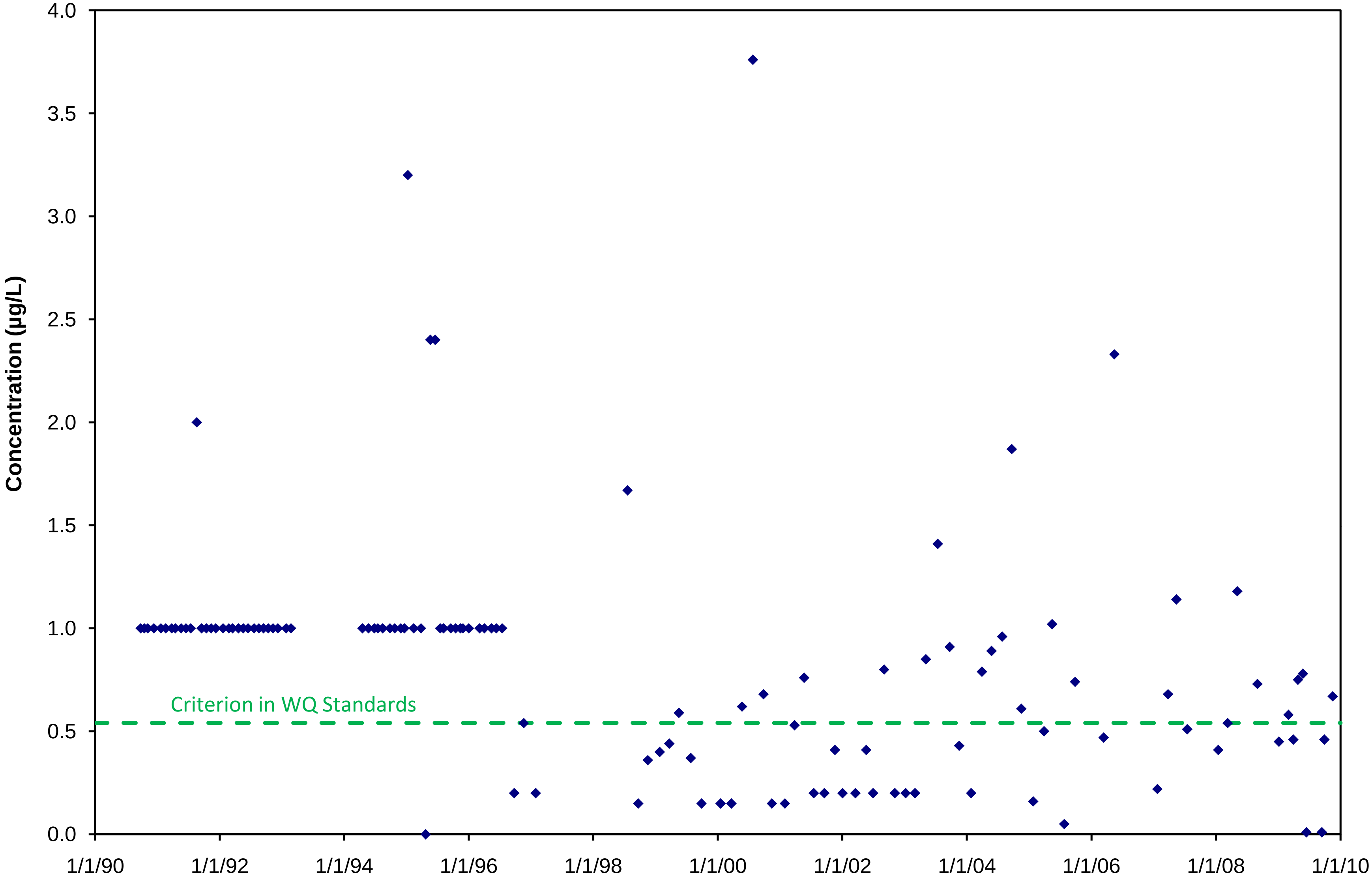


Figure B.5 Time Series Plot of Turbidity in Bodcau Creek near Lewisville (RED0027)

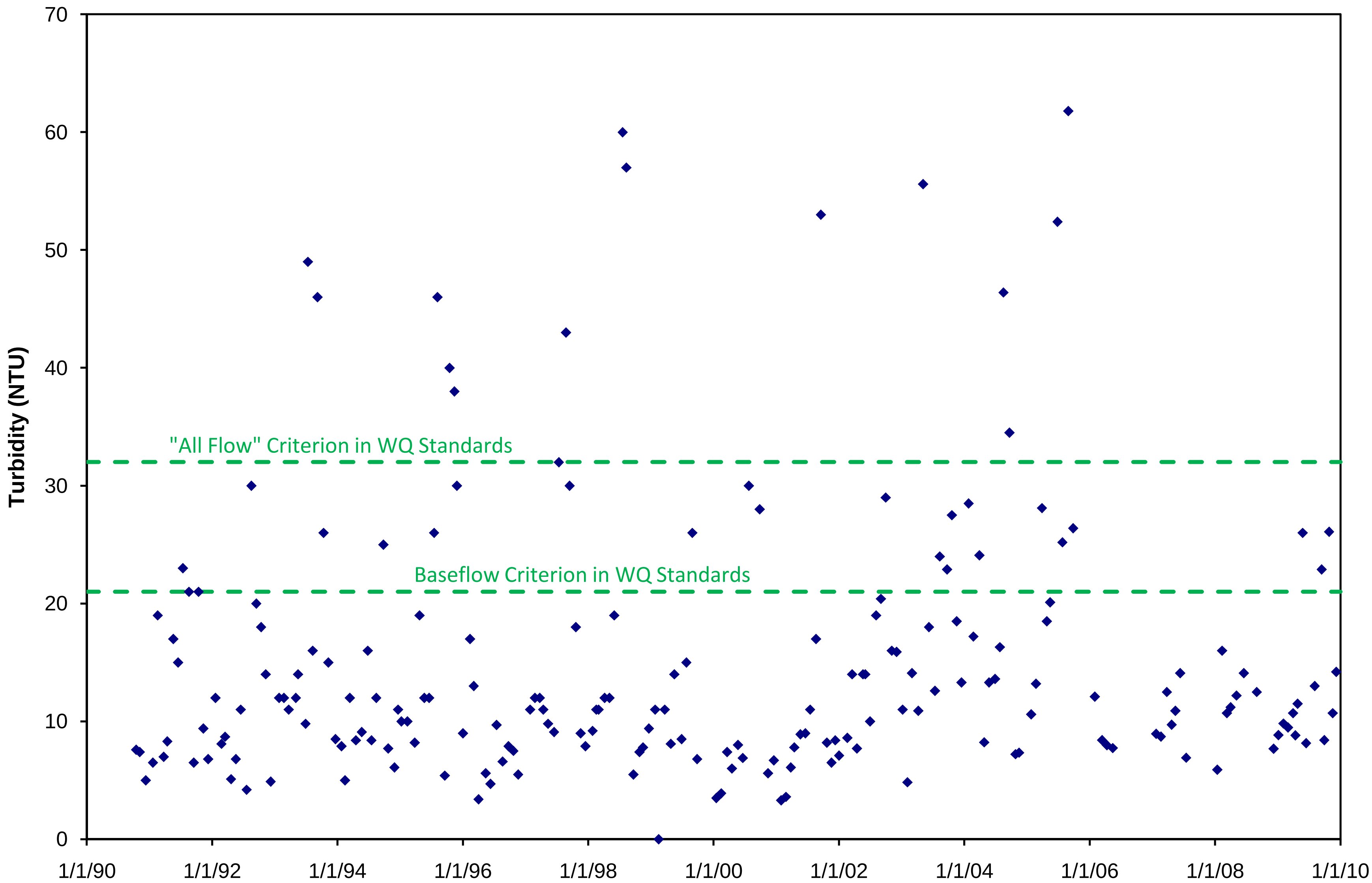


Figure B.6 Time Series Plot of TSS in Bodcau Creek near Lewisville (RED0027)

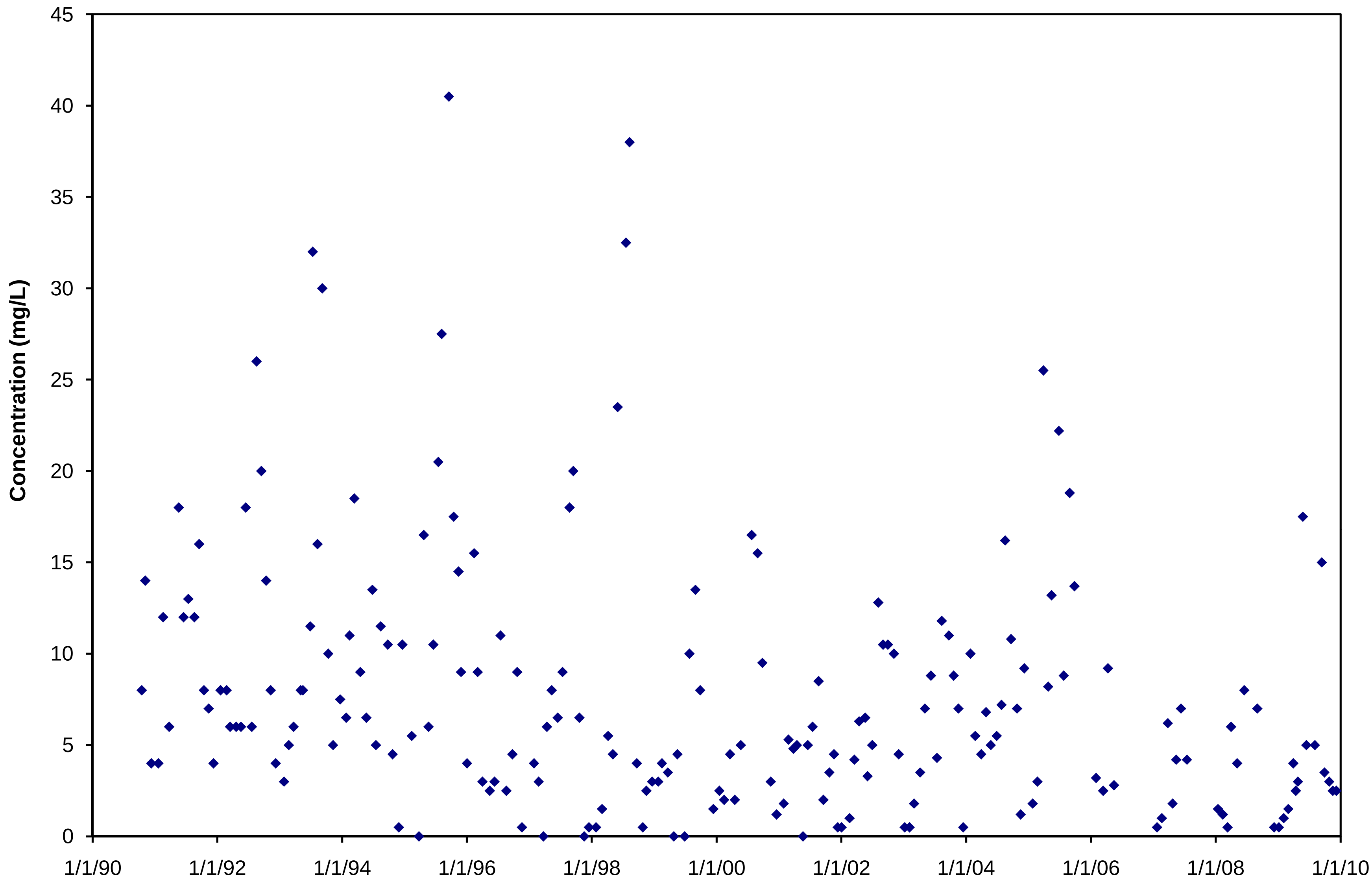


Figure B.7 Time Series Plot of pH in Bodcau Creek near Lewisville (RED0027)

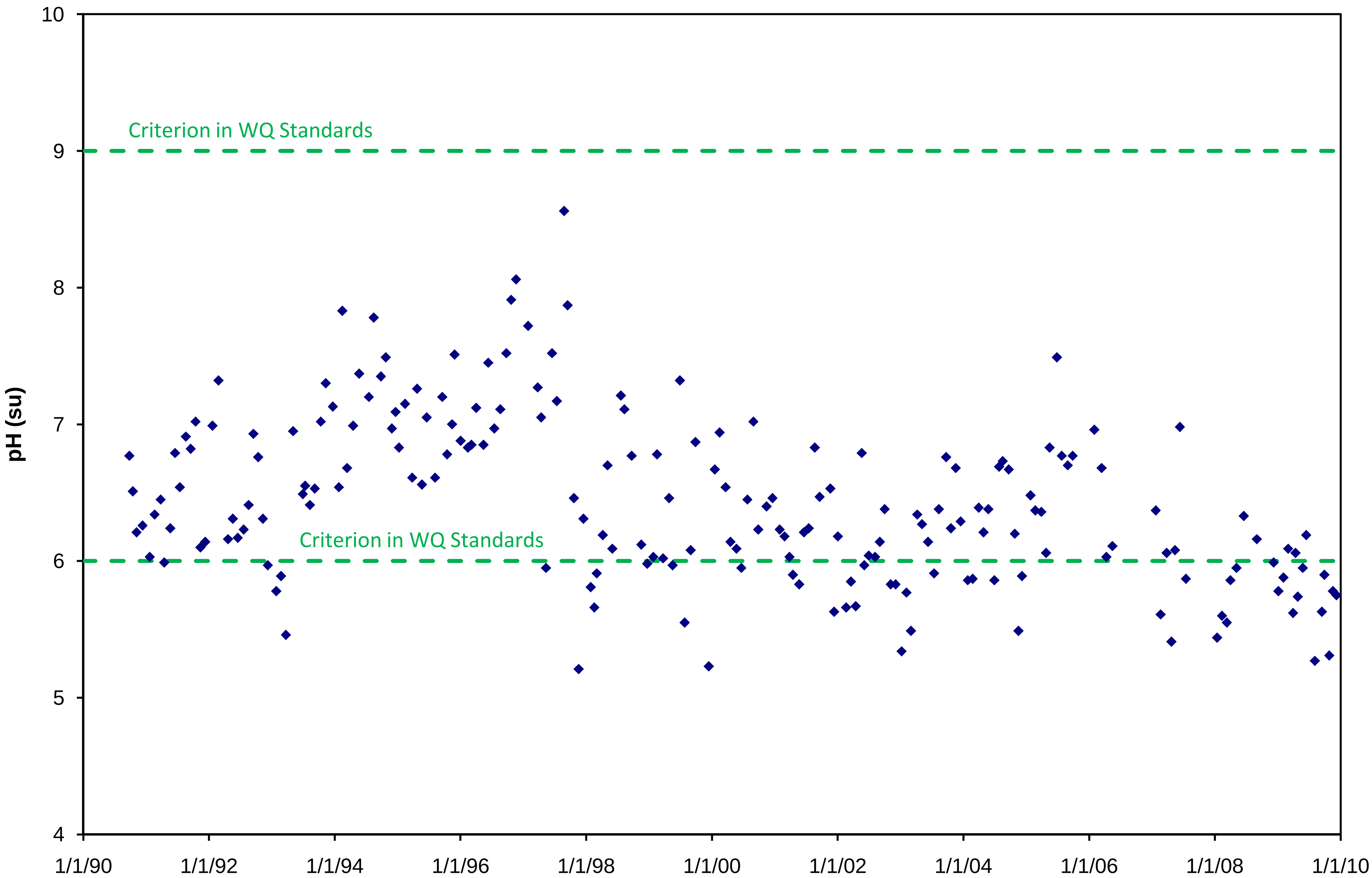


Figure B.8 Time Series Plot of Dissolved Lead in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)

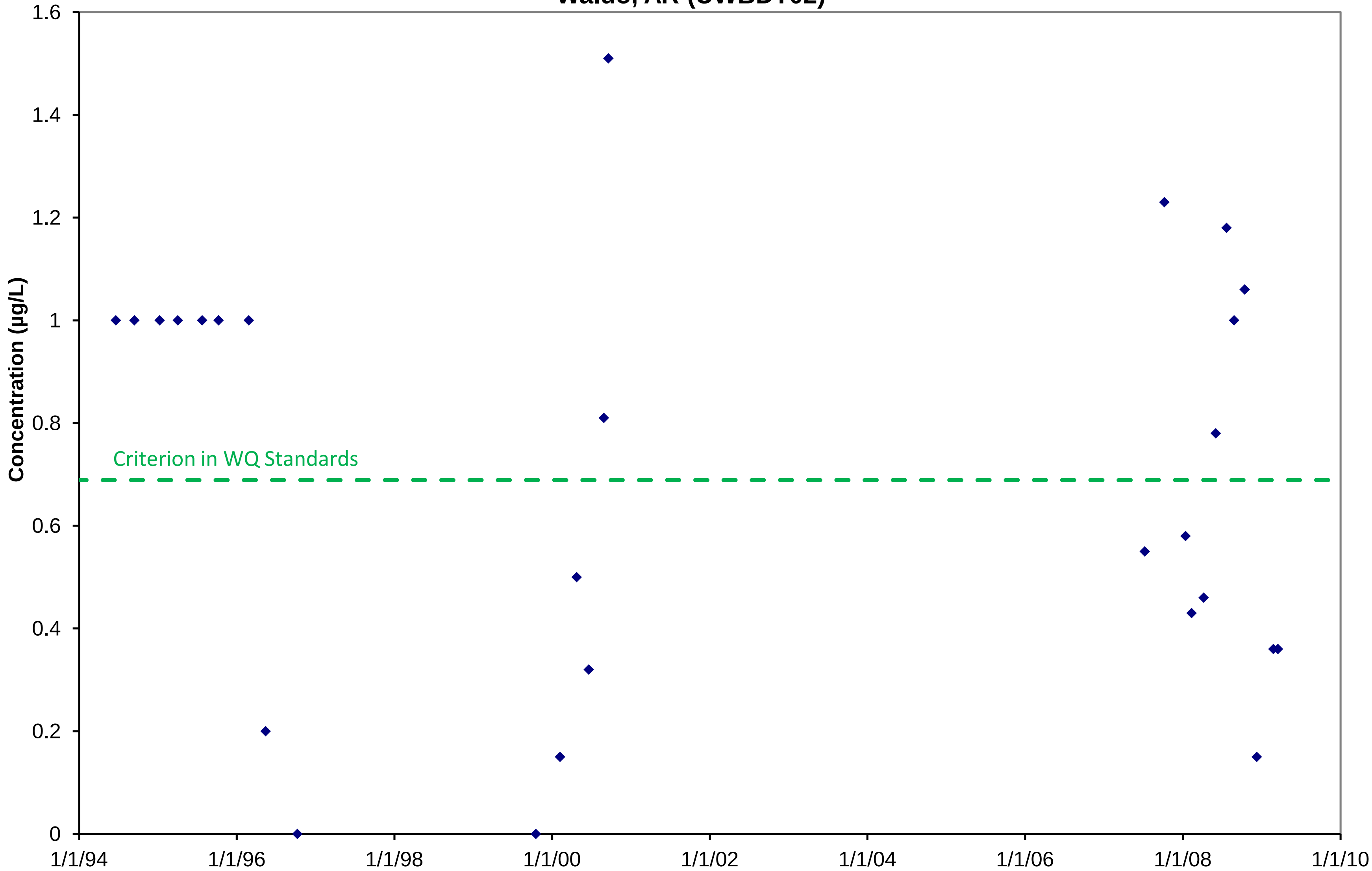


Figure B.9 Time Series Plot of pH in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)

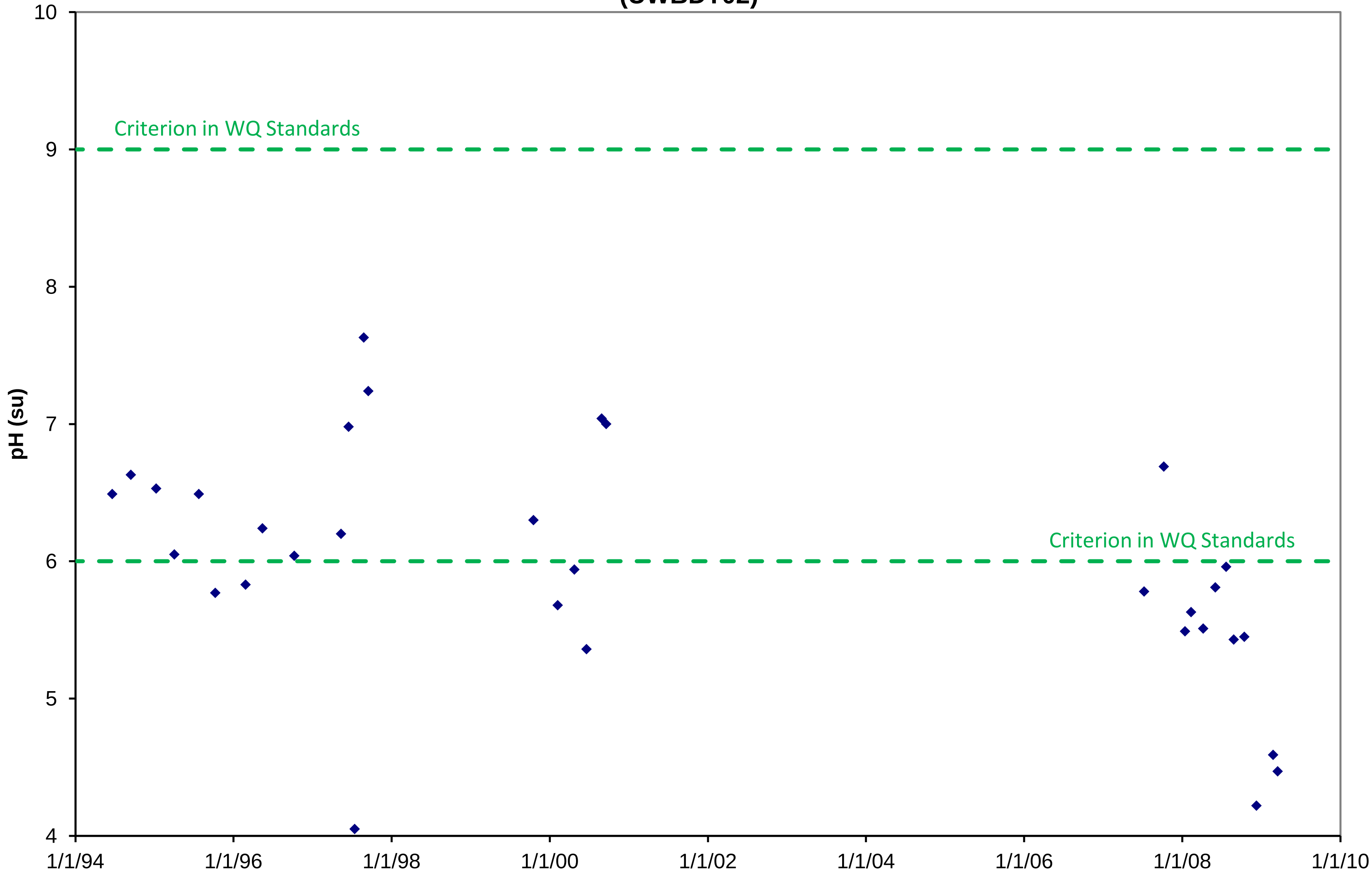
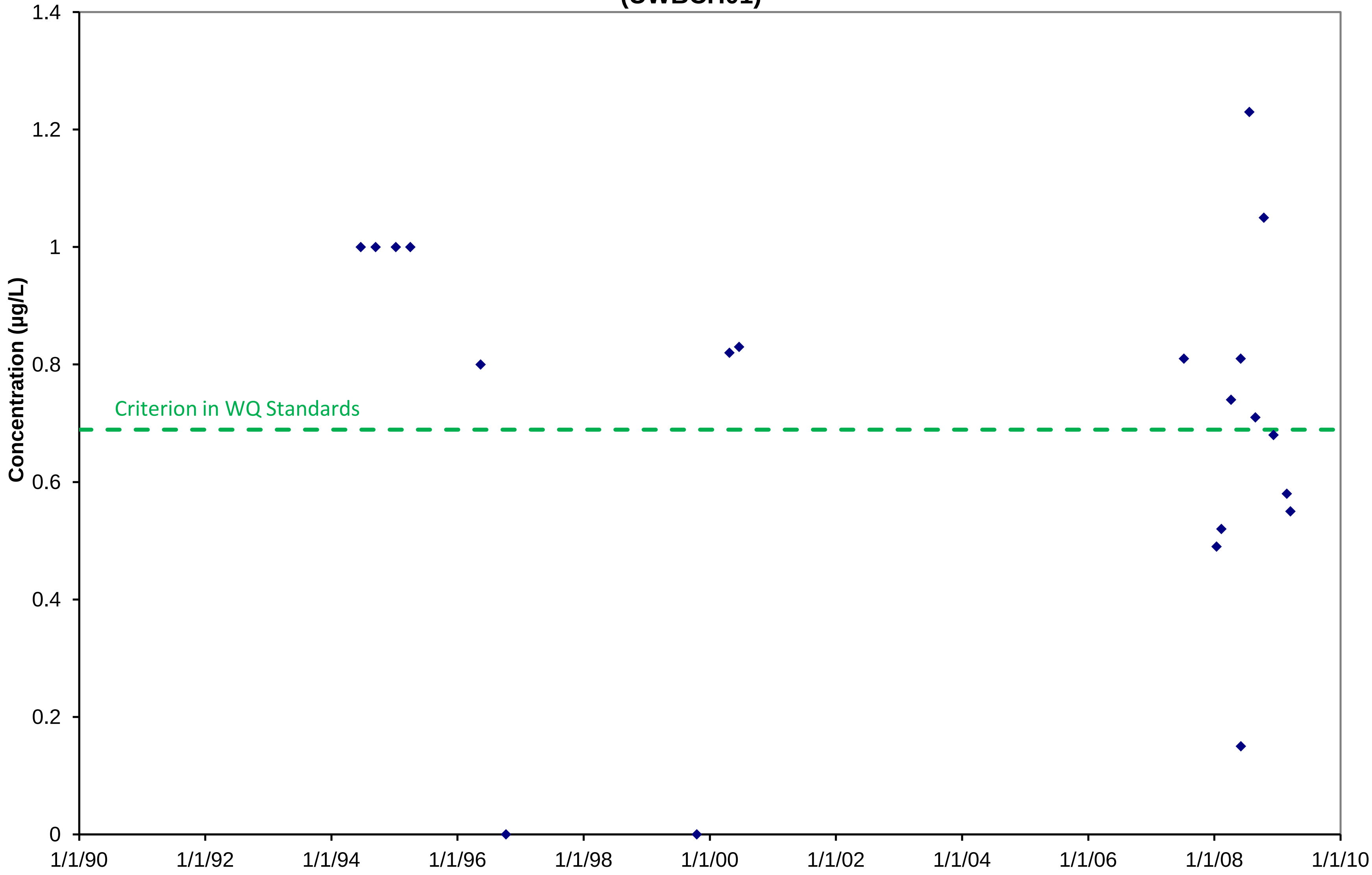


Figure B.10 Time Series Plot of Dissolved Lead in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)



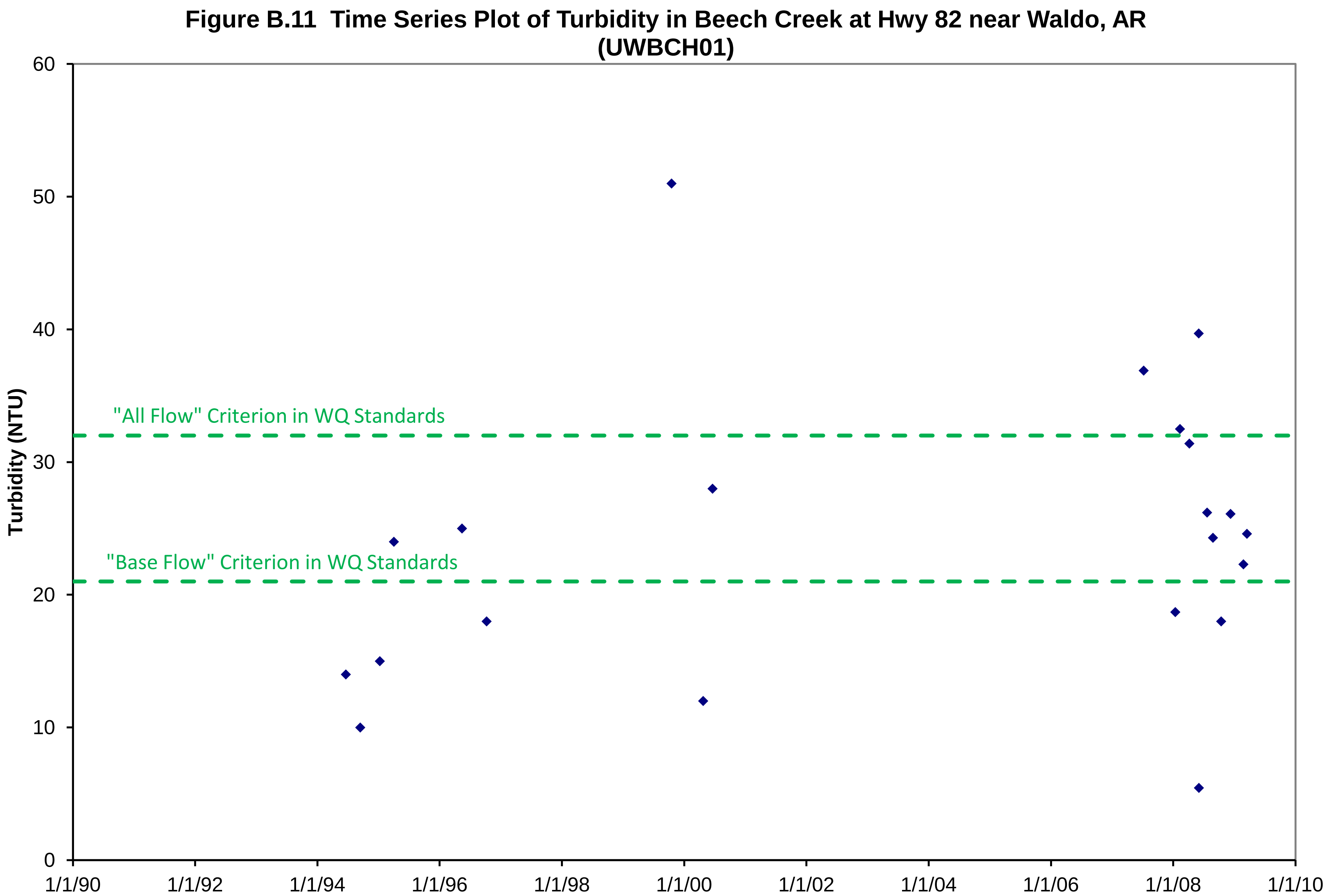


Figure B.11 Time Series Plot of Turbidity in Beech Creek at Hwy 82 near Waldo, AR
(UWBCH01)
Turbidity (NTU)
"All Flow" Criterion in WQ Standards
"Base Flow" Criterion in WQ Standards
0
10
20
30
40
50
60
1/1/90
1/1/92
1/1/94
1/1/96
1/1/98
1/1/00
1/1/02
1/1/04
1/1/06
1/1/08
1/1/10

Figure B.12 Time Series Plot of Total Suspended Solids in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

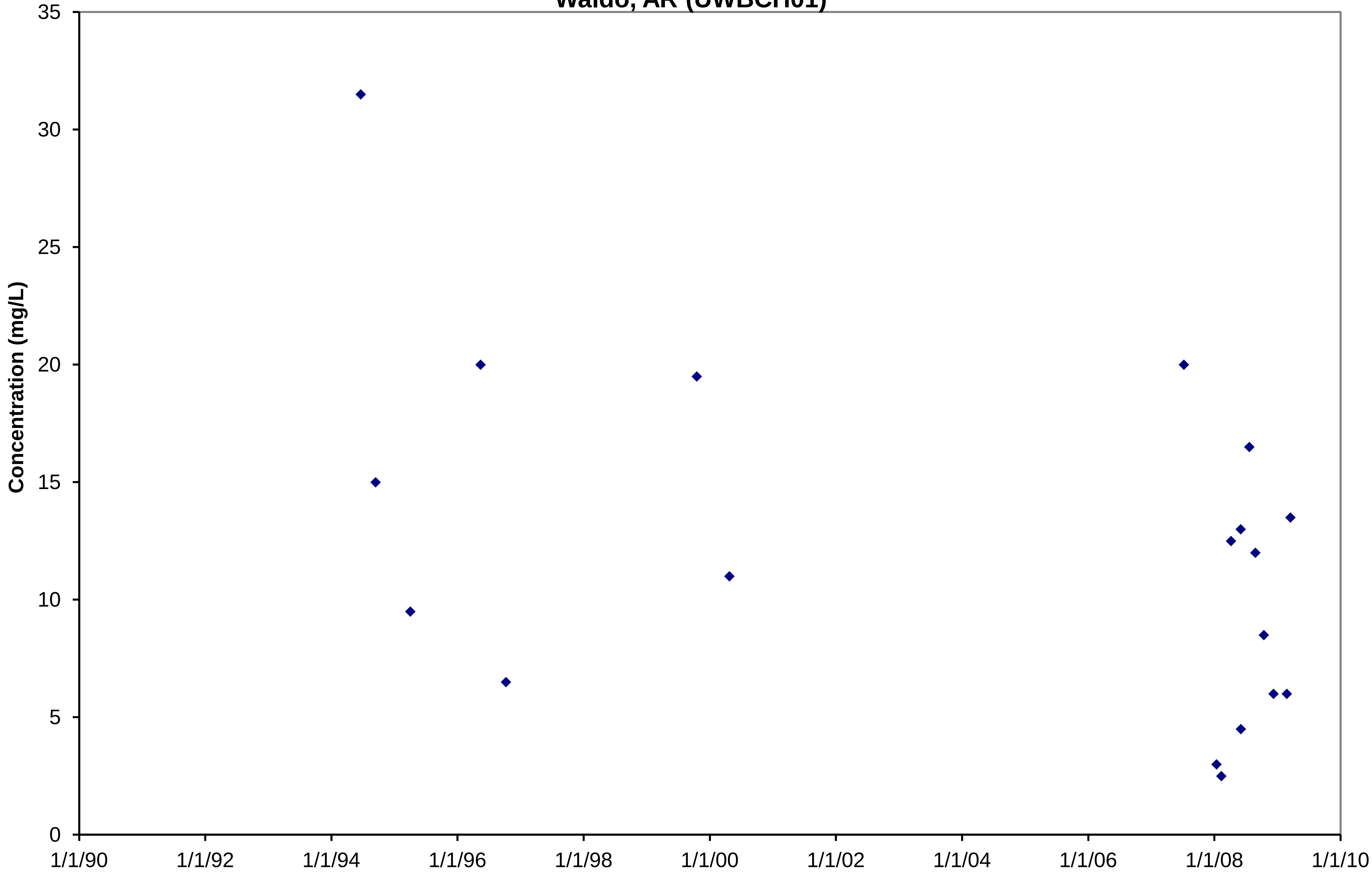


Figure B.13 Time Series Plot of Dissolved Oxygen in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

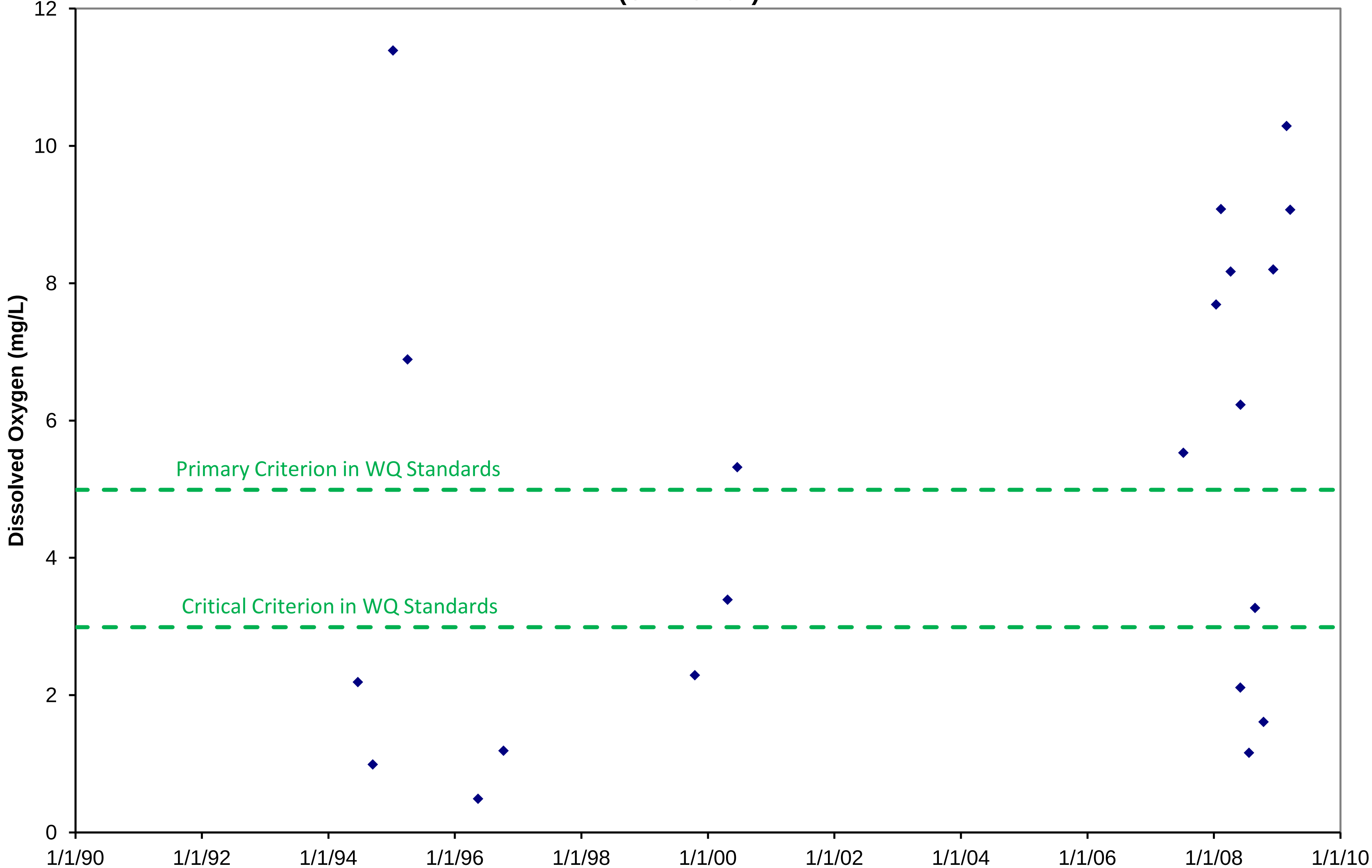


Figure B.14 Time Series Plot of pH in Bayou Dorcheat near Magnolia, AR (RED0065)

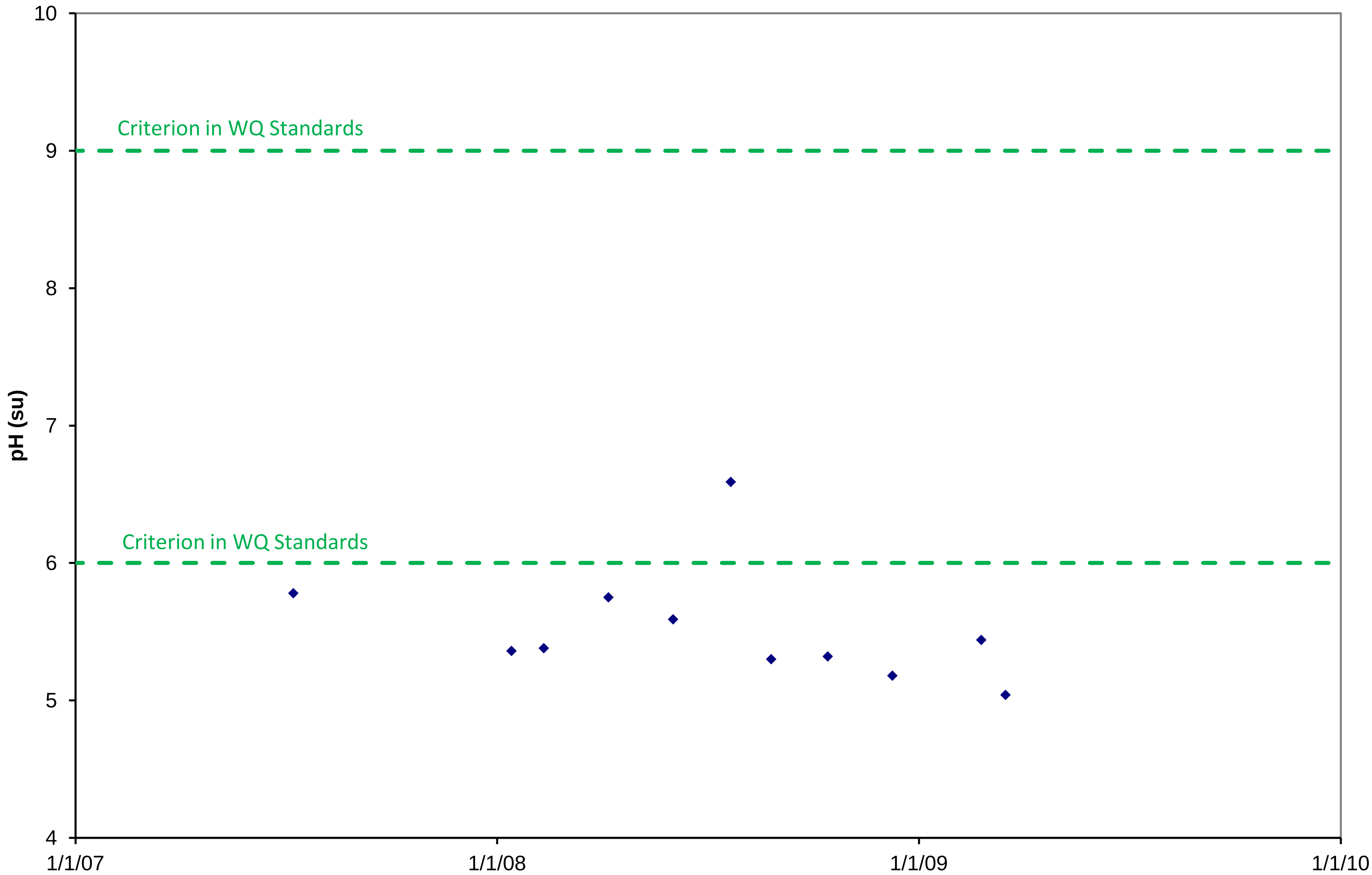


Figure B.15 Time Series Plot of Dissolved Lead in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)

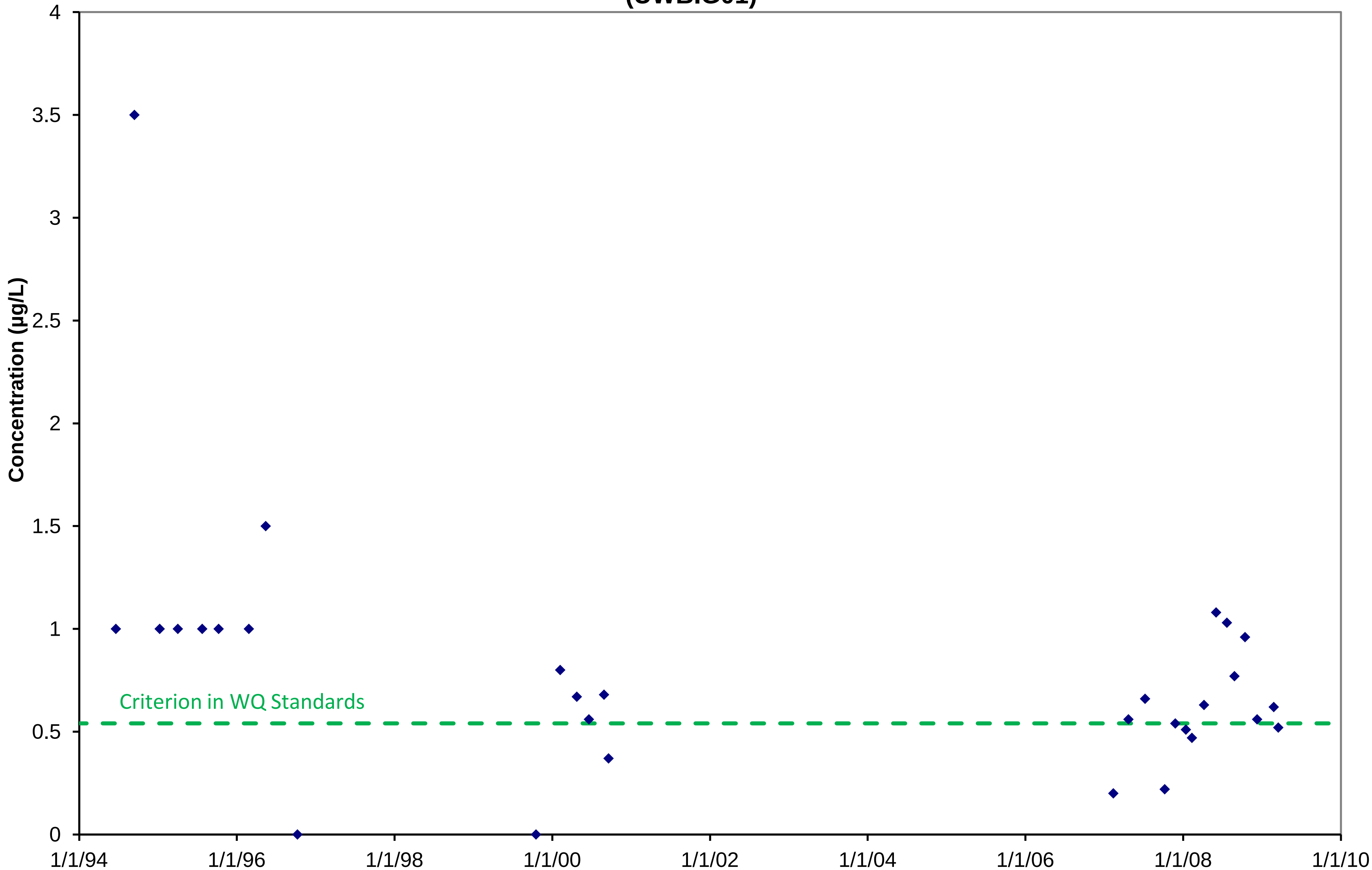


Figure B.16 Time Series Plot of pH in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)

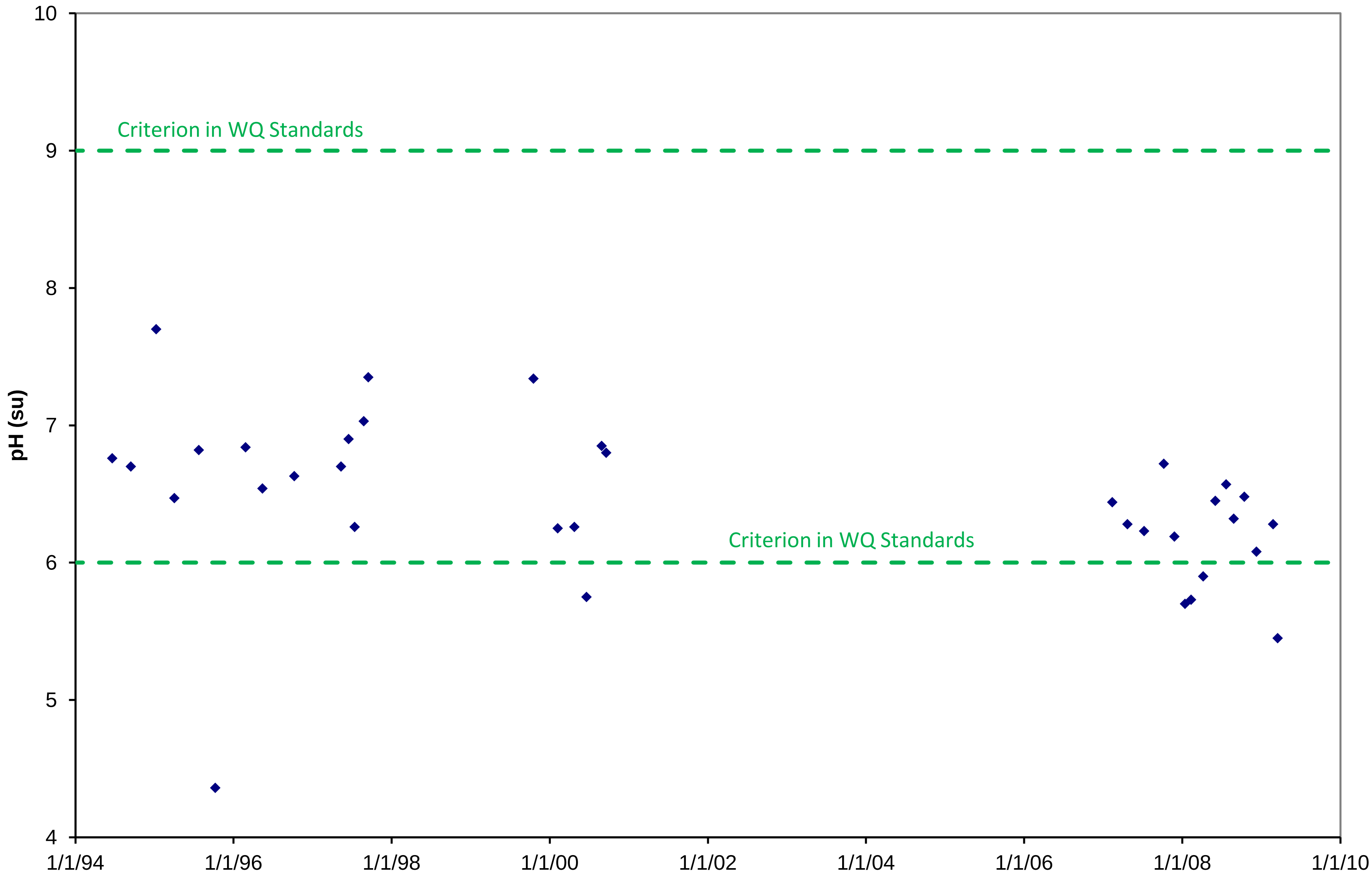


Figure B.17 Time Series Plot of Chloride in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

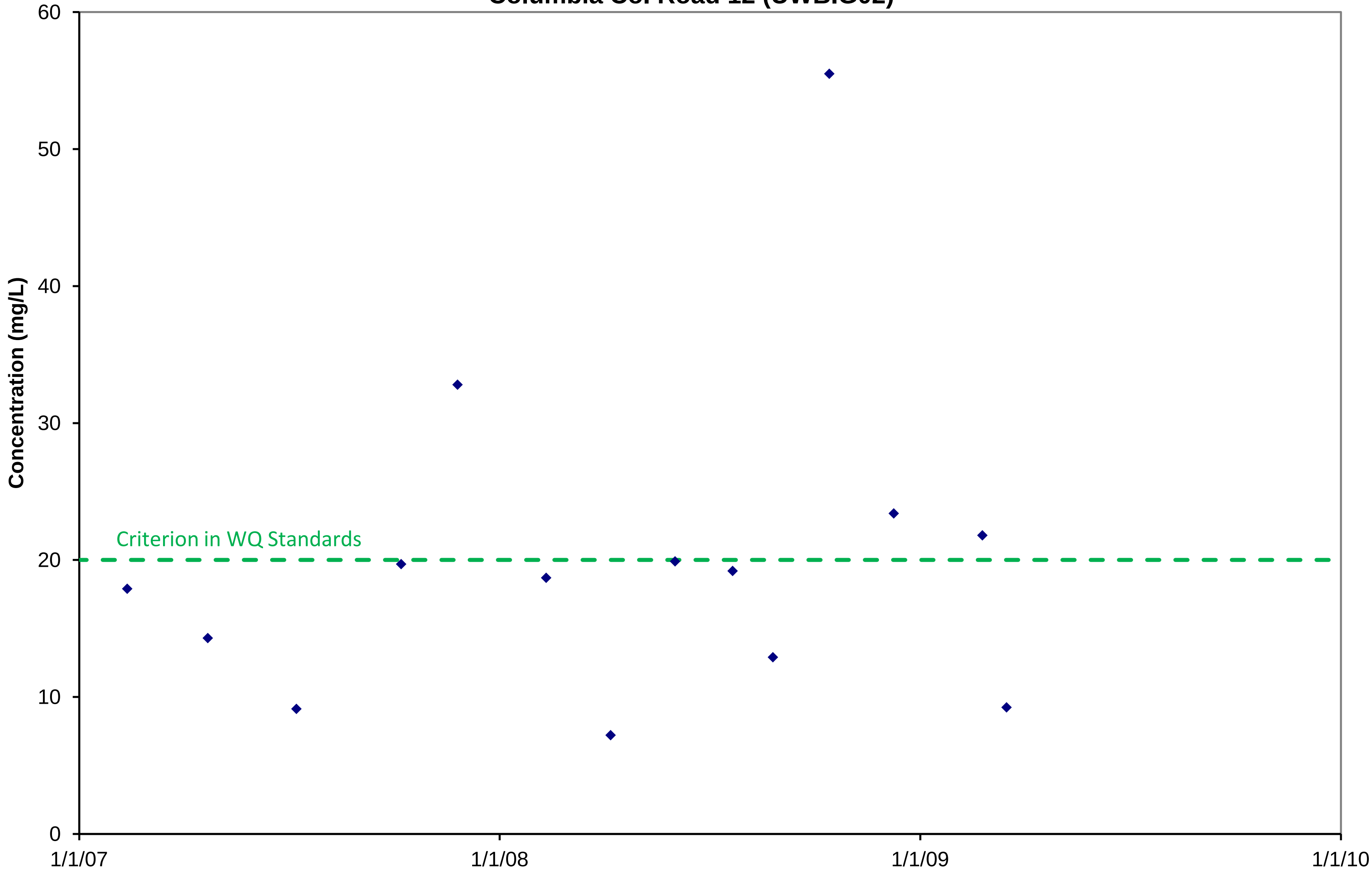


Figure B.18 Time Series Plot of Dissolved Lead in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

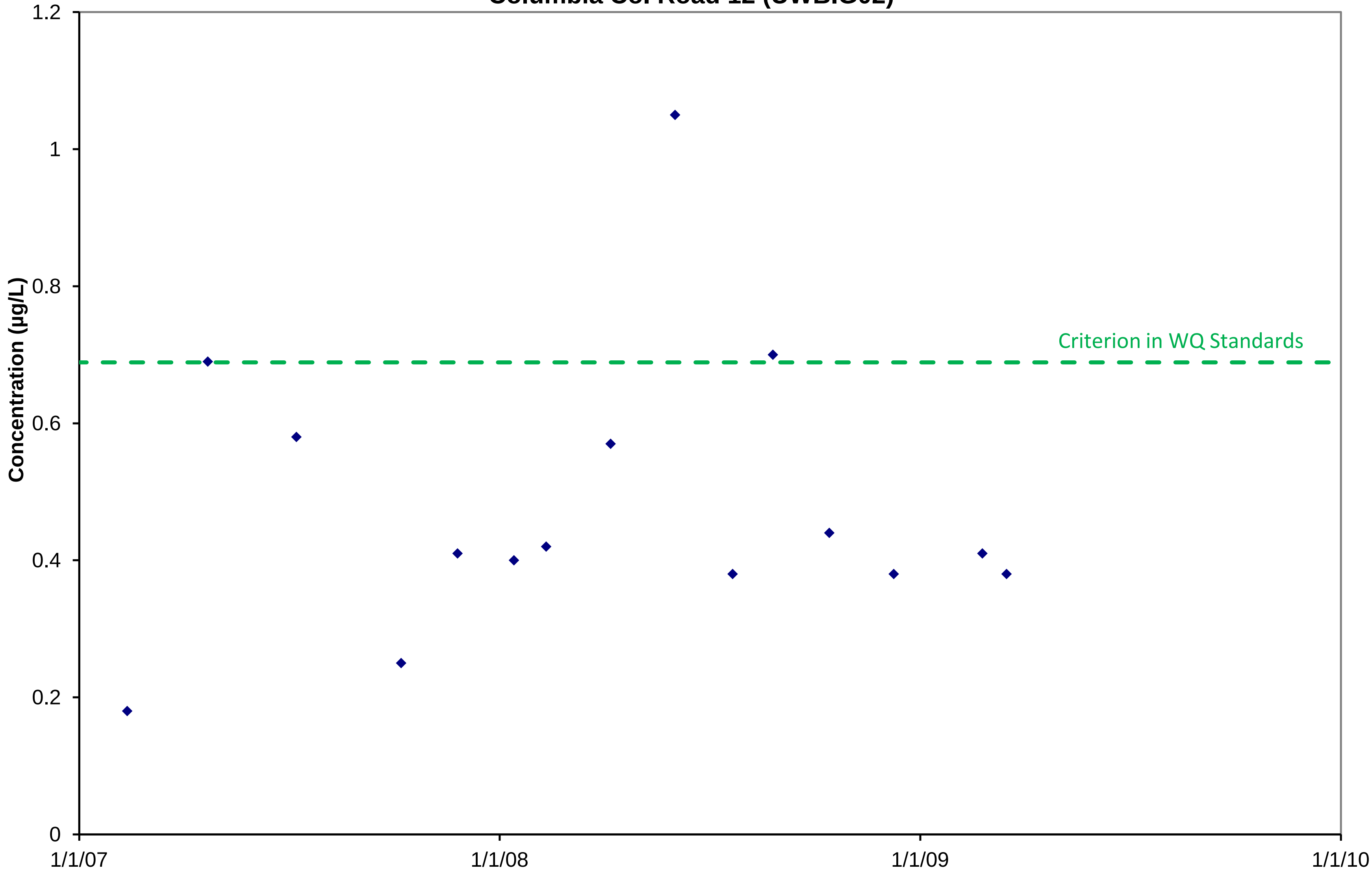


Figure B.19 Time Series Plot of Sulfate in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

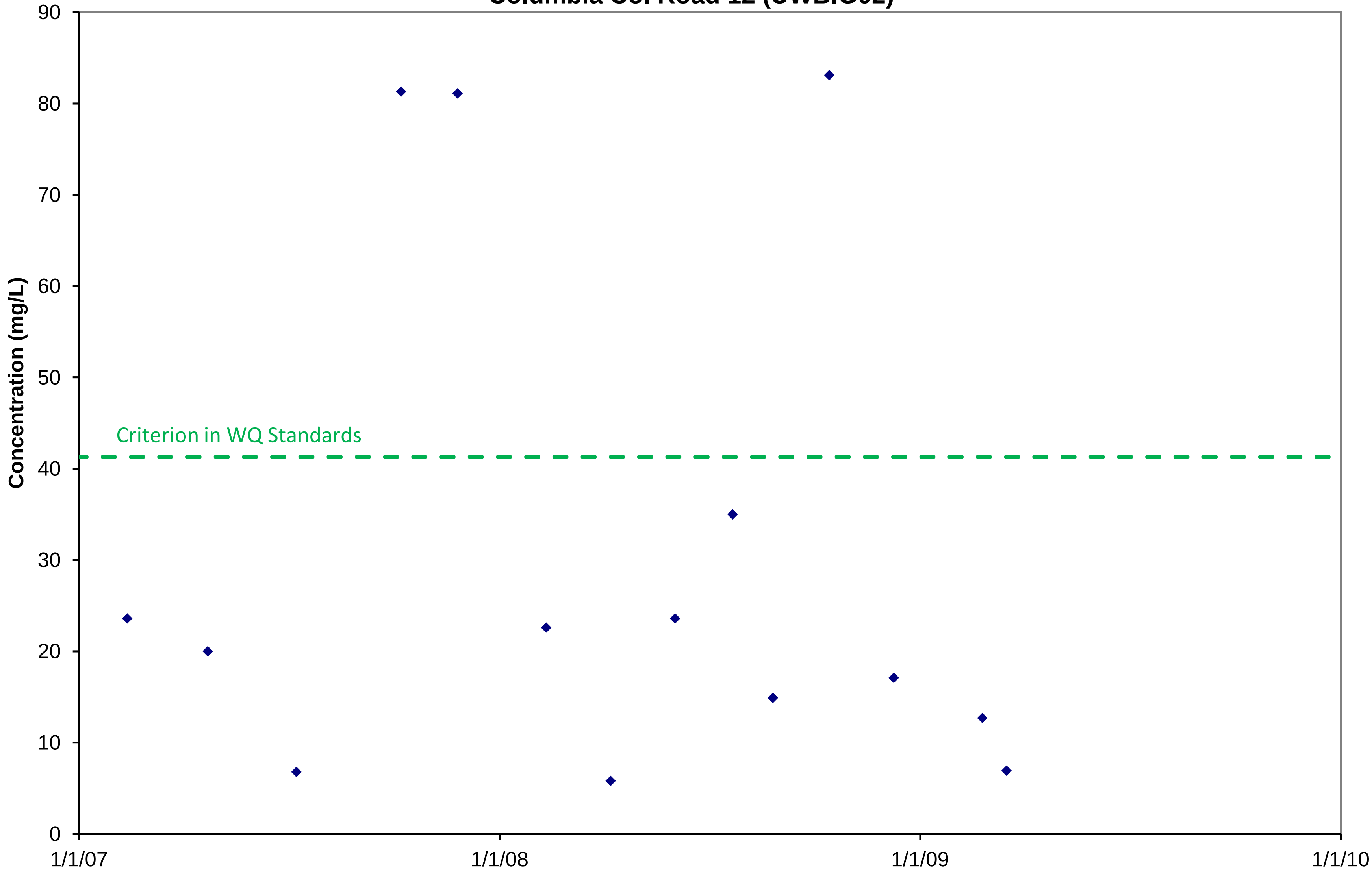


Figure B.20 Time Series Plot of Total Dissolved Solids in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

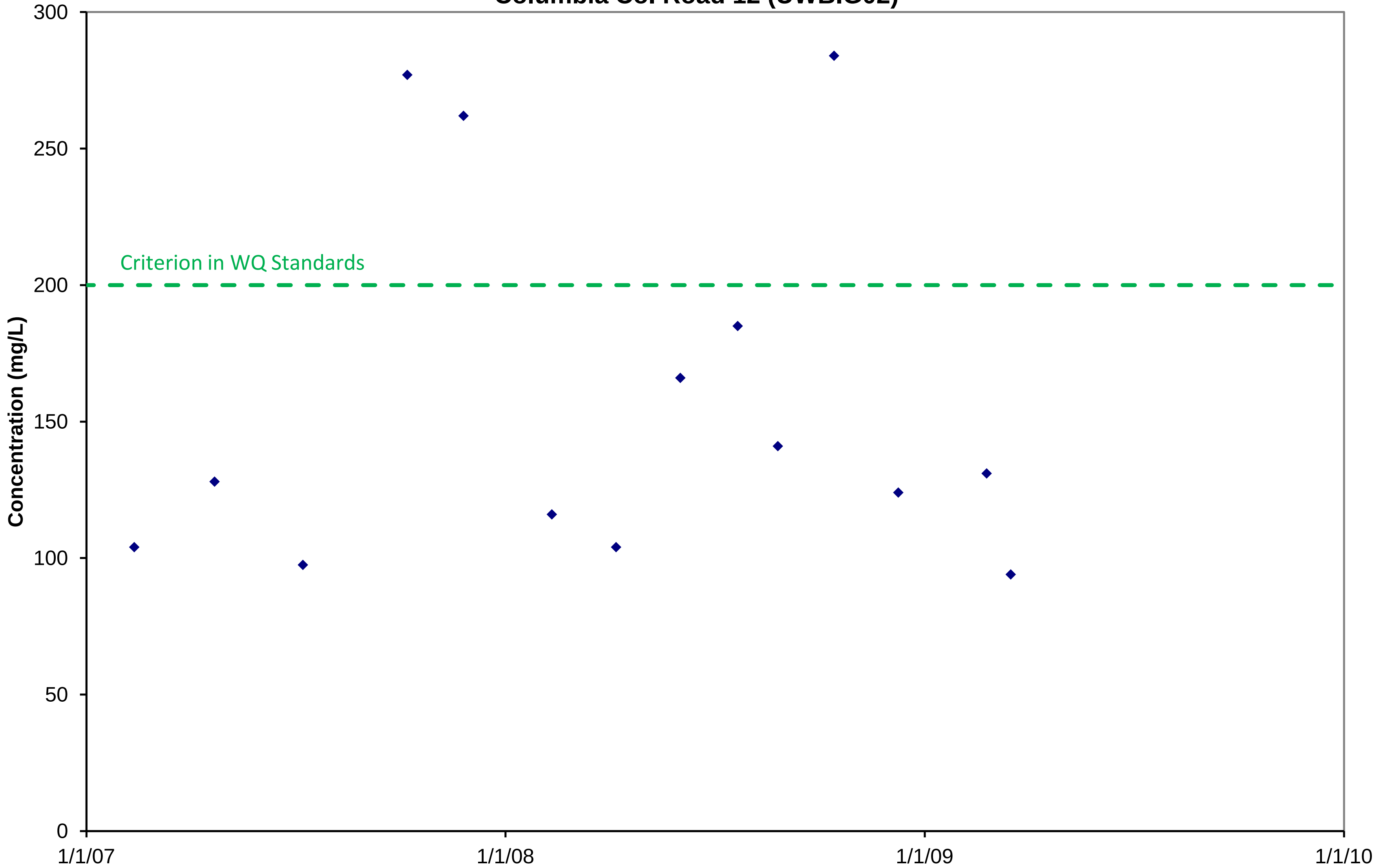


Figure B.21 Time Series Plot of Dissolved Lead in Dorcheat Bayou east of Taylor, AR (RED0015A)

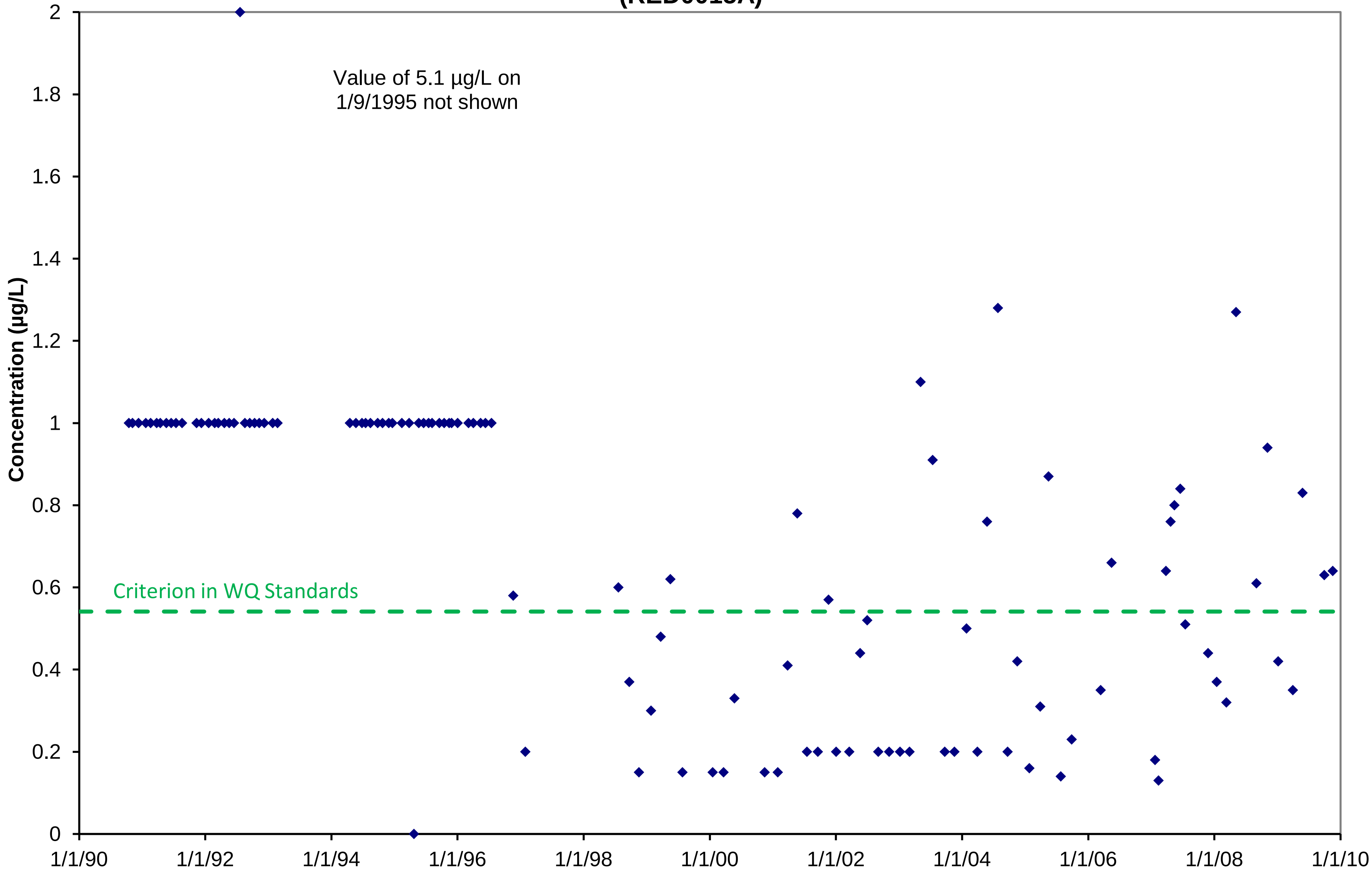


Figure B.22 Time Series Plot of Sulfate in Dorcheat Bayou east of Taylor, AR (RED0015A)

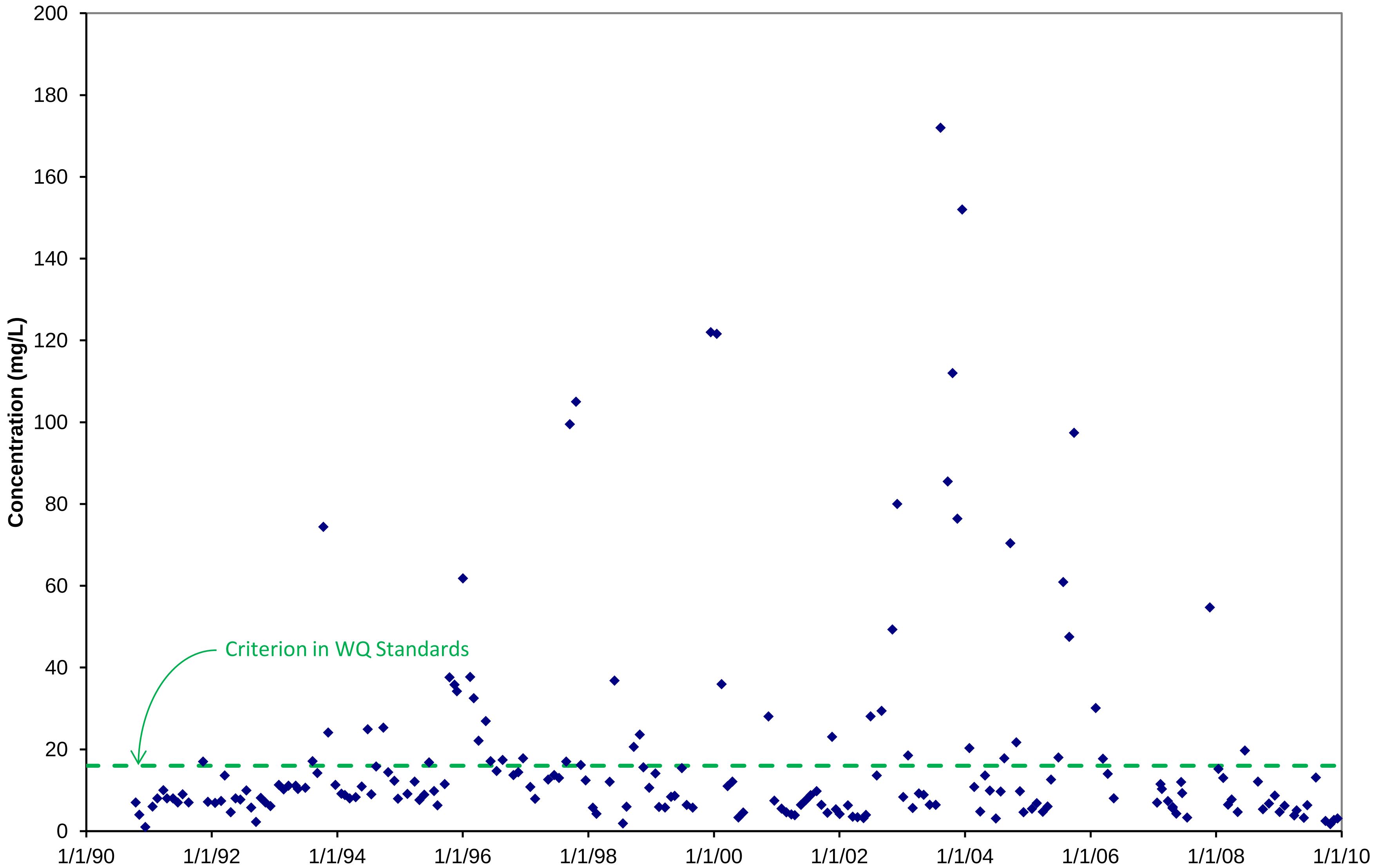


Figure B.23 Time Series Plot of pH in Dorcheat Bayou east of Taylor, AR (RED0015A)

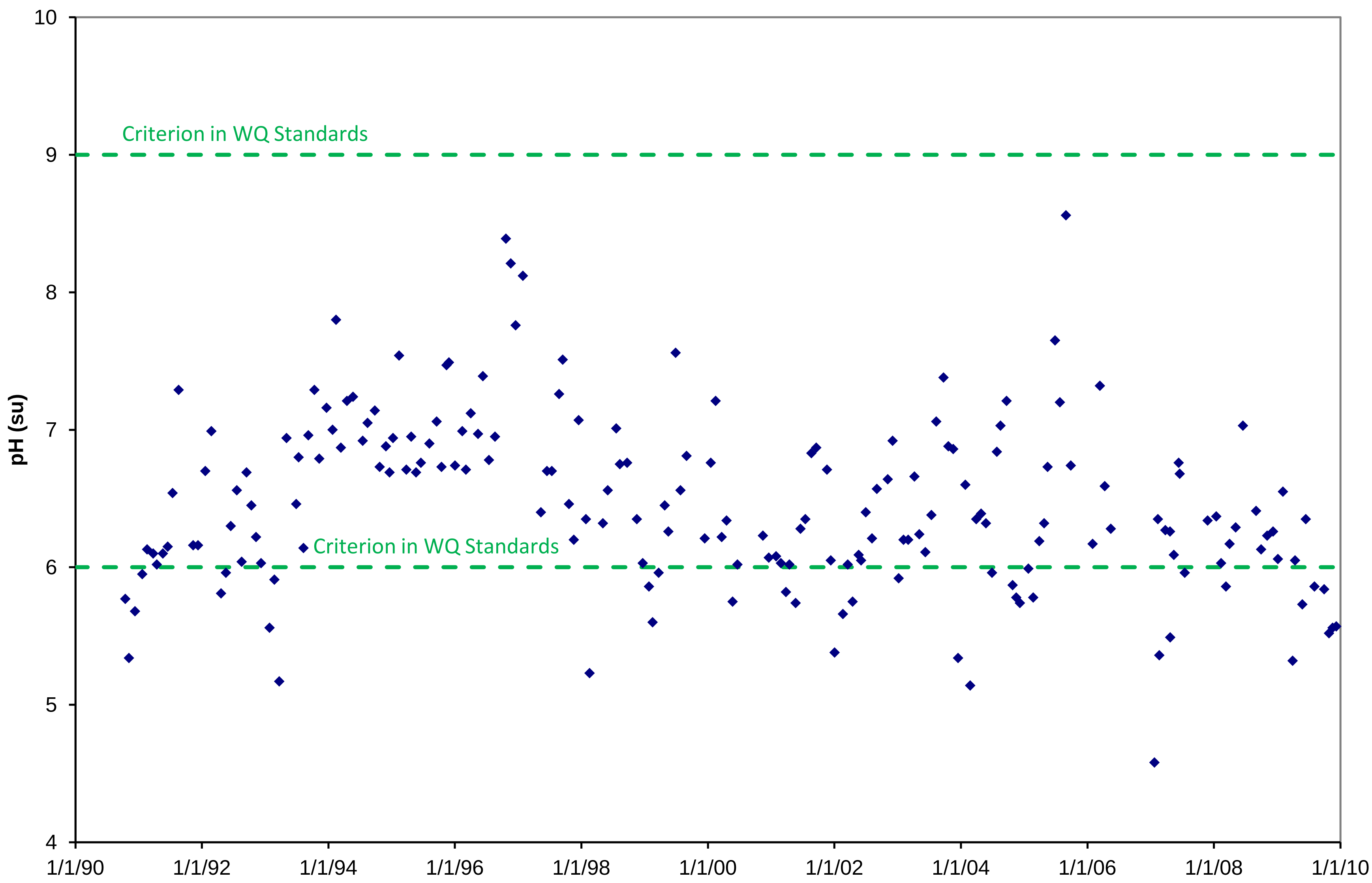


Figure B.24 Time Series Plot of Dissolved Lead in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)

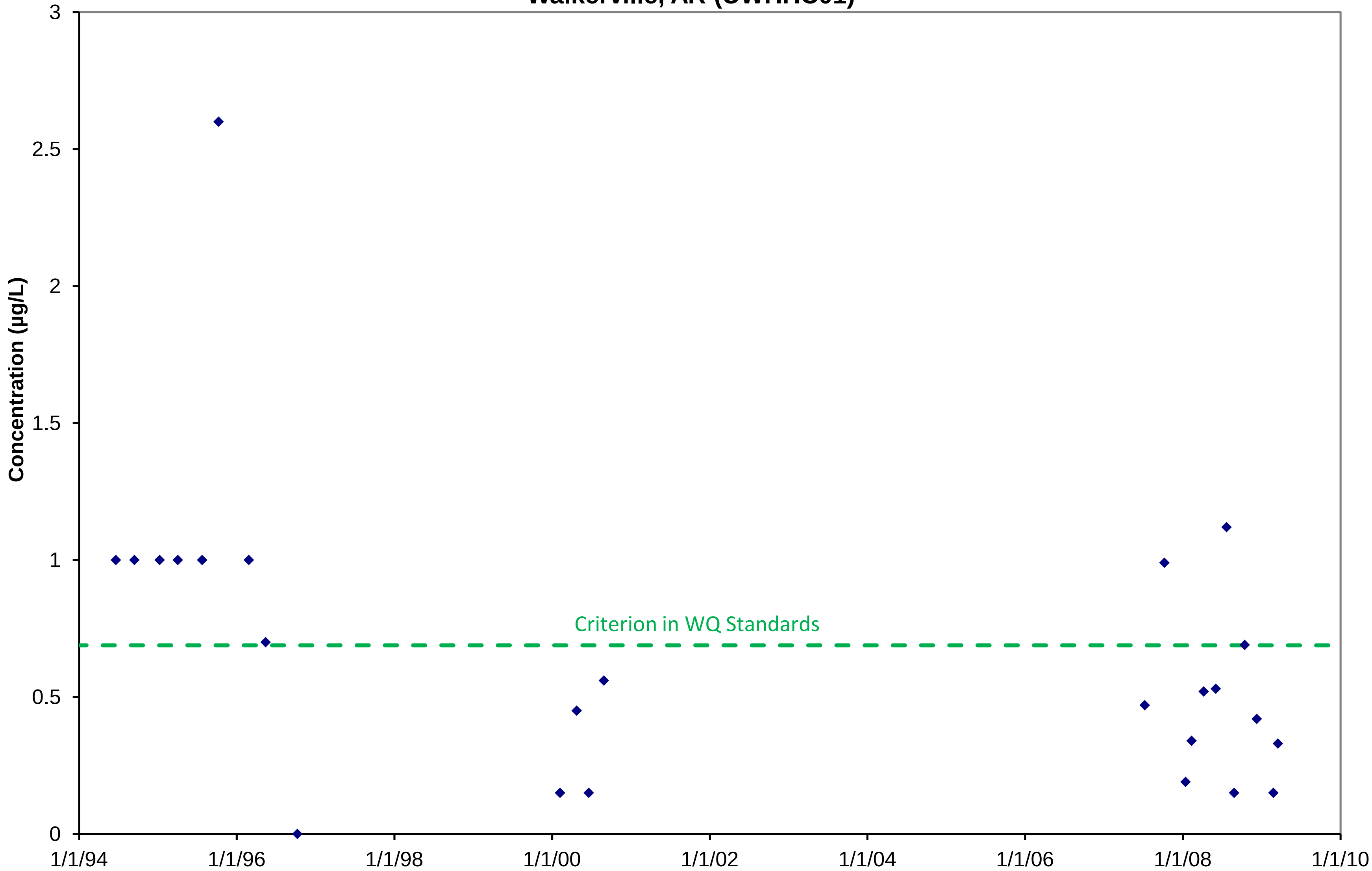
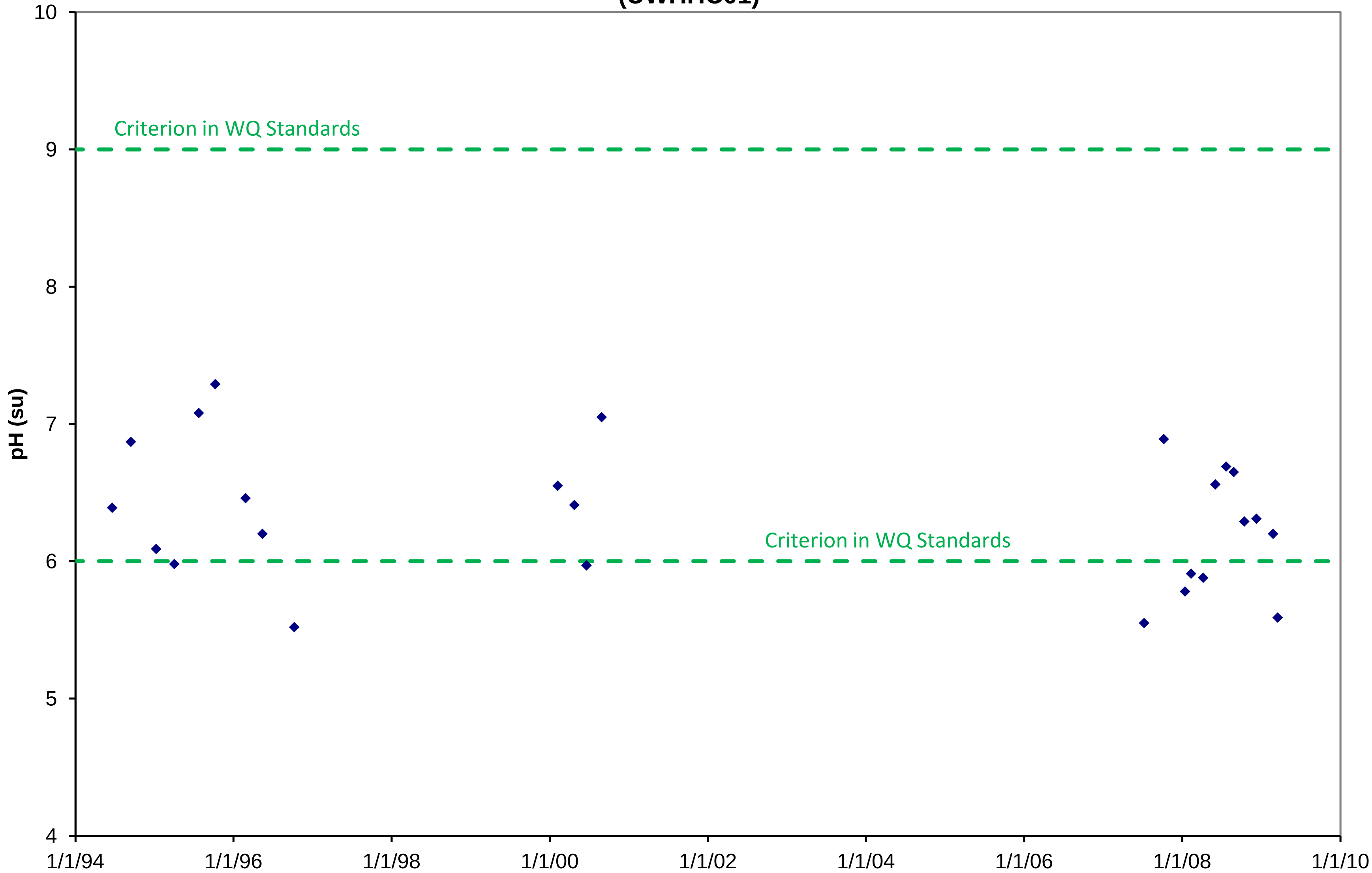


Figure B.25 Time Series Plot of pH in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)



APPENDIX C

Seasonal Plots of Water Quality Data

Figure C.1 Seasonal Plot of Lead in Bodcau Creek near Falcon, AR (RED0057)

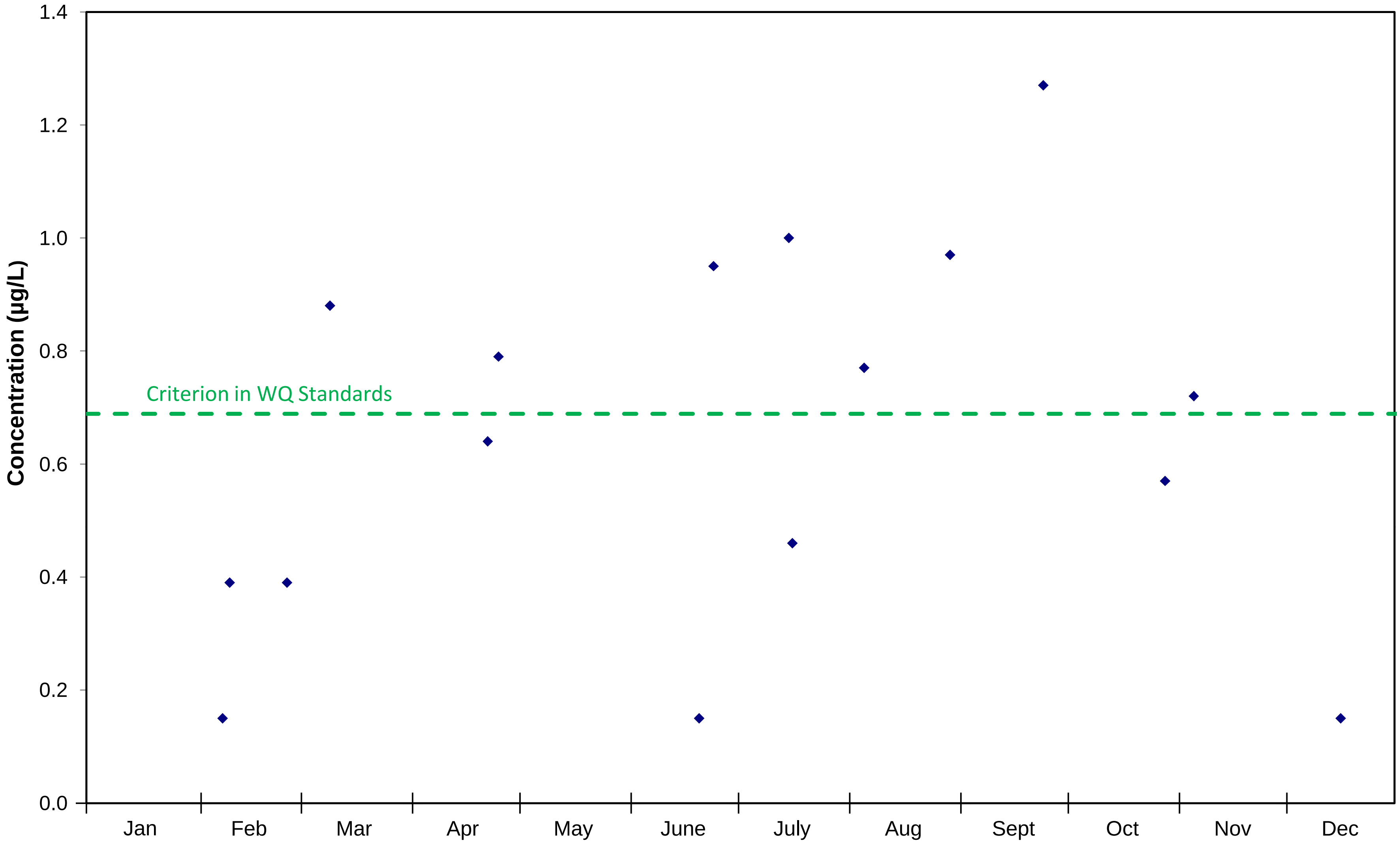


Figure C.2 Seasonal Plot of Dissolved Lead in Little Bodcau Creek near Piney Grove, AR (RED0056)

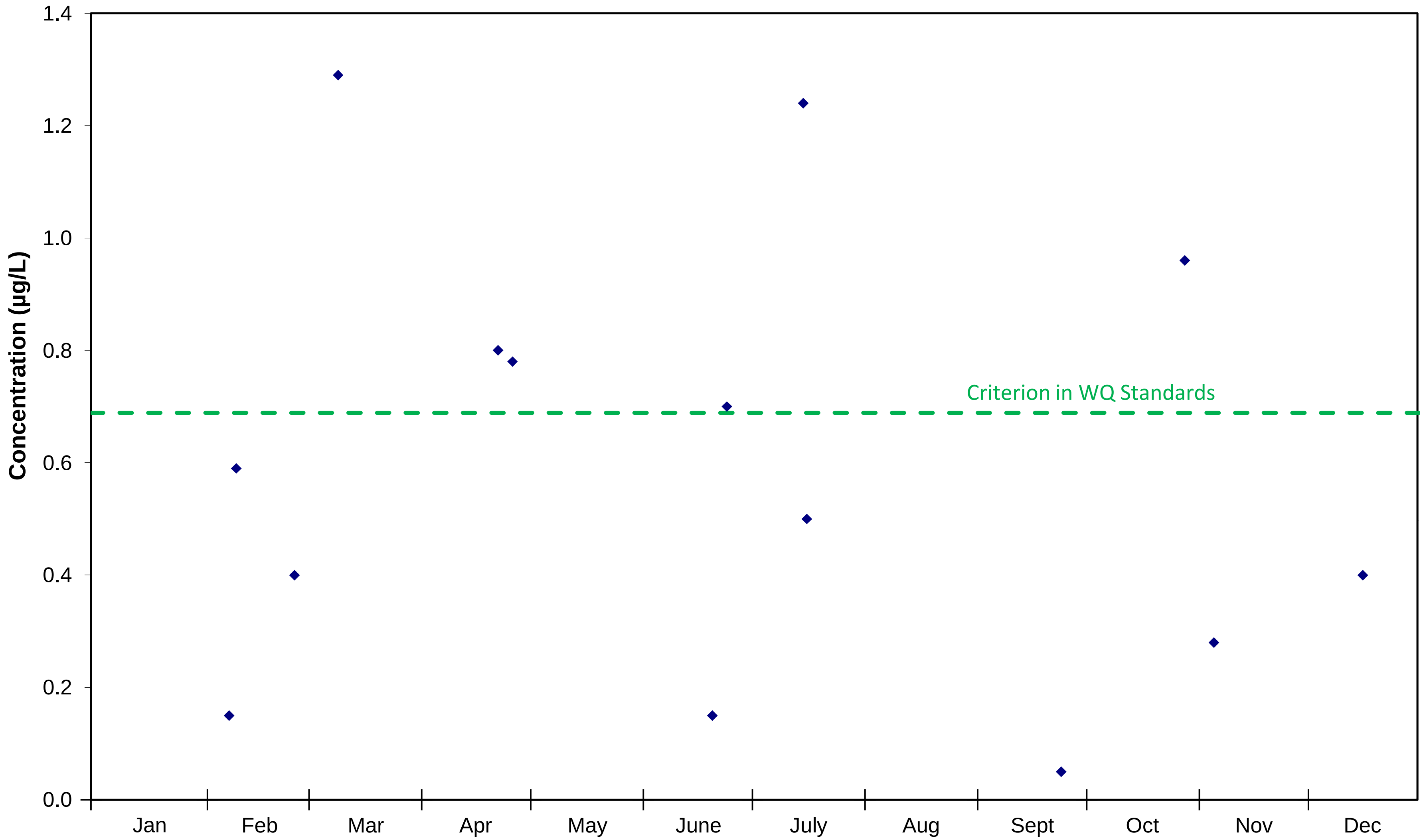


Figure C.3 Seasonal Plot of Dissolved Copper in Bodcau Creek near Lewisville (RED0027)

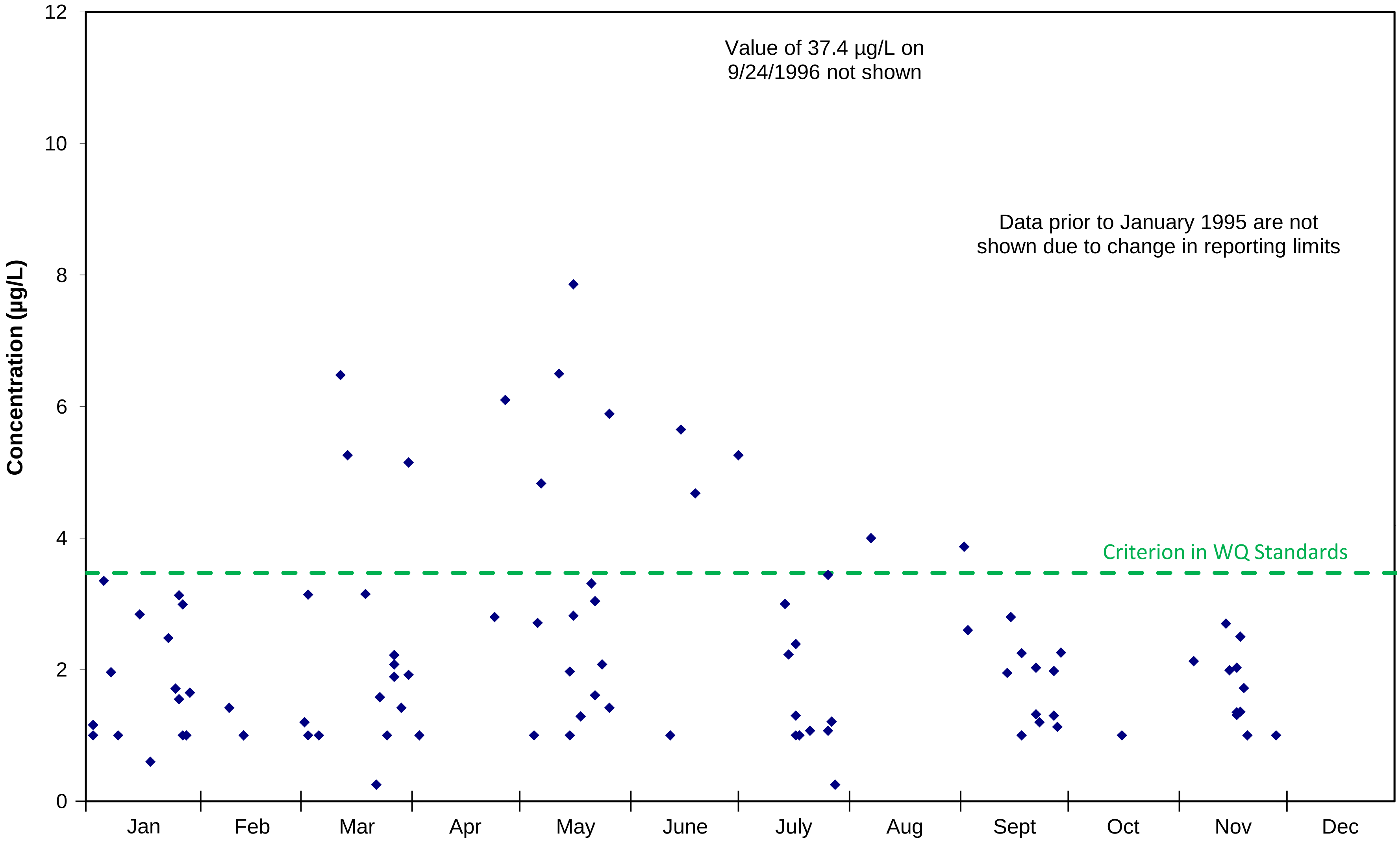


Figure C.4 Seasonal Plot of Dissolved Lead in Bodcau Creek near Lewisville (RED0027)

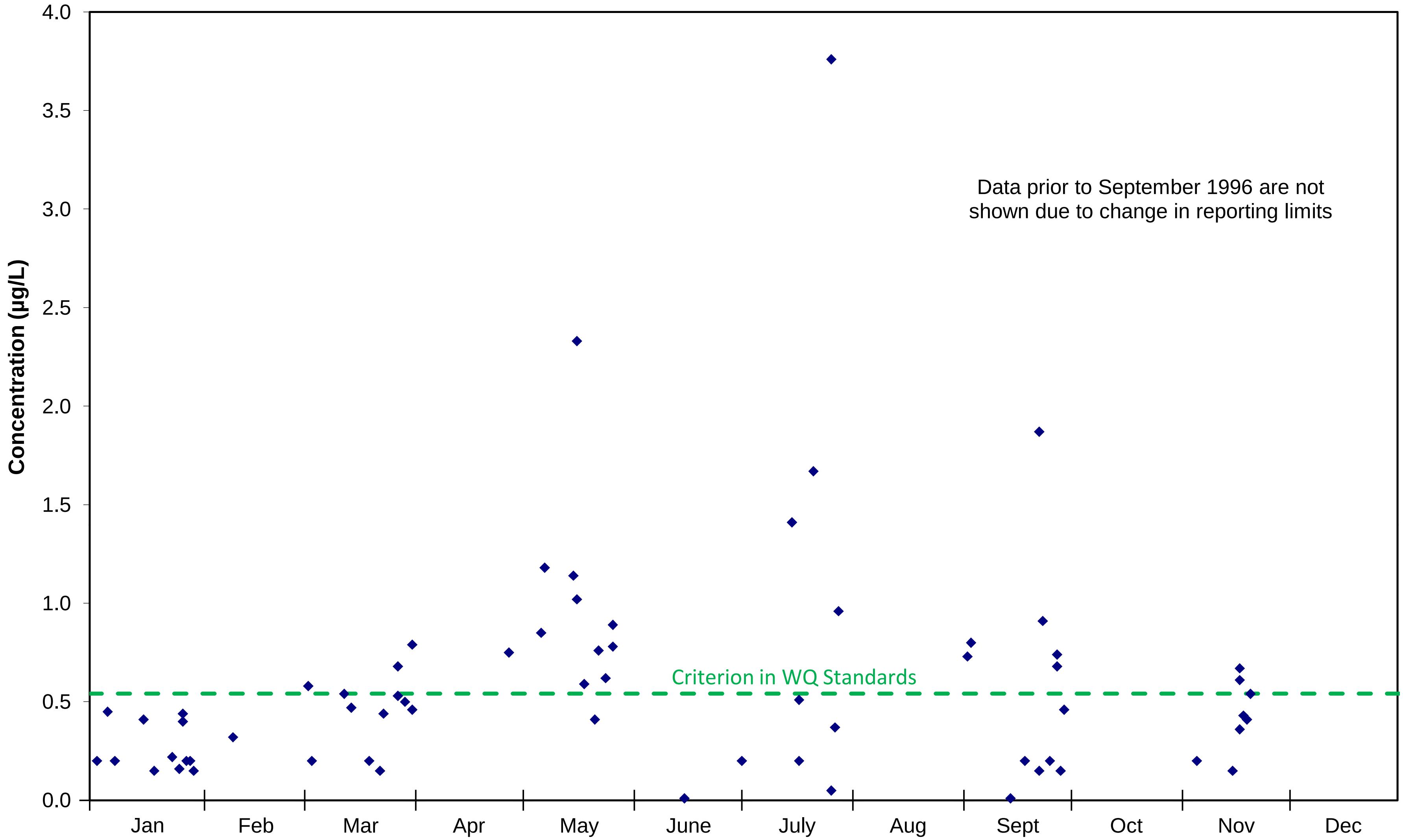


Figure C.5 Seasonal Plot of Turbidity in Bodcau Creek near Lewisville (RED0027)

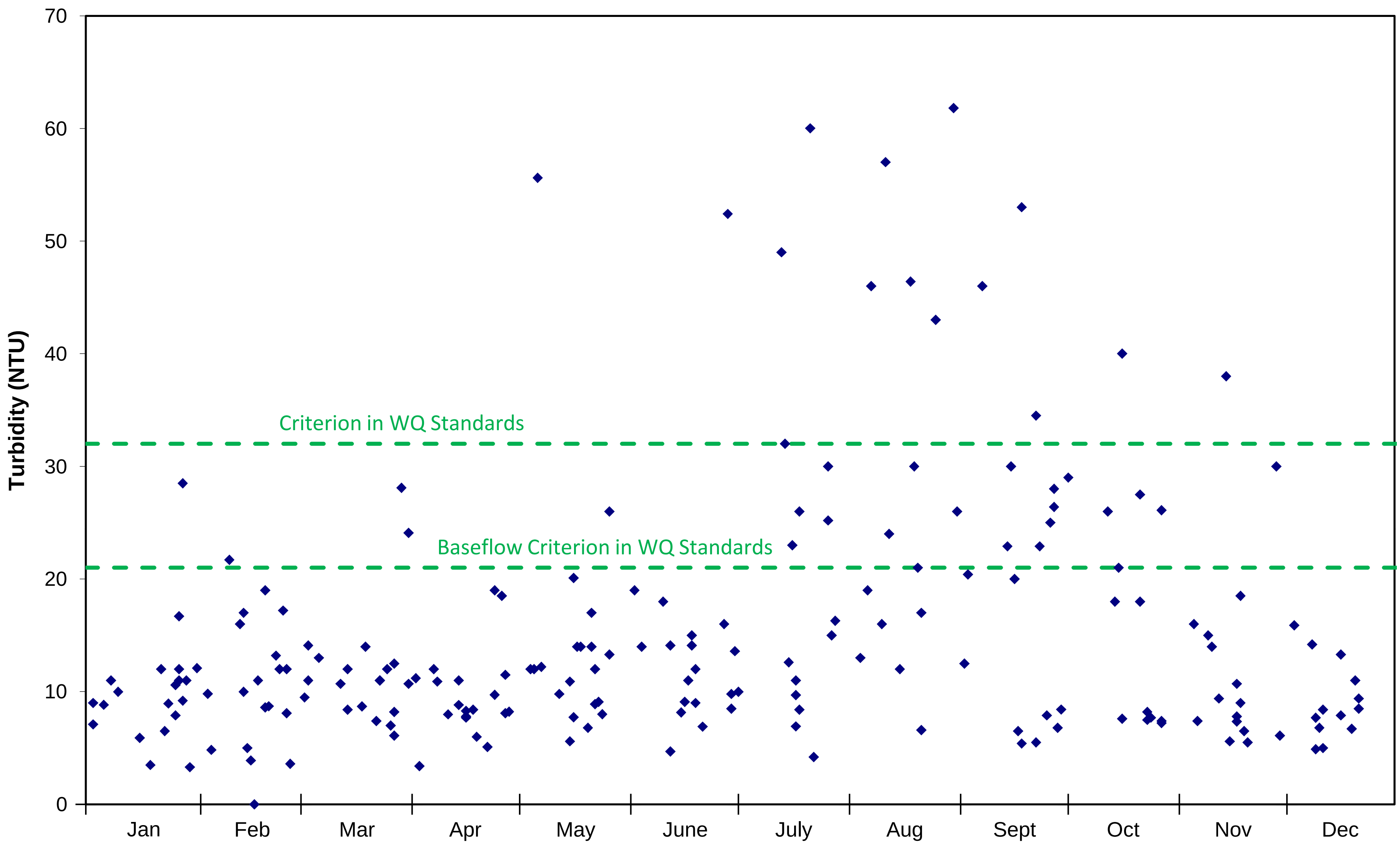


Figure C.6 Seasonal Plot of TSS in Bodcau Creek near Lewisville (RED0027)

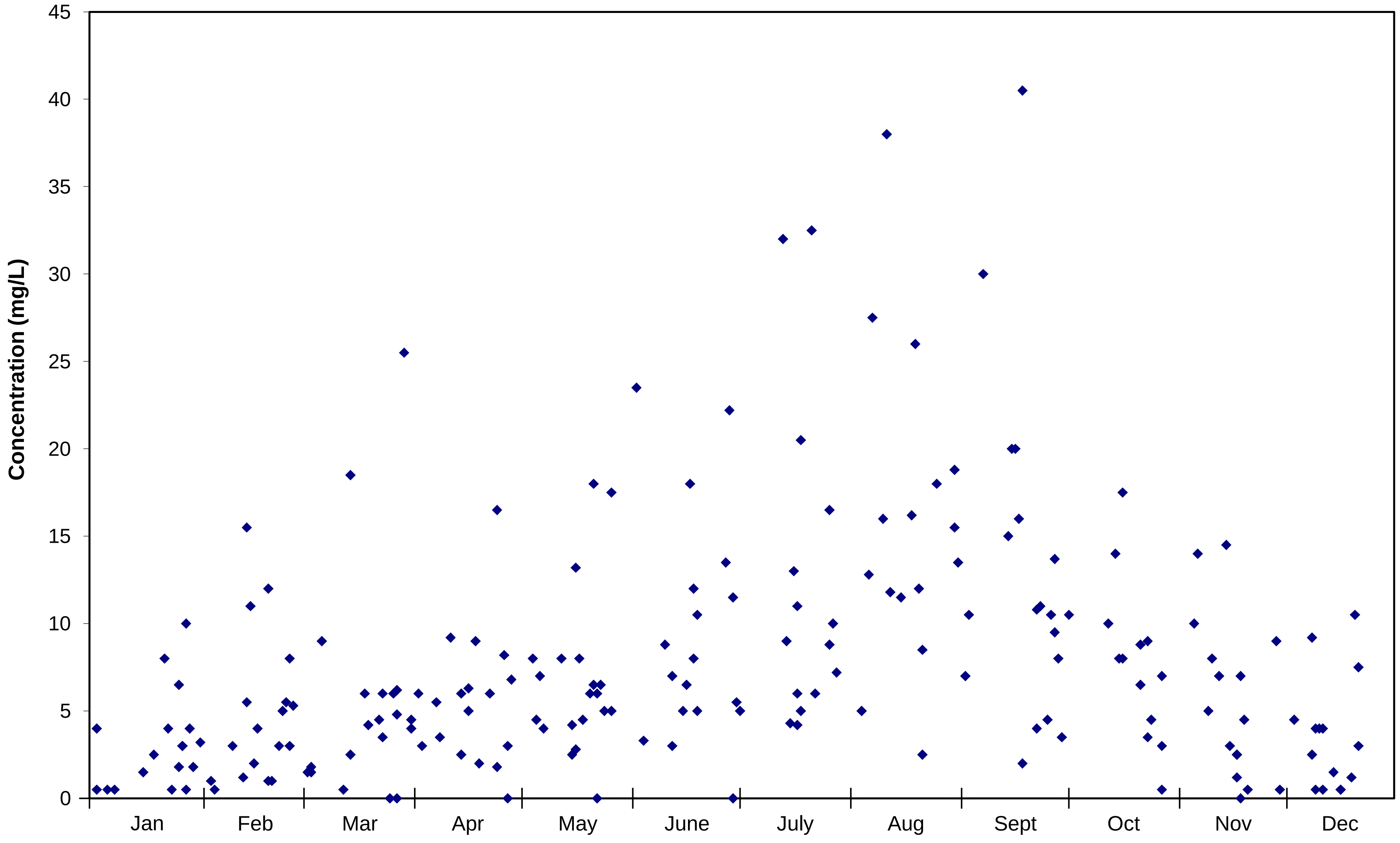


Figure C.7 Seasonal Plot of pH in Bodcau Creek near Lewisville (RED0027)

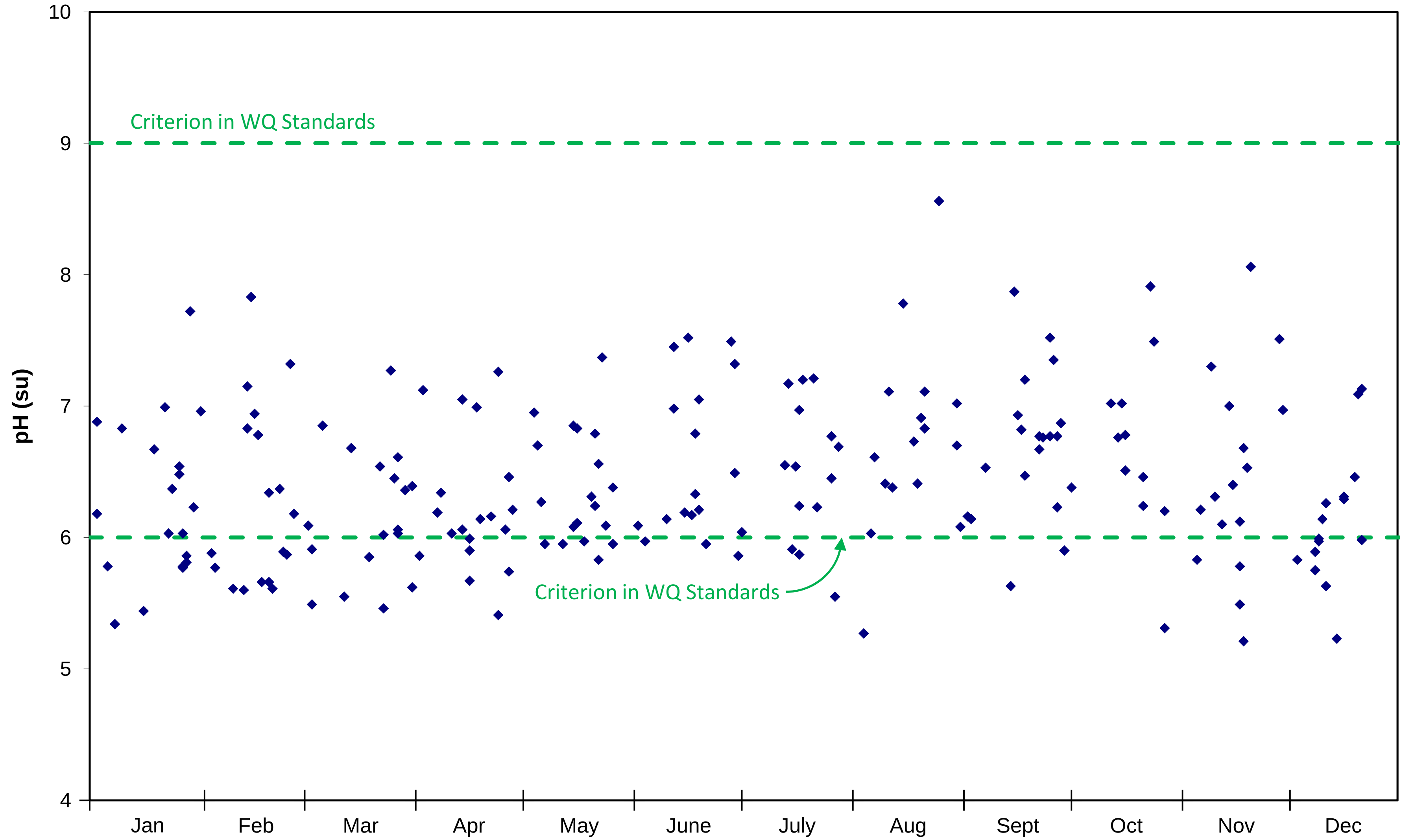


Figure C.8 Seasonal Plot of Dissolved Lead in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)

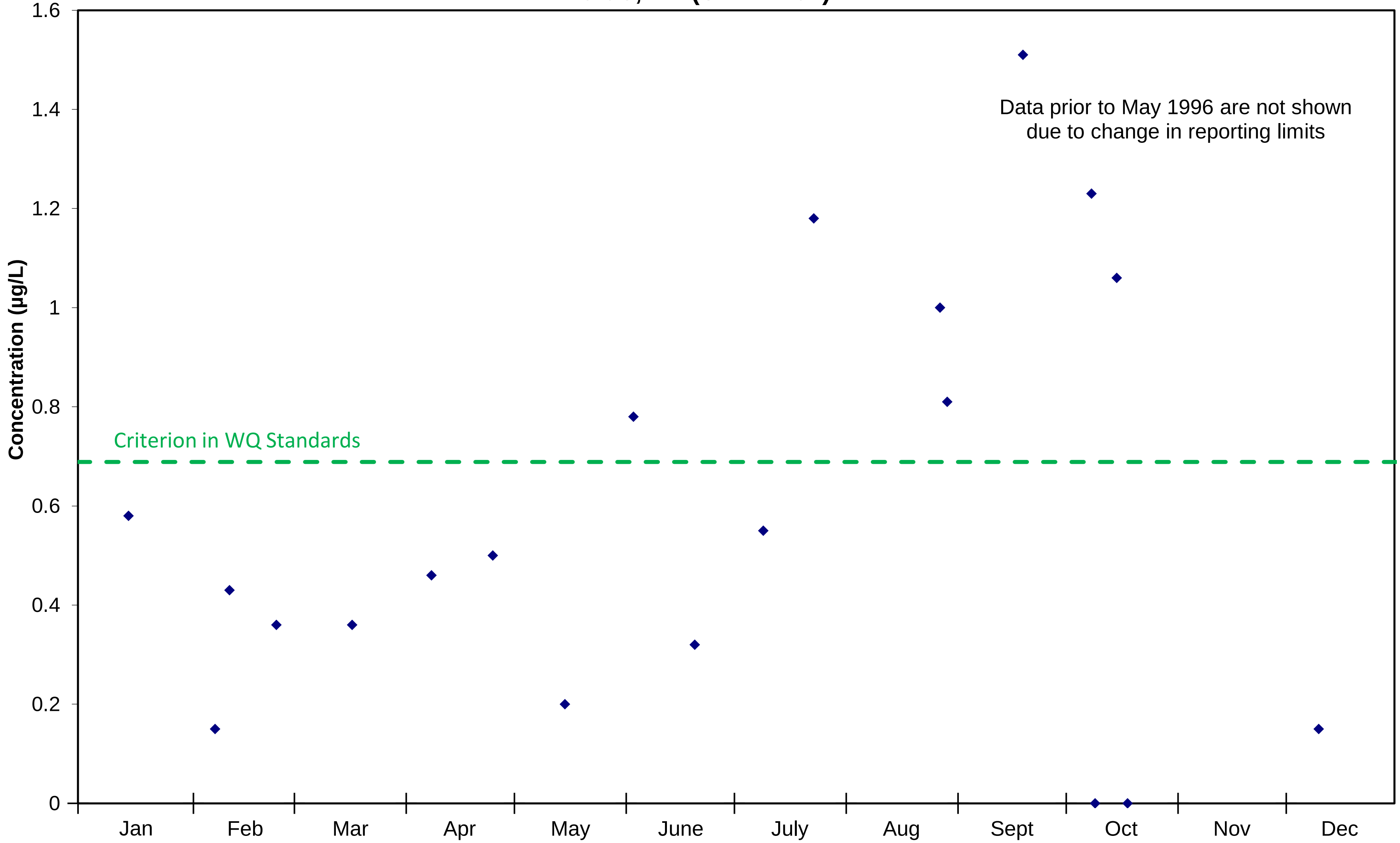


Figure C.9 Seasonal Plot of pH in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)

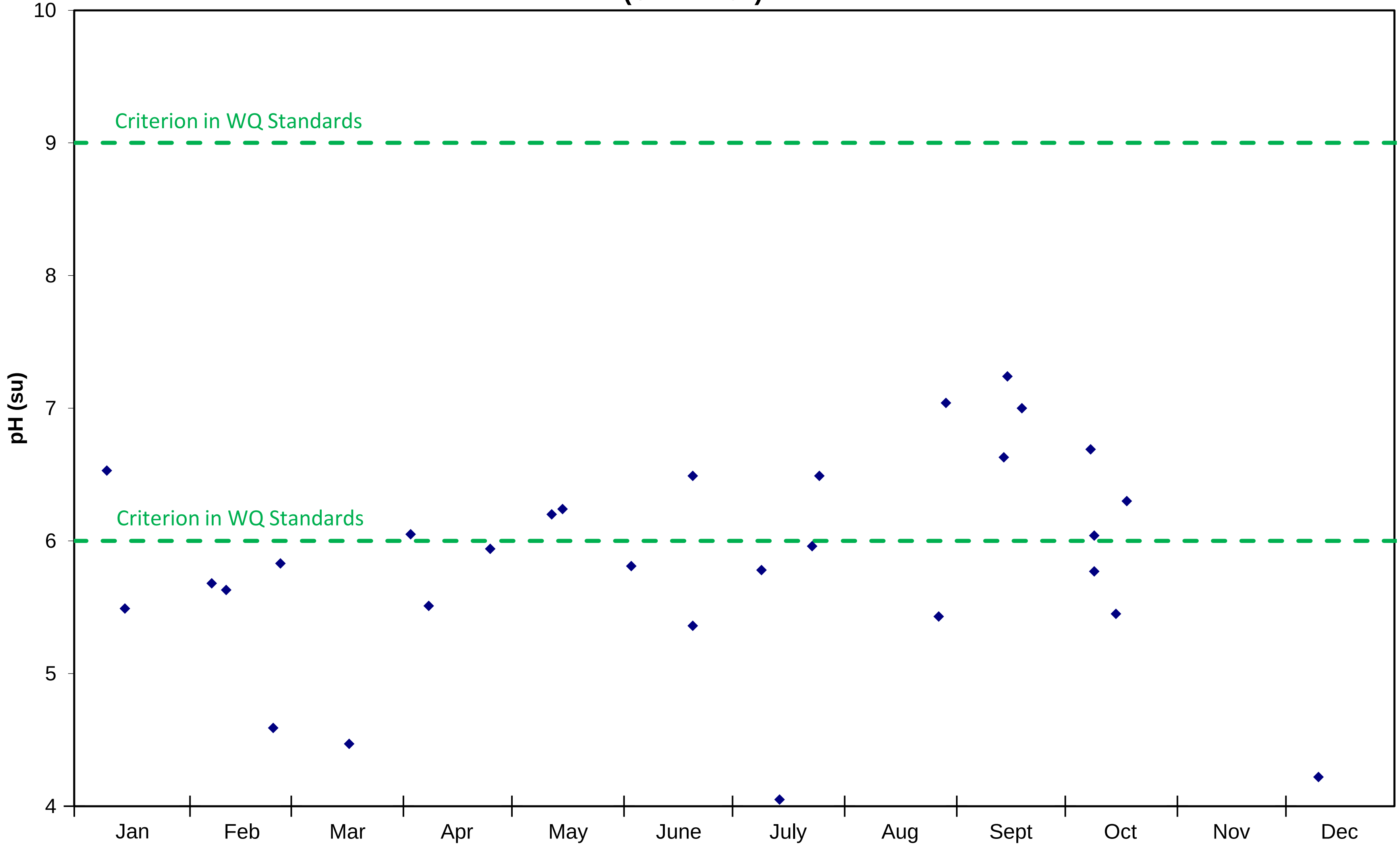


Figure C.10 Seasonal Plot of Dissolved Lead in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

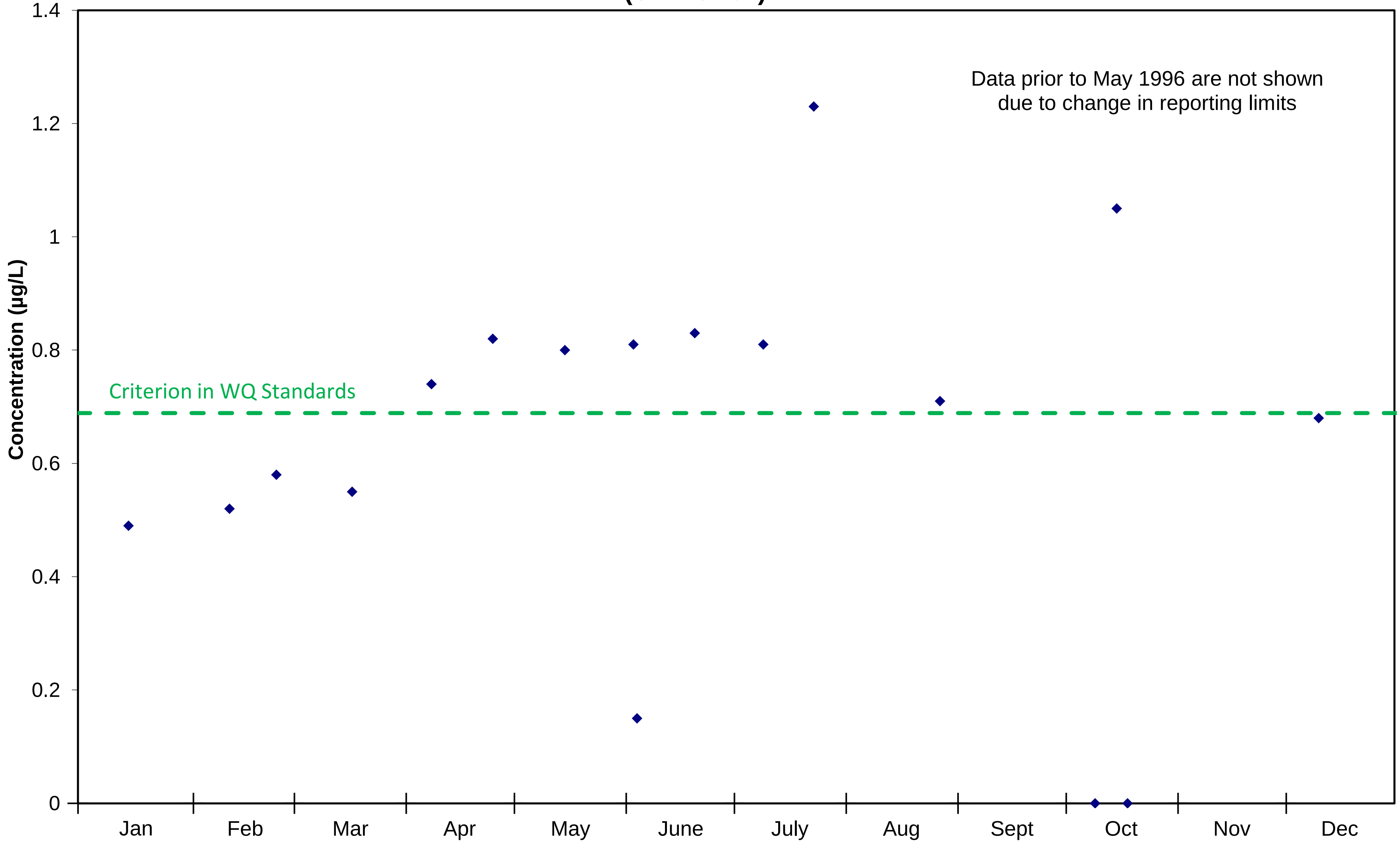


Figure C.11 Seasonal Plot of Turbidity in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

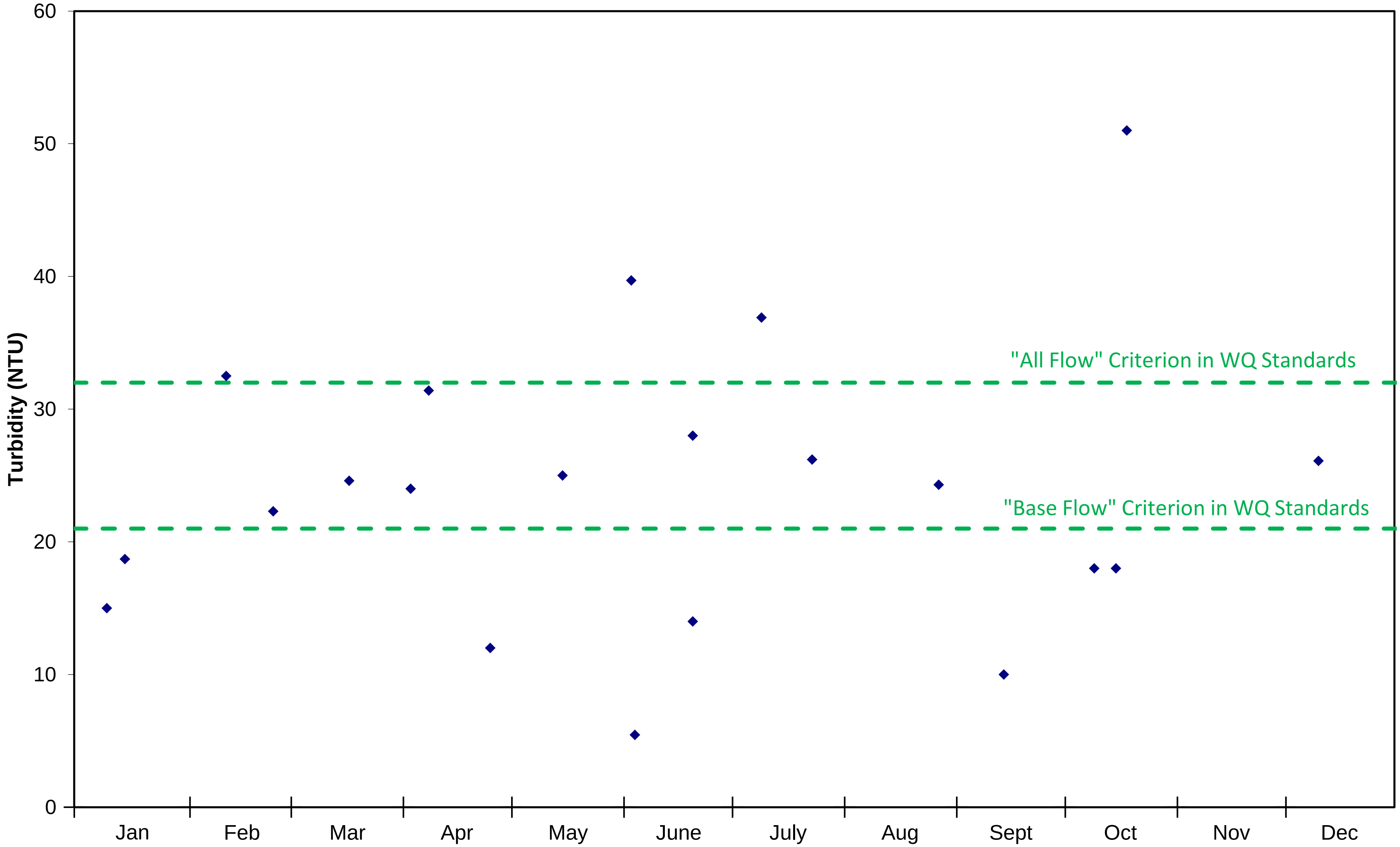


Figure C.12 Seasonal Plot of Total Suspended Solids in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

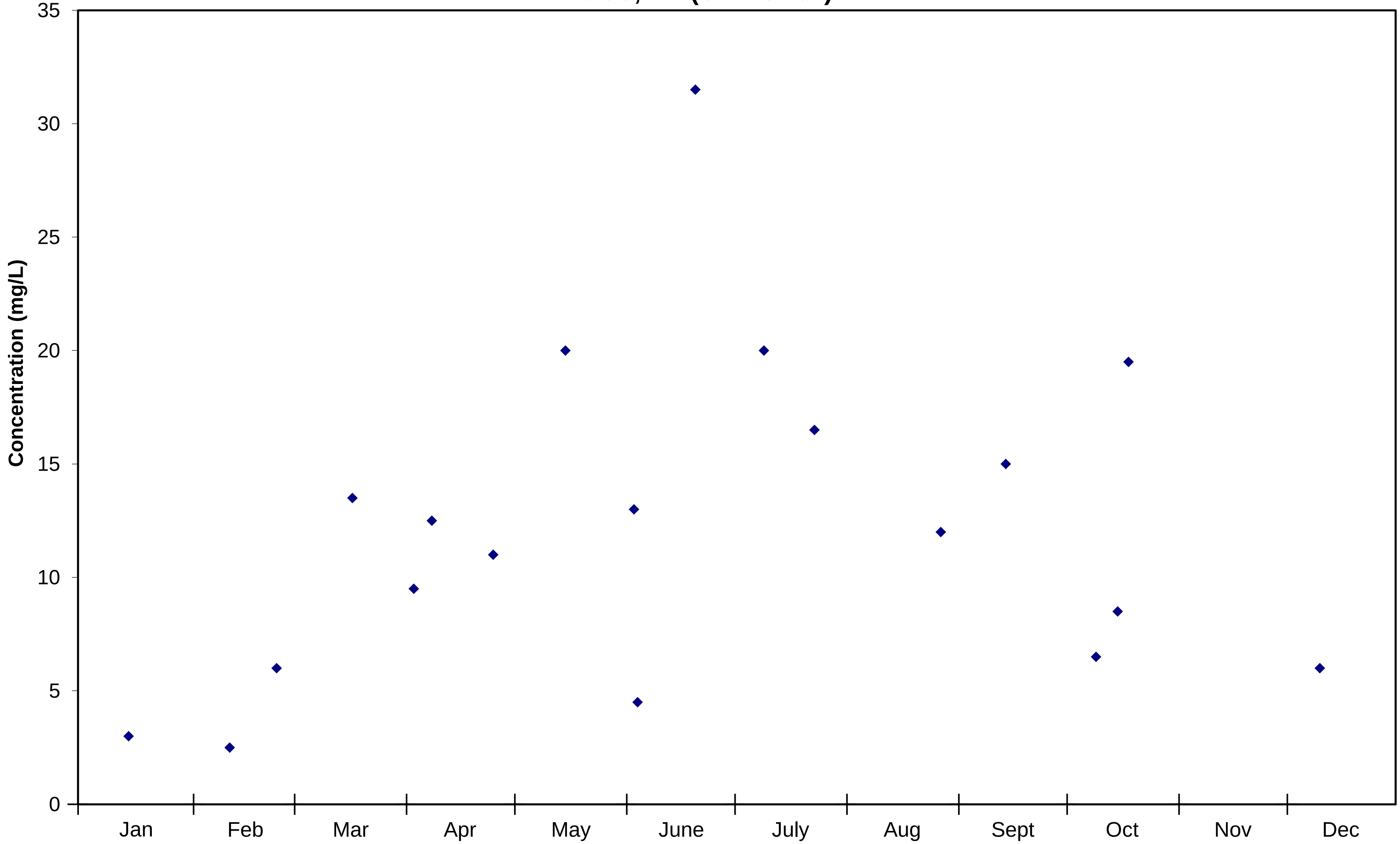


Figure C.13 Seasonal Plot of Dissolved Oxygen in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

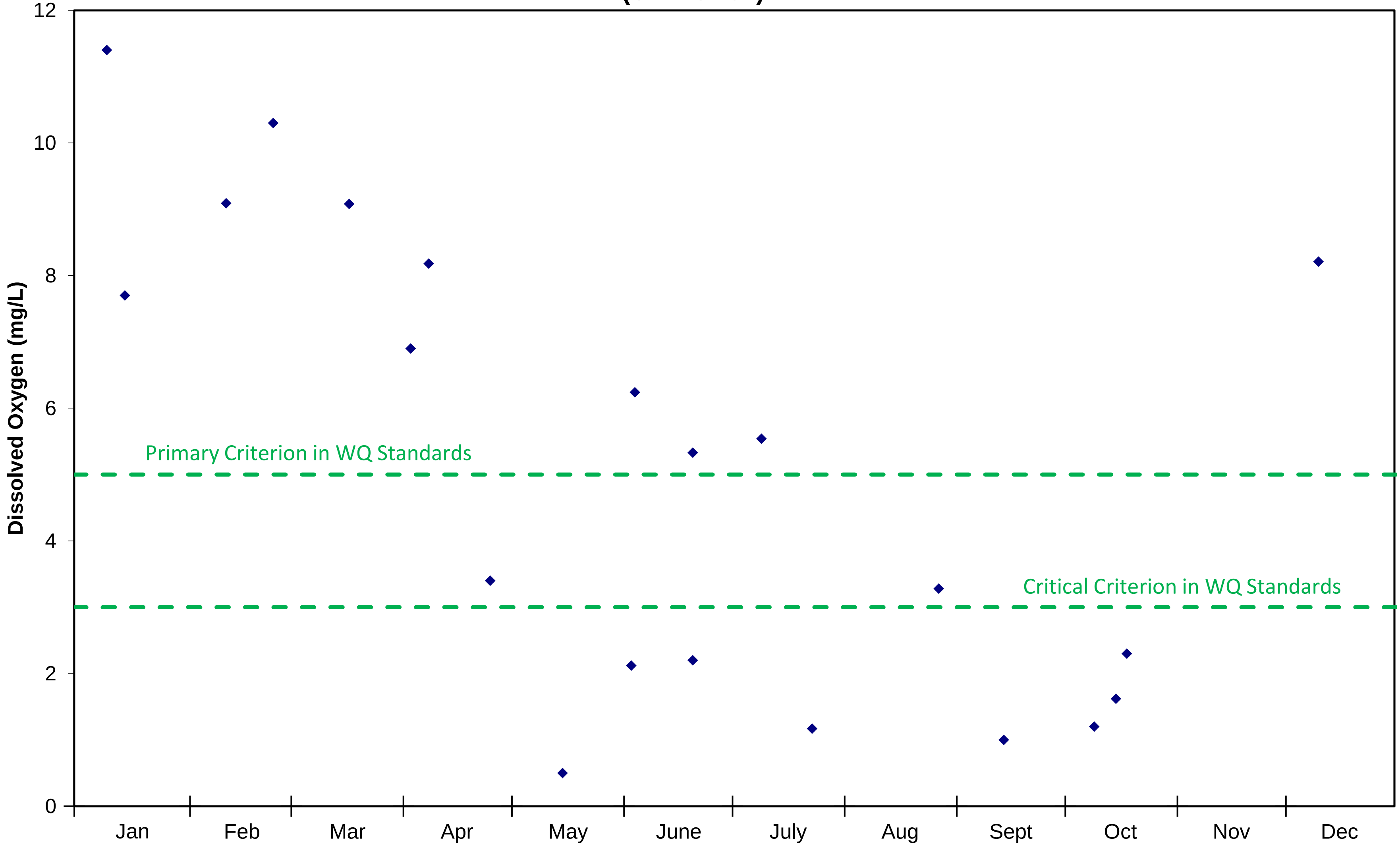


Figure C.14 Seasonal Plot of pH in Bayou Dorcheat near Magnolia, AR (RED0065)

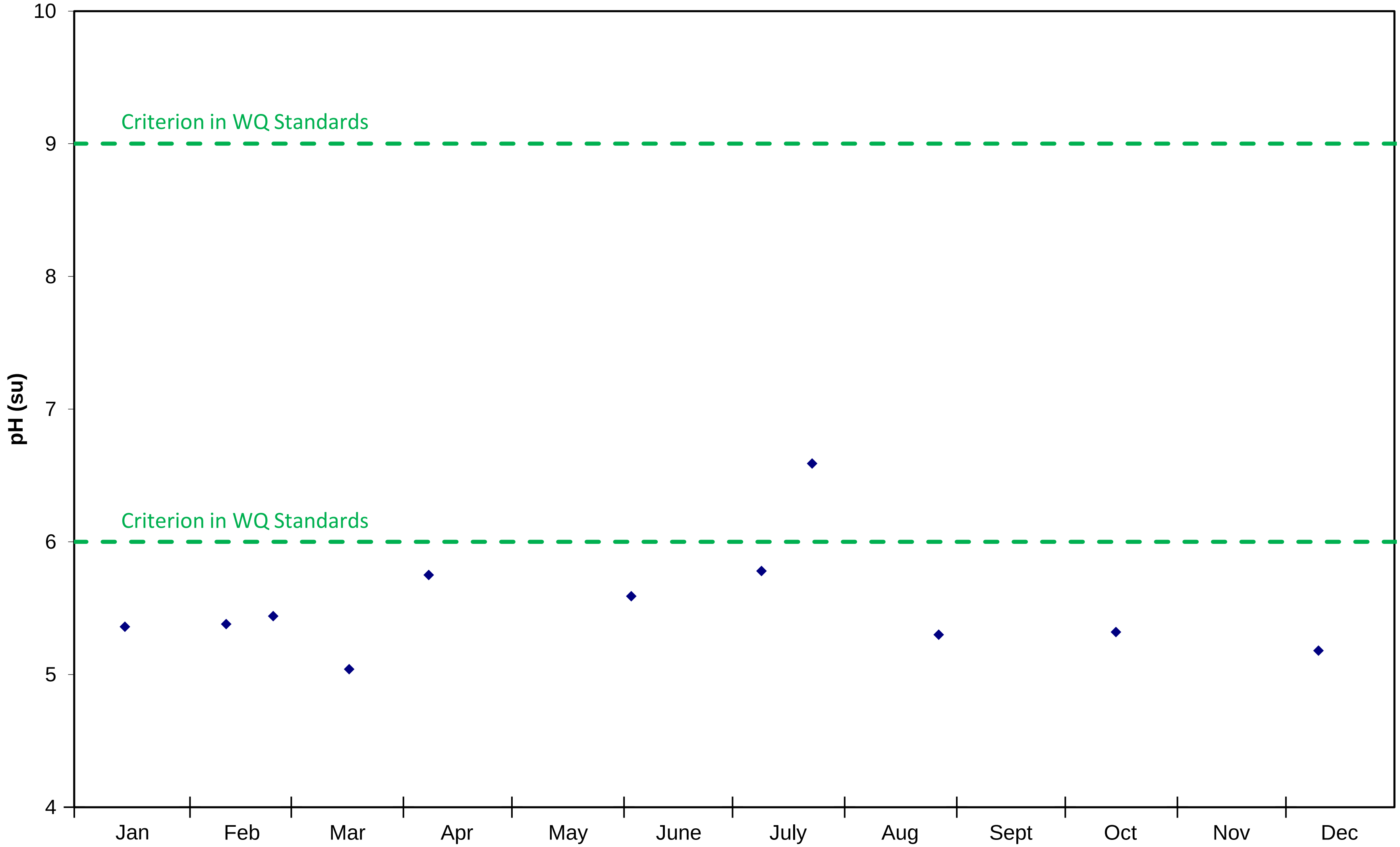


Figure C.15 Seasonal Plot of Dissolved Lead in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)

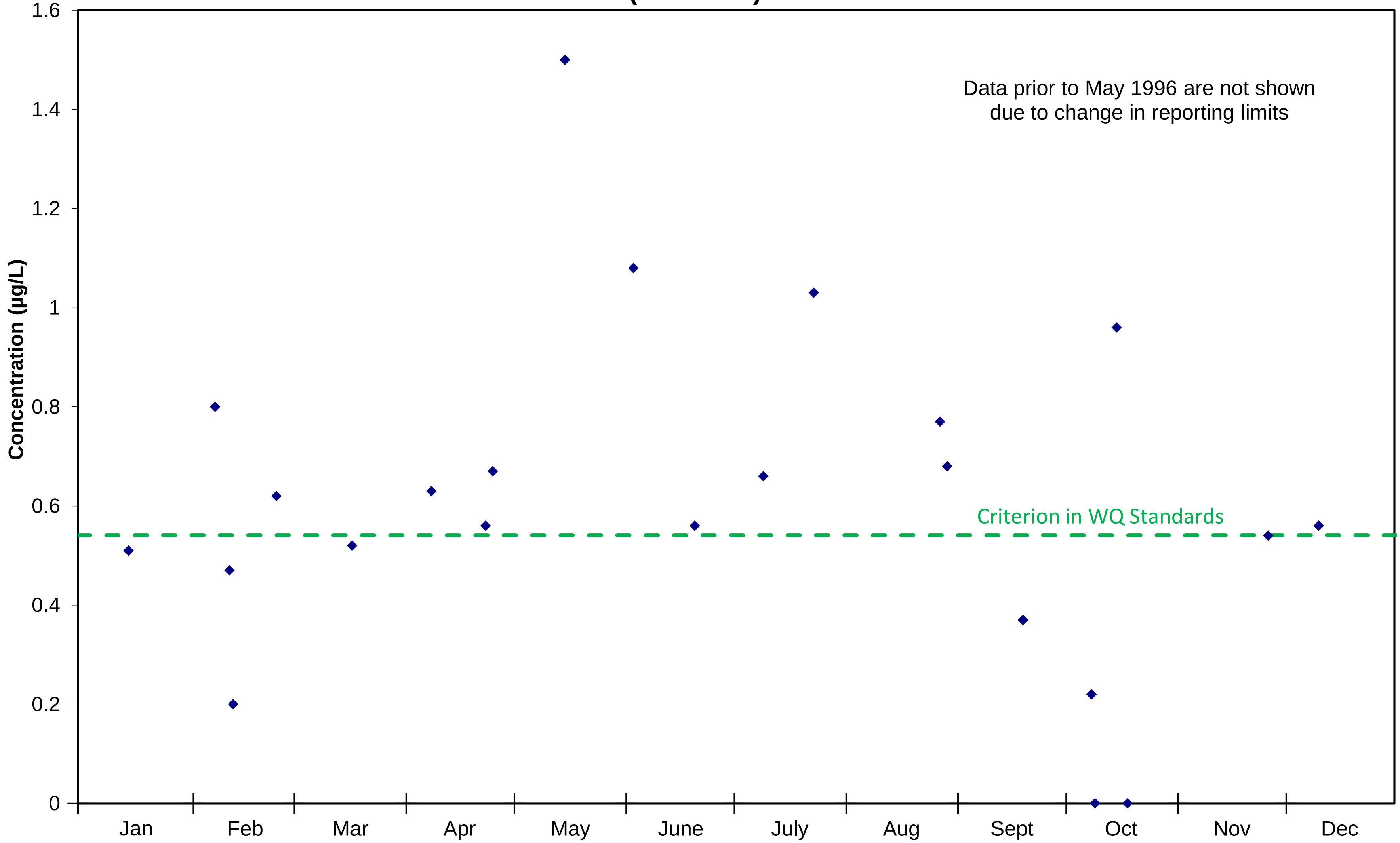


Figure C.16 Seasonal Plot of pH in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)

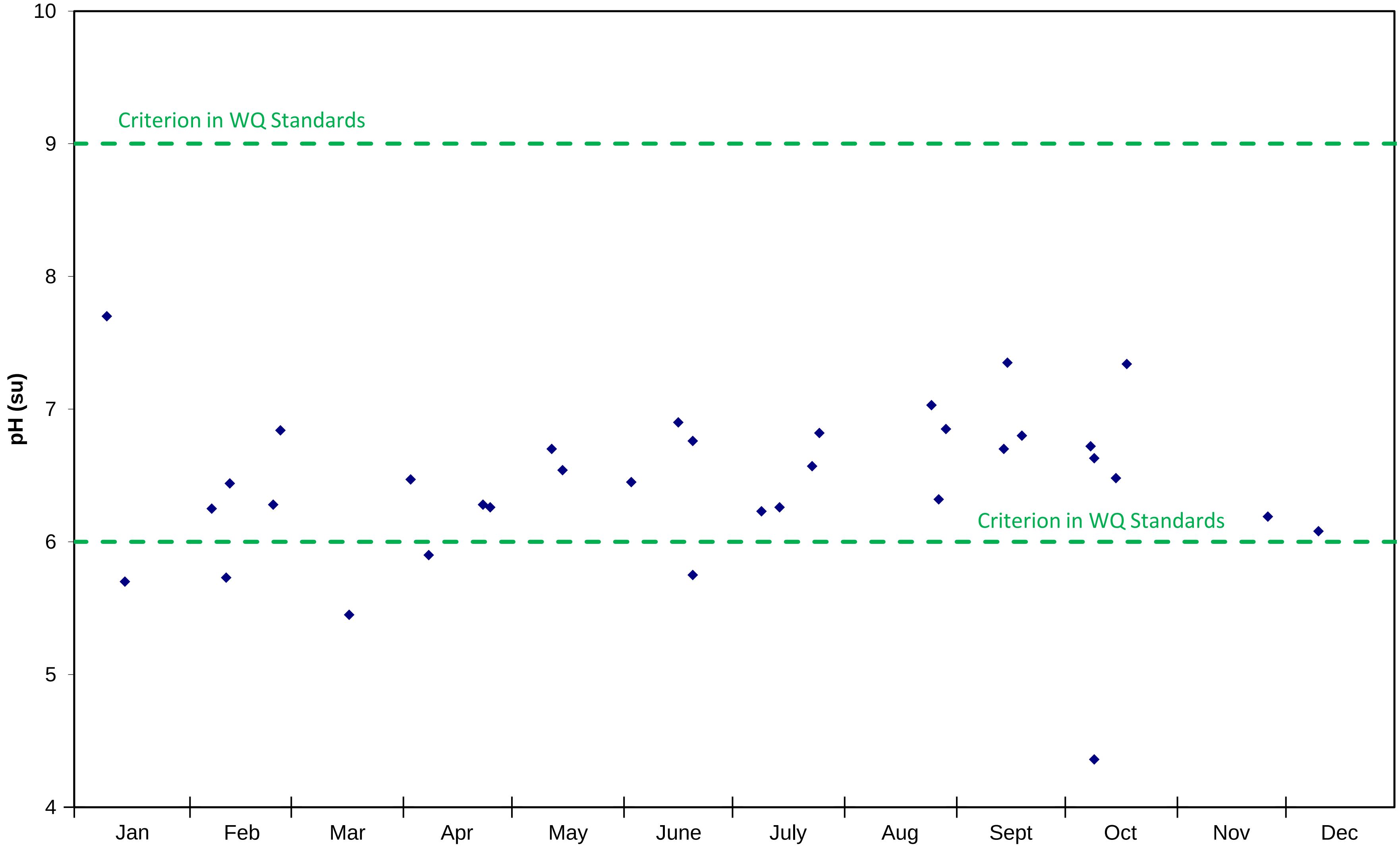


Figure C.17 Seasonal Plot of Chloride in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

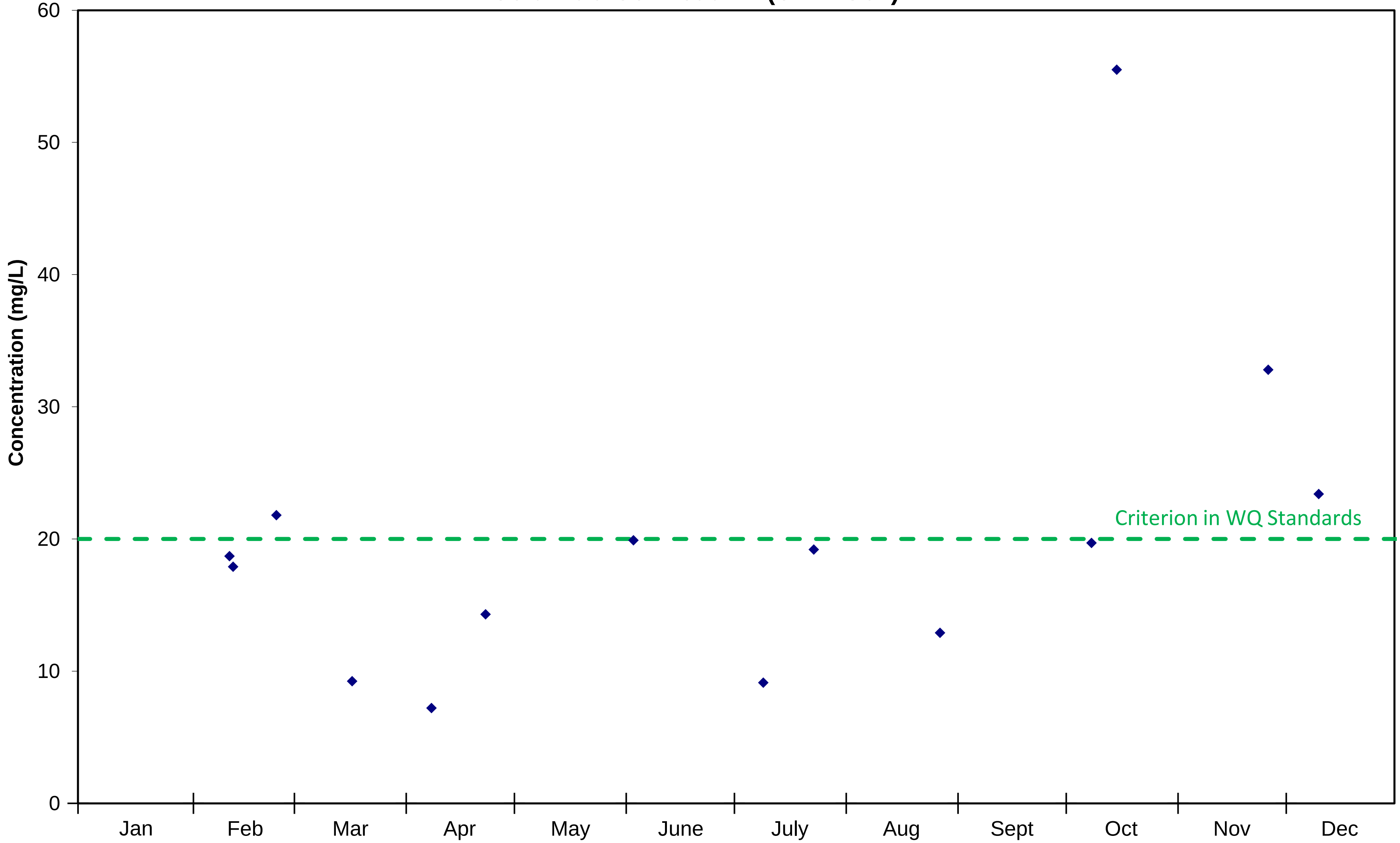


Figure C.18 Seasonal Plot of Dissolved Lead in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

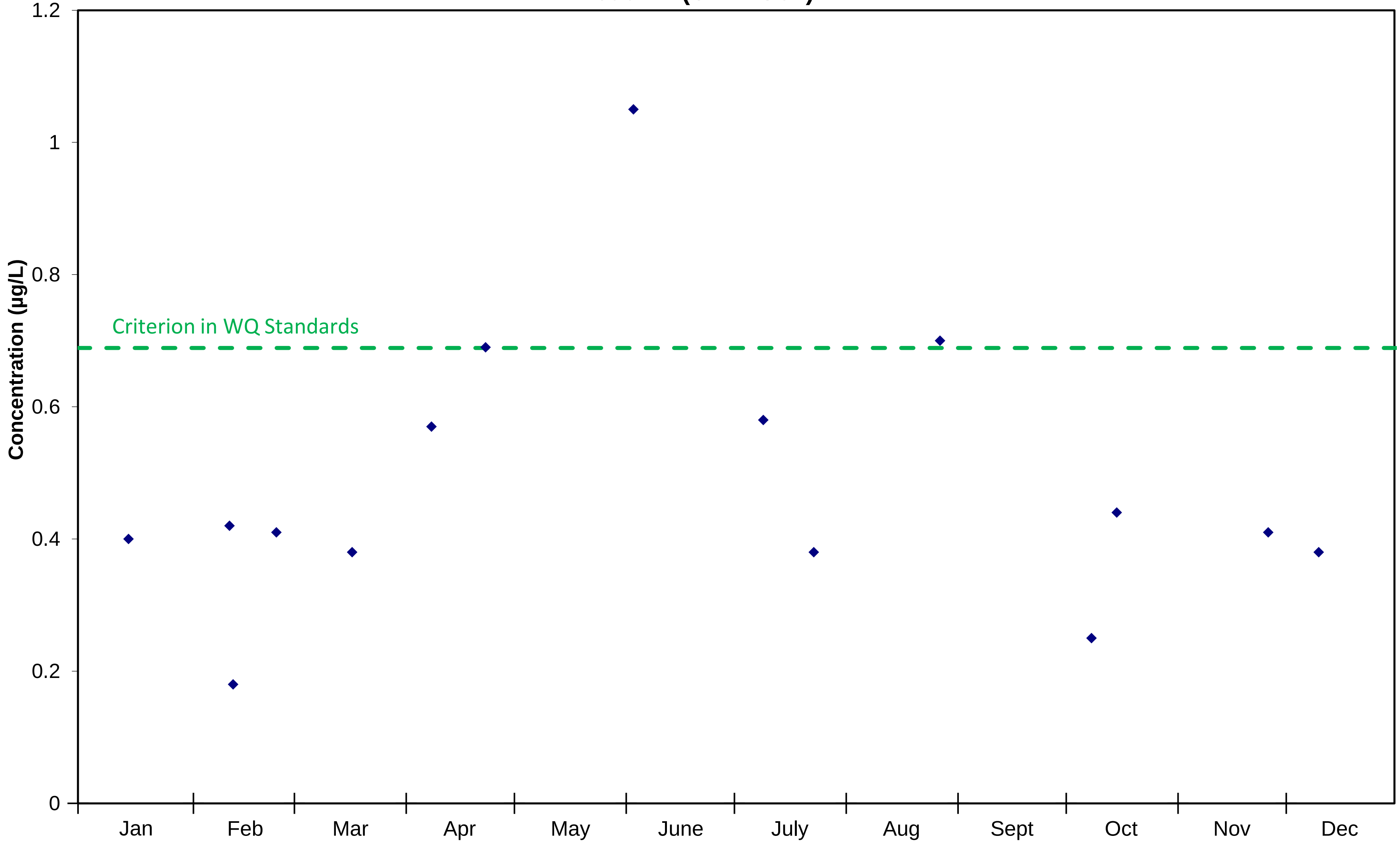


Figure C.19 Seasonal Plot of Sulfate in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

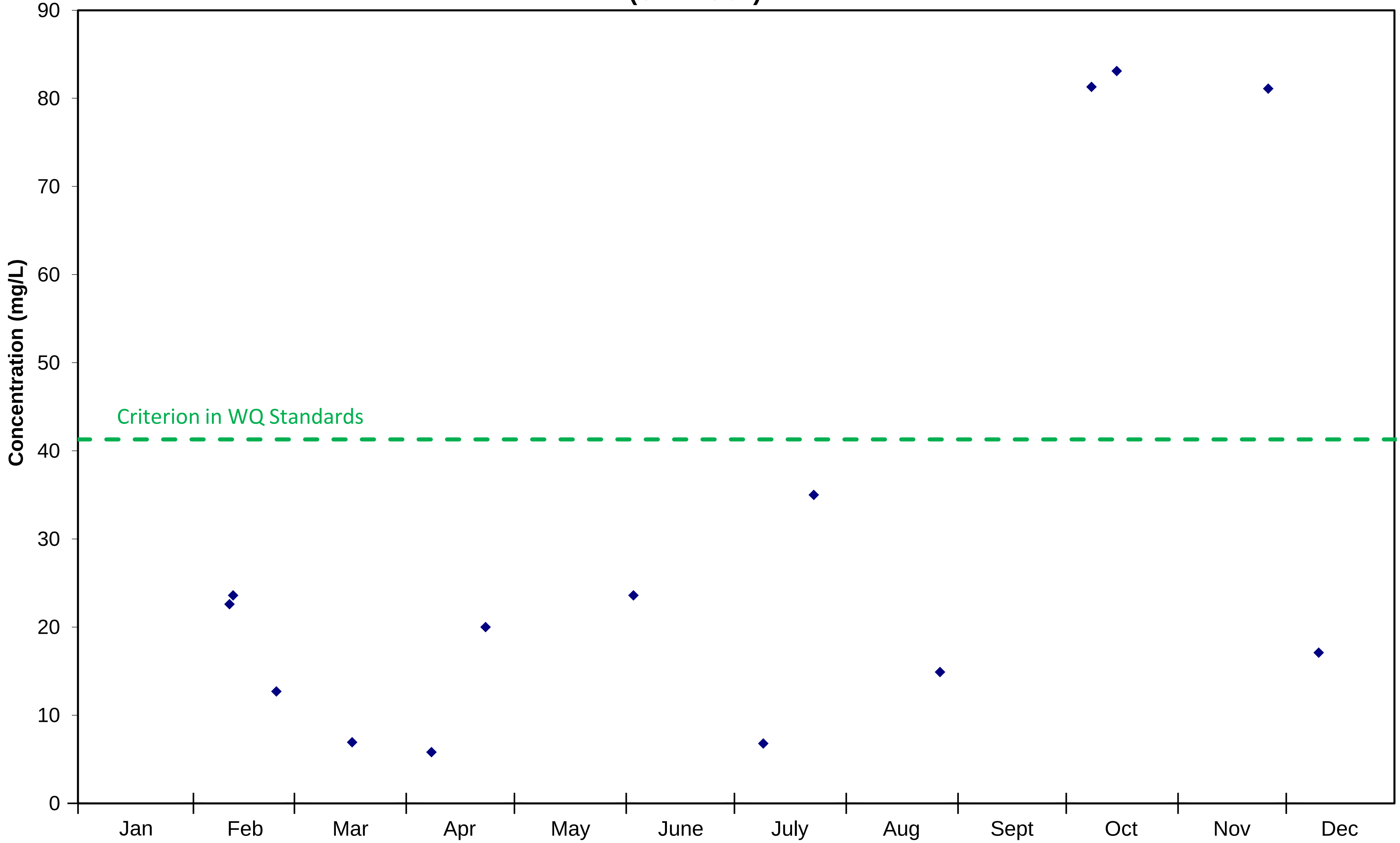


Figure C.20 Seasonal Plot of Total Dissolved Solids in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)

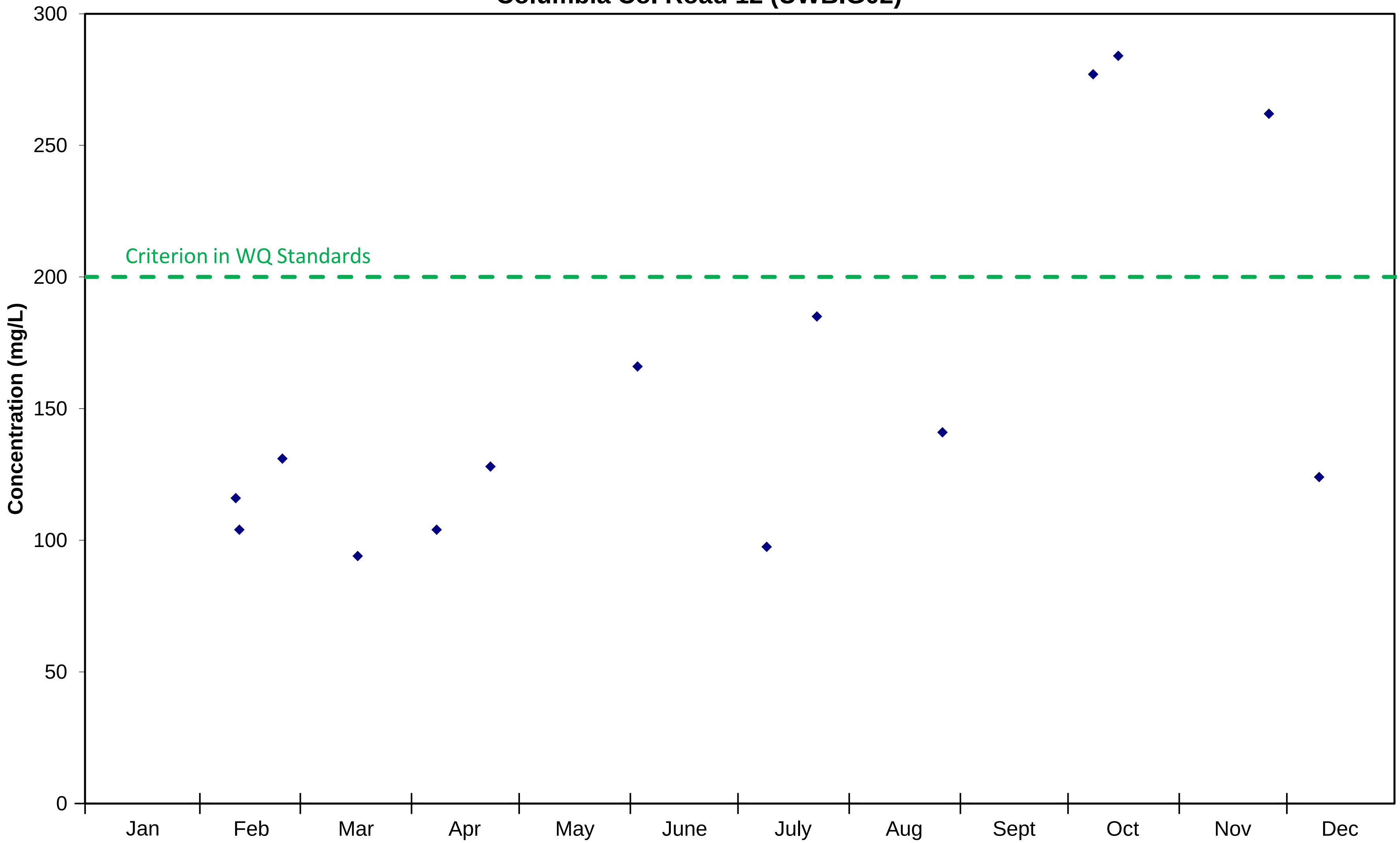


Figure C.21 Seasonal Plot of Dissolved Lead in Dorcheat Bayou east of Taylor, AR (RED0015A)

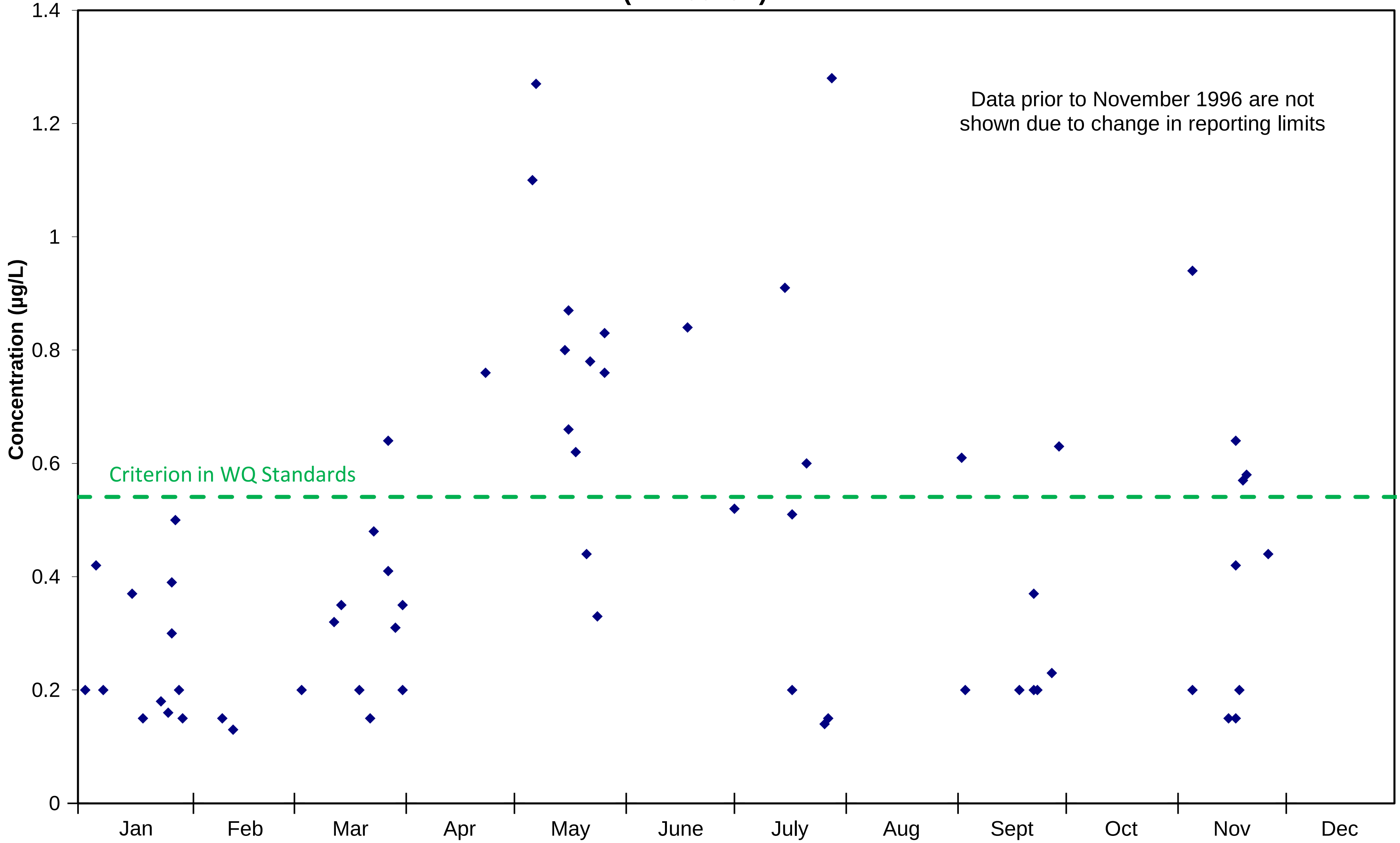


Figure C.22 Seasonal Plot of Sulfate in Dorcheat Bayou east of Taylor, AR (RED0015A)

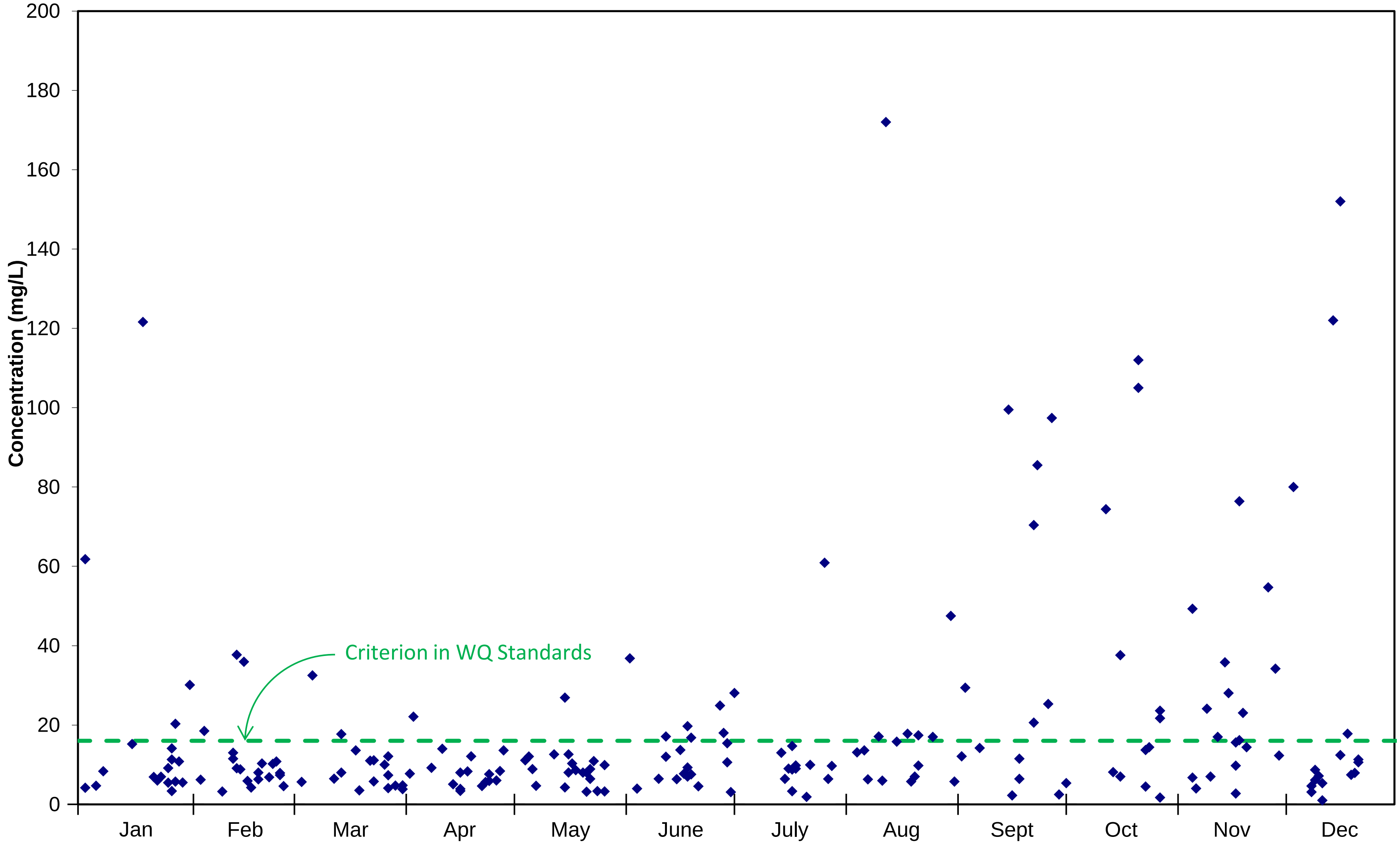


Figure C.23 Seasonal Plot of pH in Dorcheat Bayou east of Taylor, AR (RED0015A)

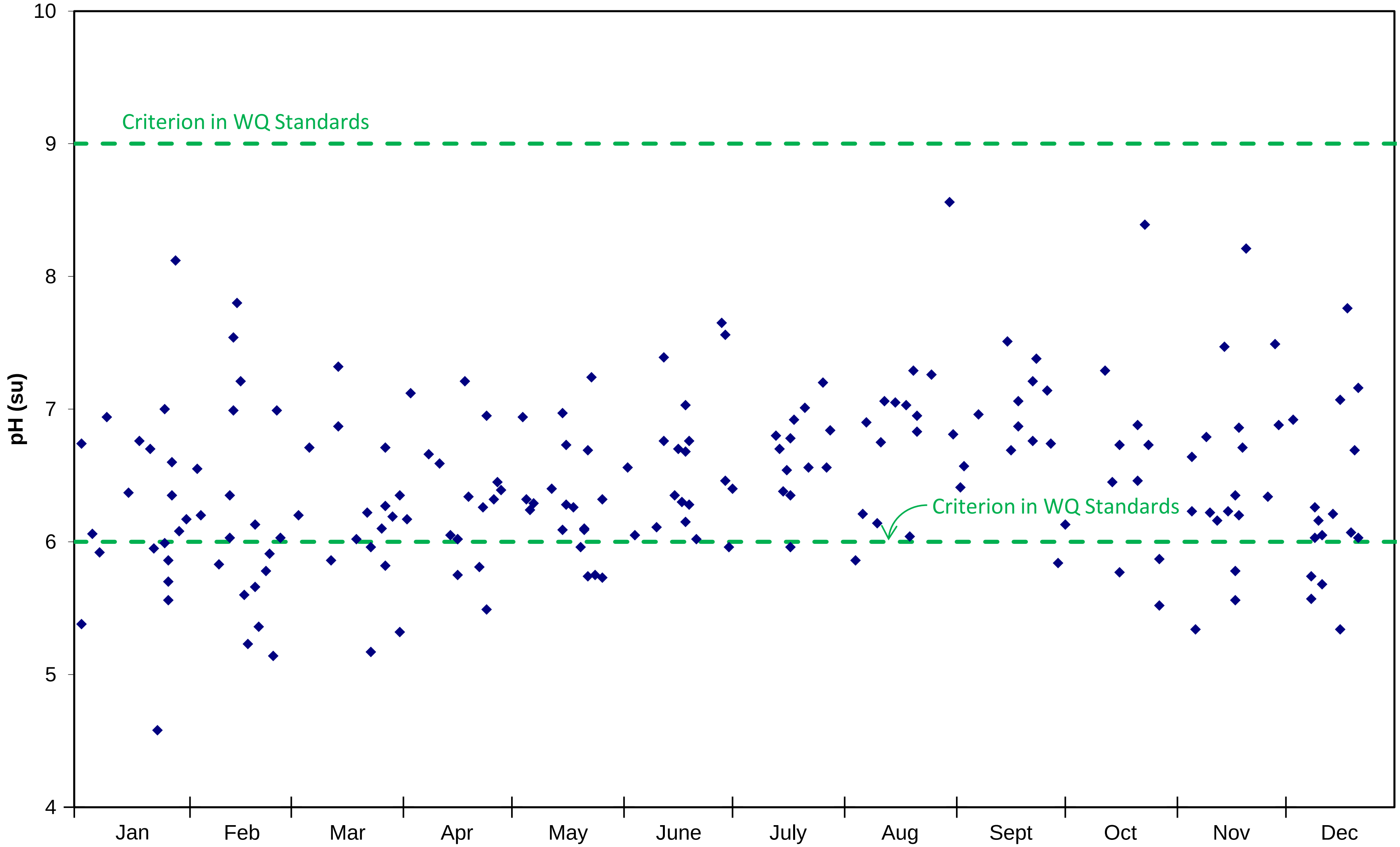


Figure C.24 Seasonal Plot of Dissolved Lead in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)

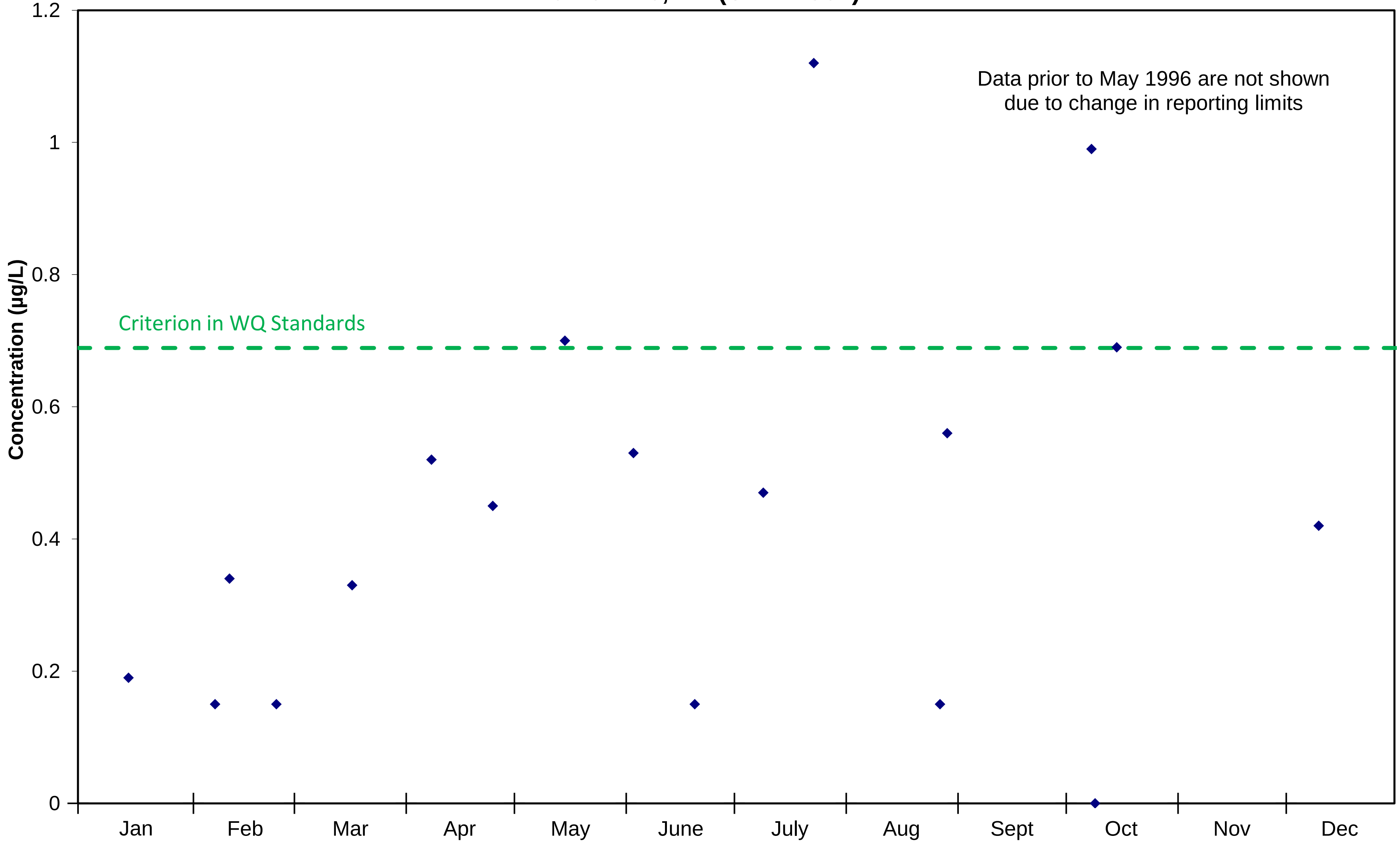
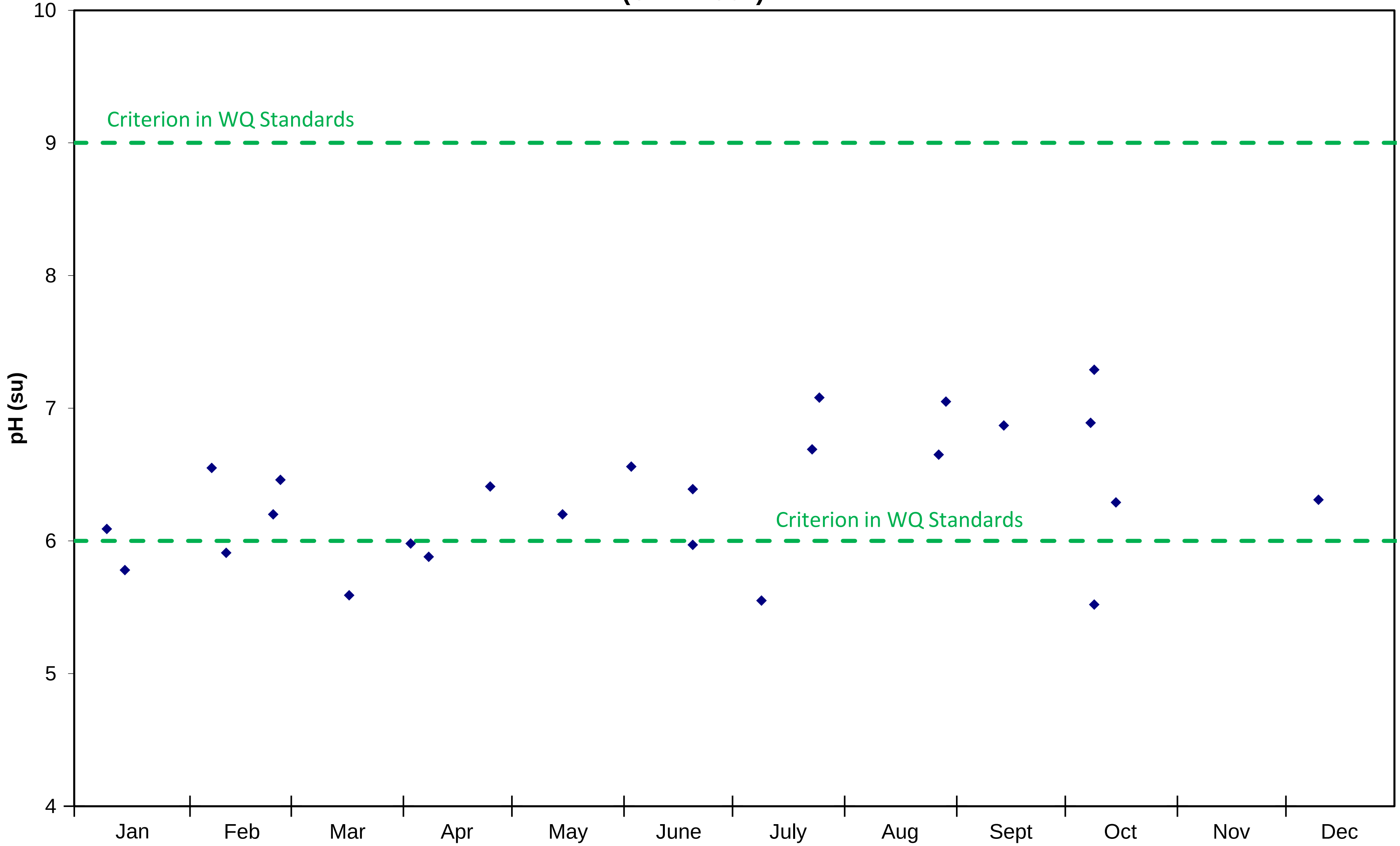


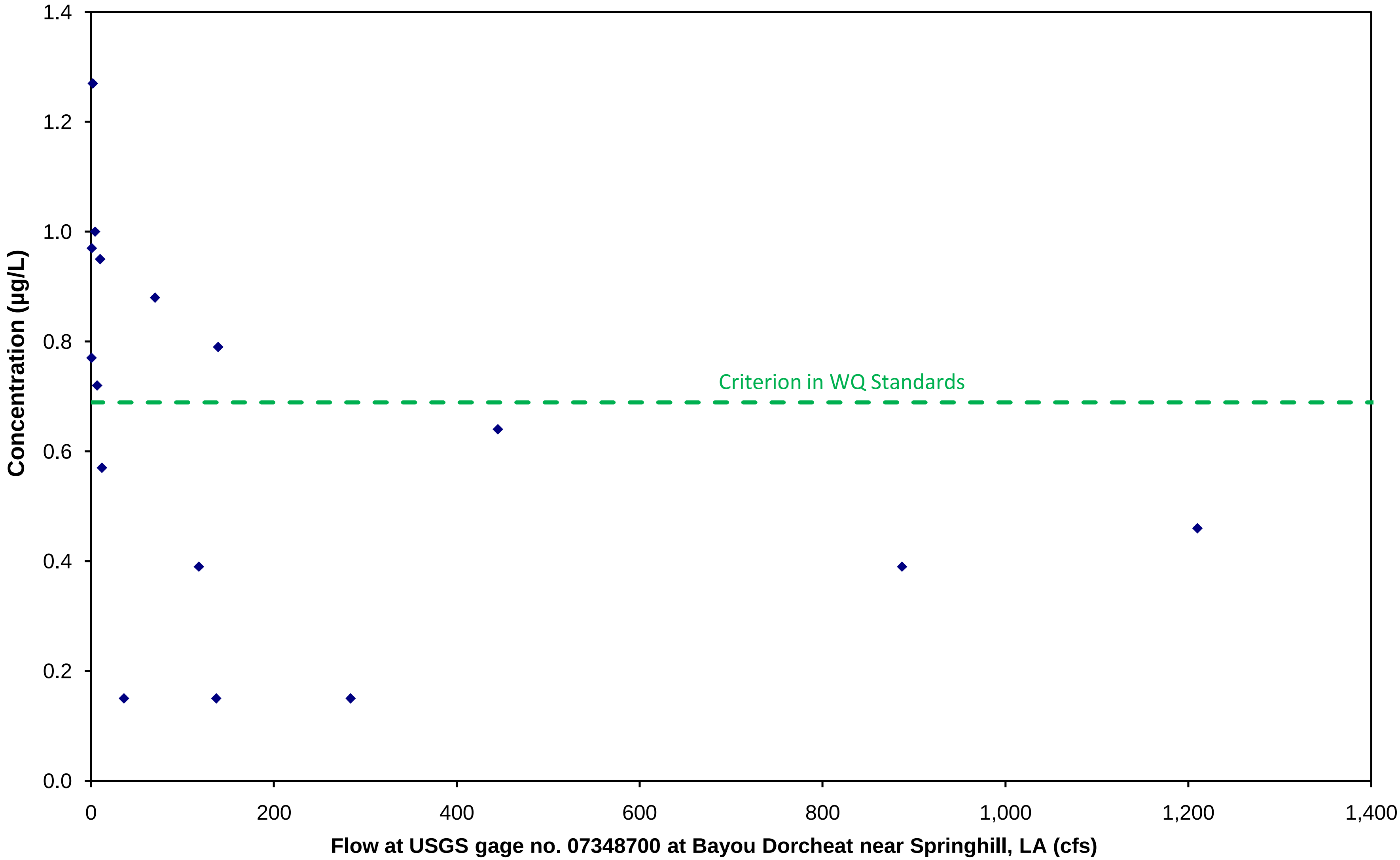
Figure C.25 Seasonal Plot of pH in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)



APPENDIX D

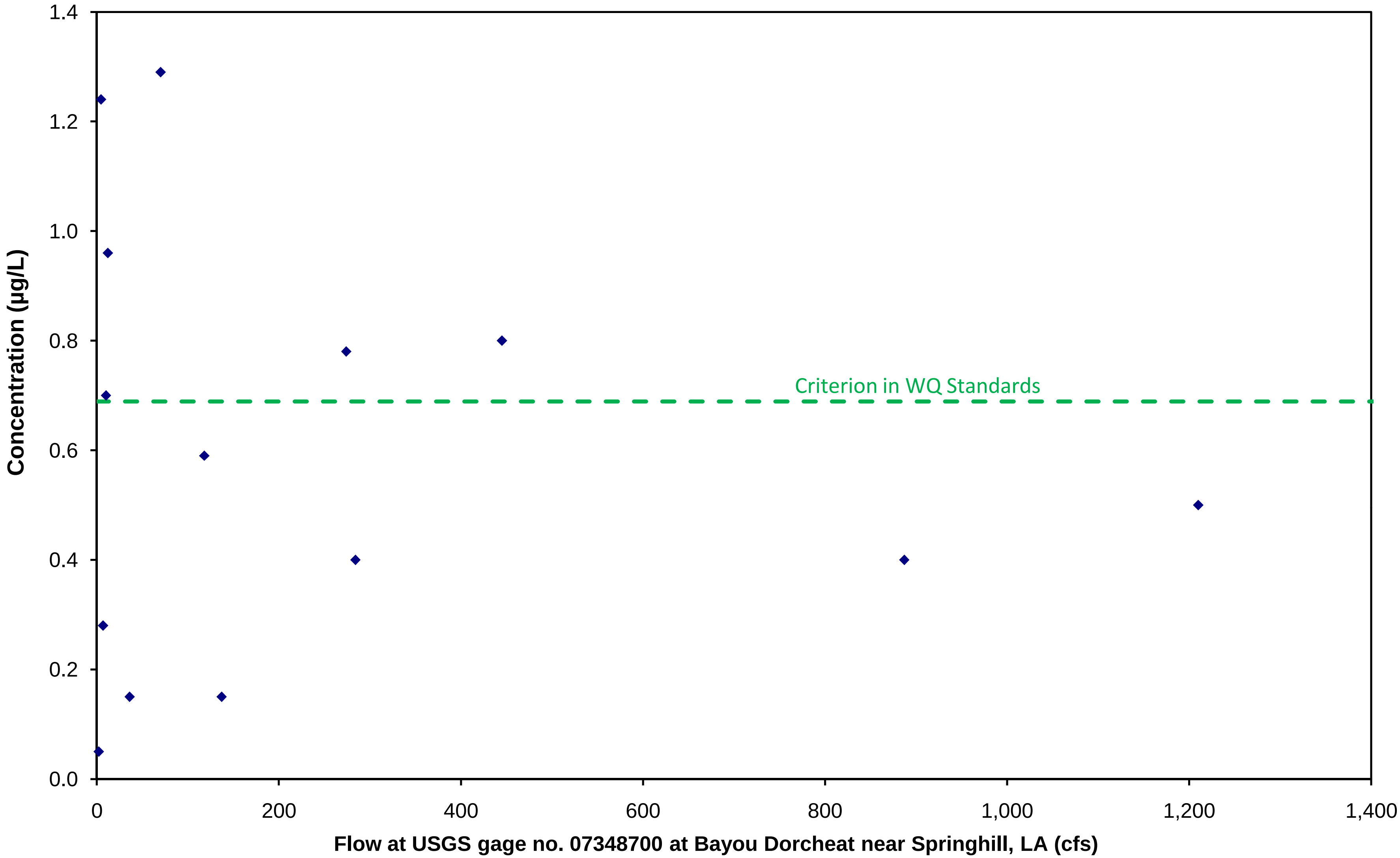
Concentration vs. Flow Plots for Water Quality Data

Figure D.1 Lead Concentration versus Flow in Bodcau Creek near Falcon, AR (RED0057)



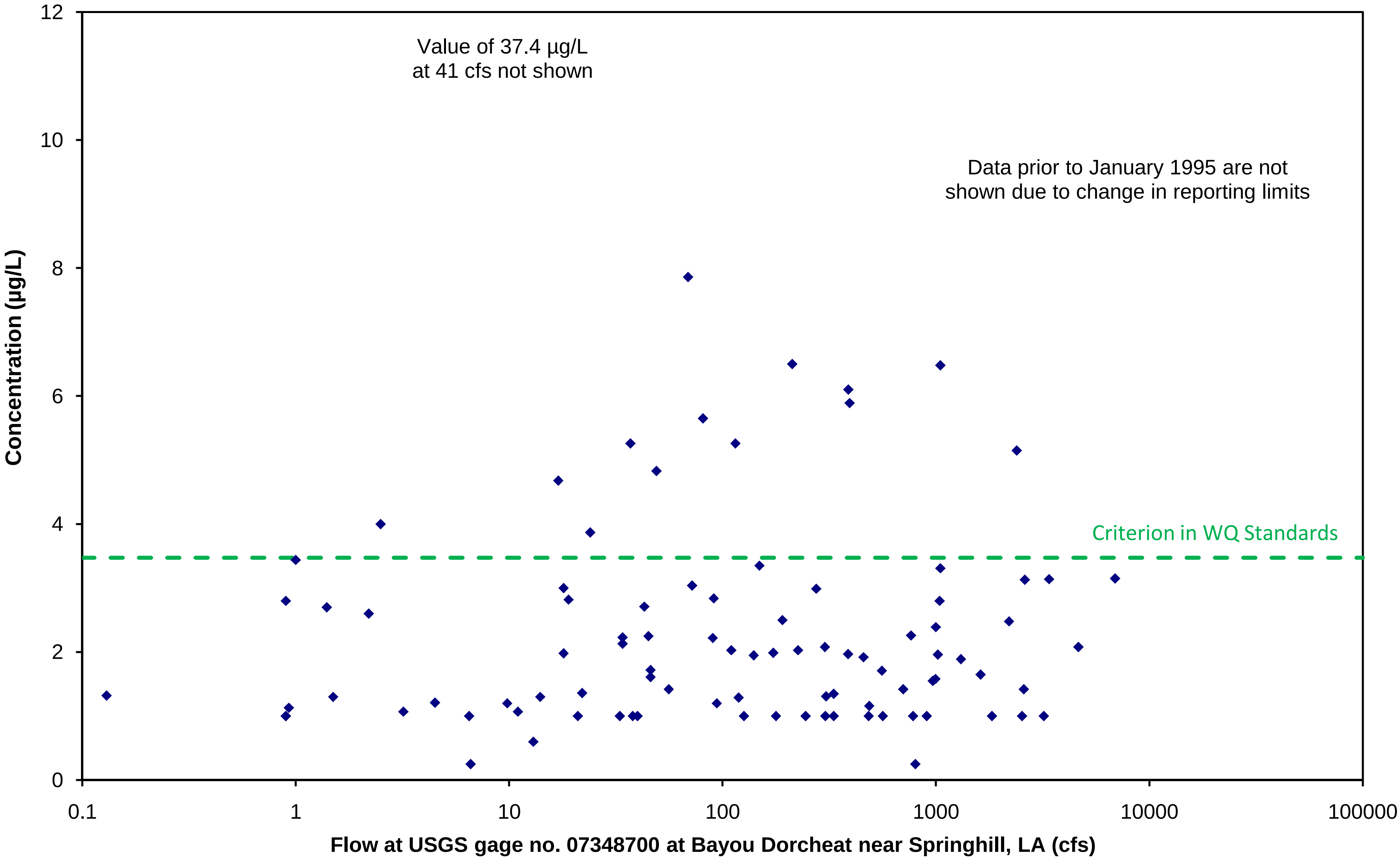
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.2 Dissolved Lead Concentration versus Flow in Little Bodcau Creek near Piney Grove, AR (RED0056)



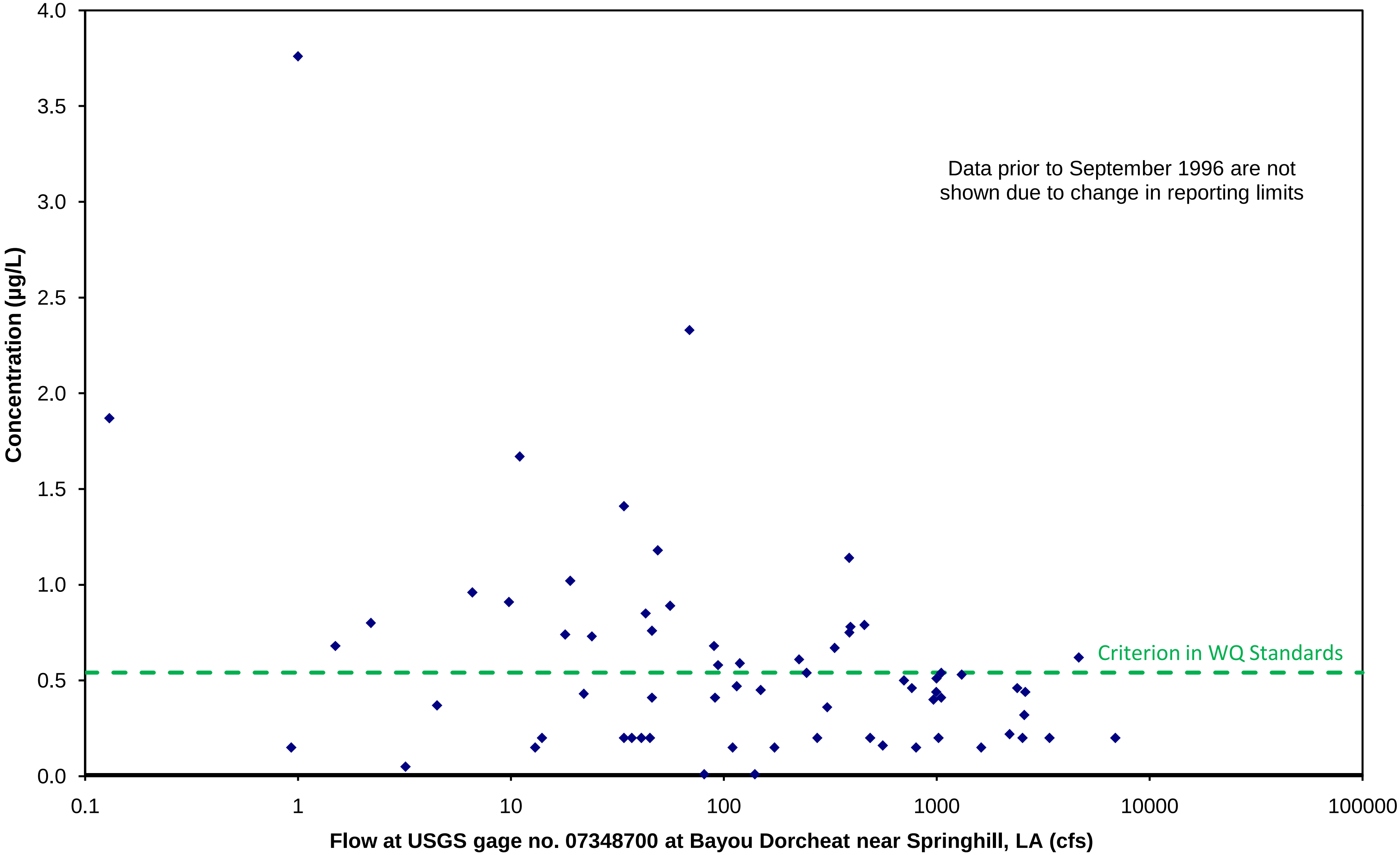
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.3 Dissolved Copper Concentration versus Flow in Bodcau Creek near Lewisville (RED0027)



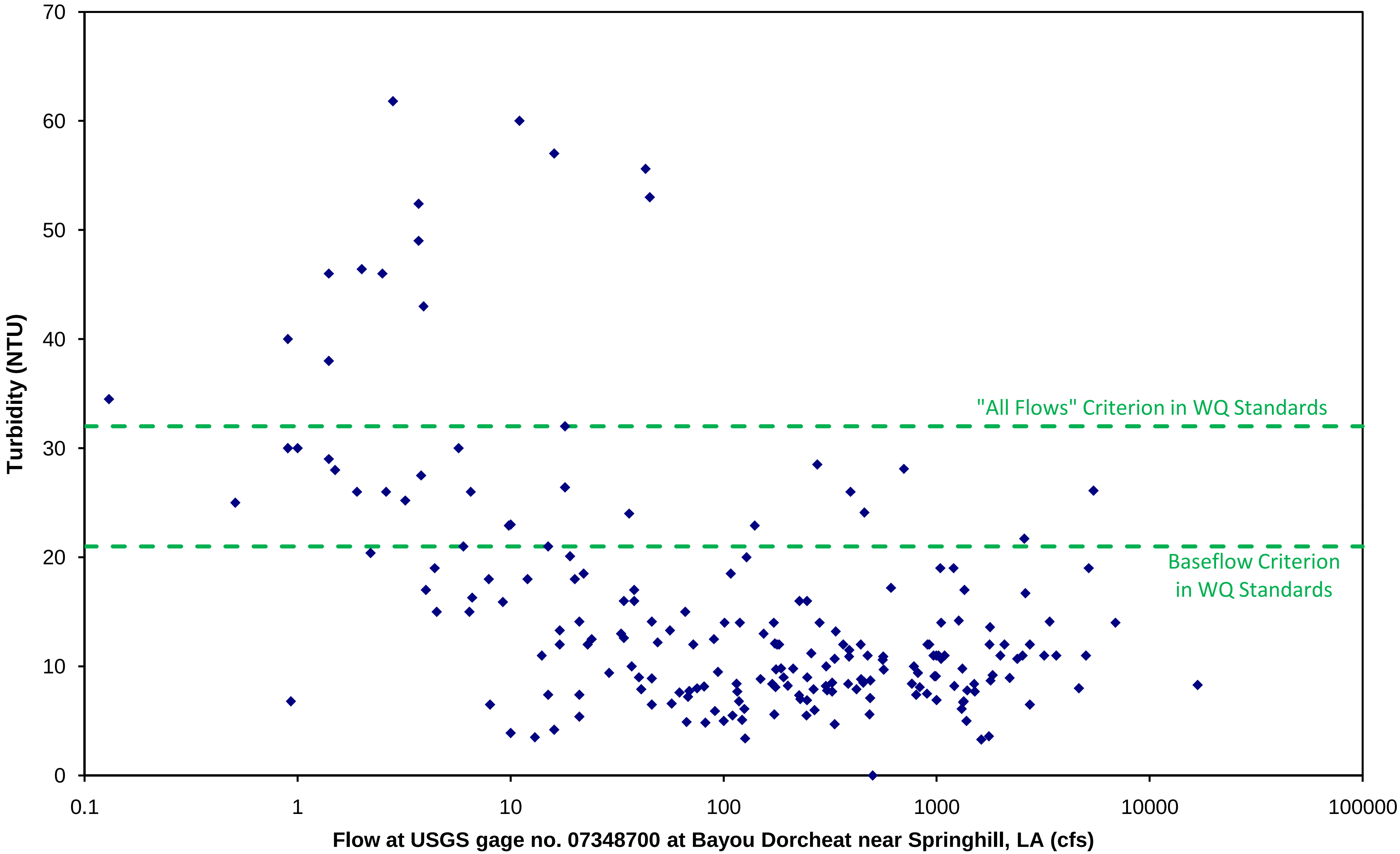
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.4 Dissolved Lead Concentration versus Flow in Bodcau Creek near Lewisville (RED0027)



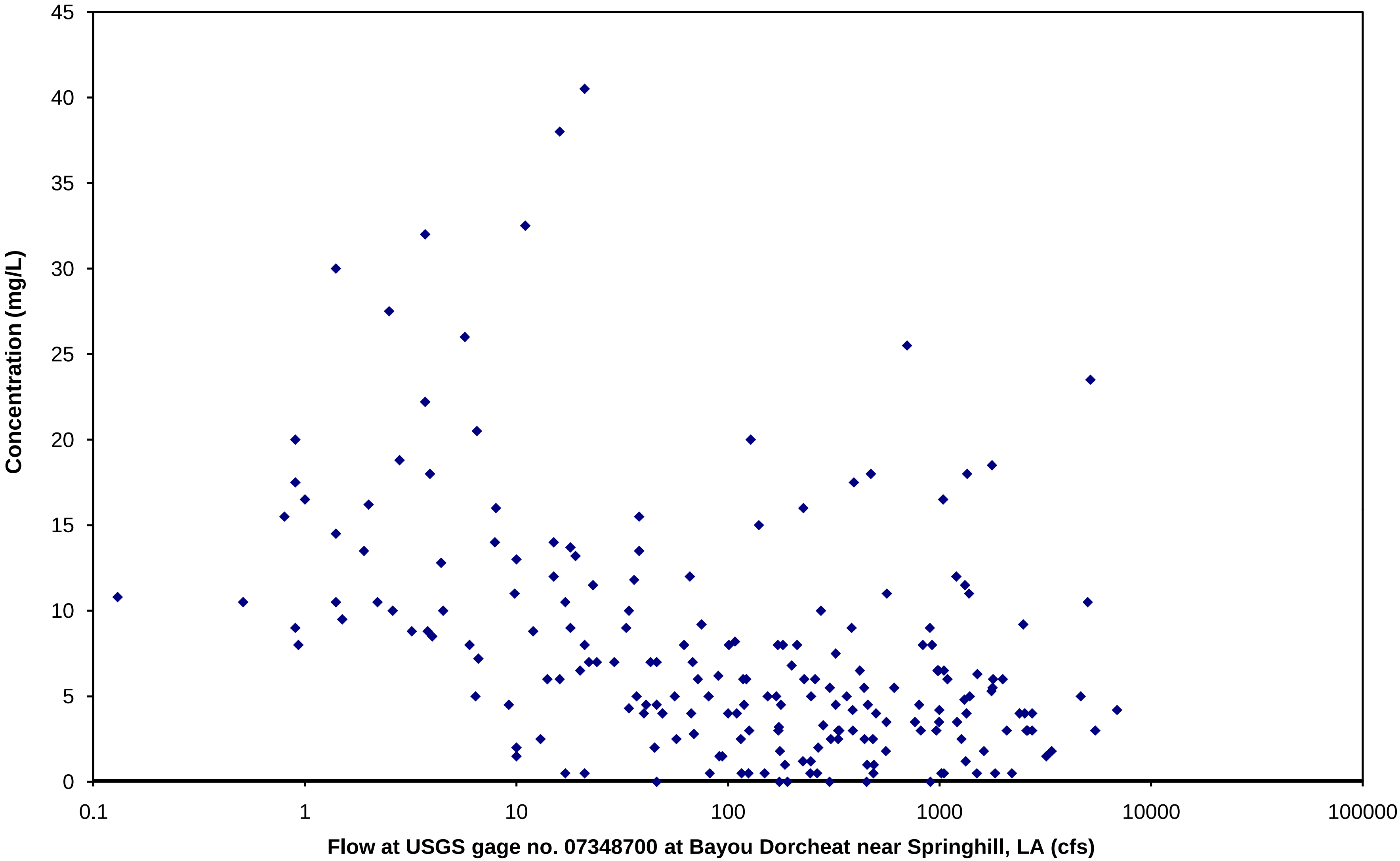
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.5 Turbidity versus Flow in Bodcau Creek near Lewisville, AR (RED0027)



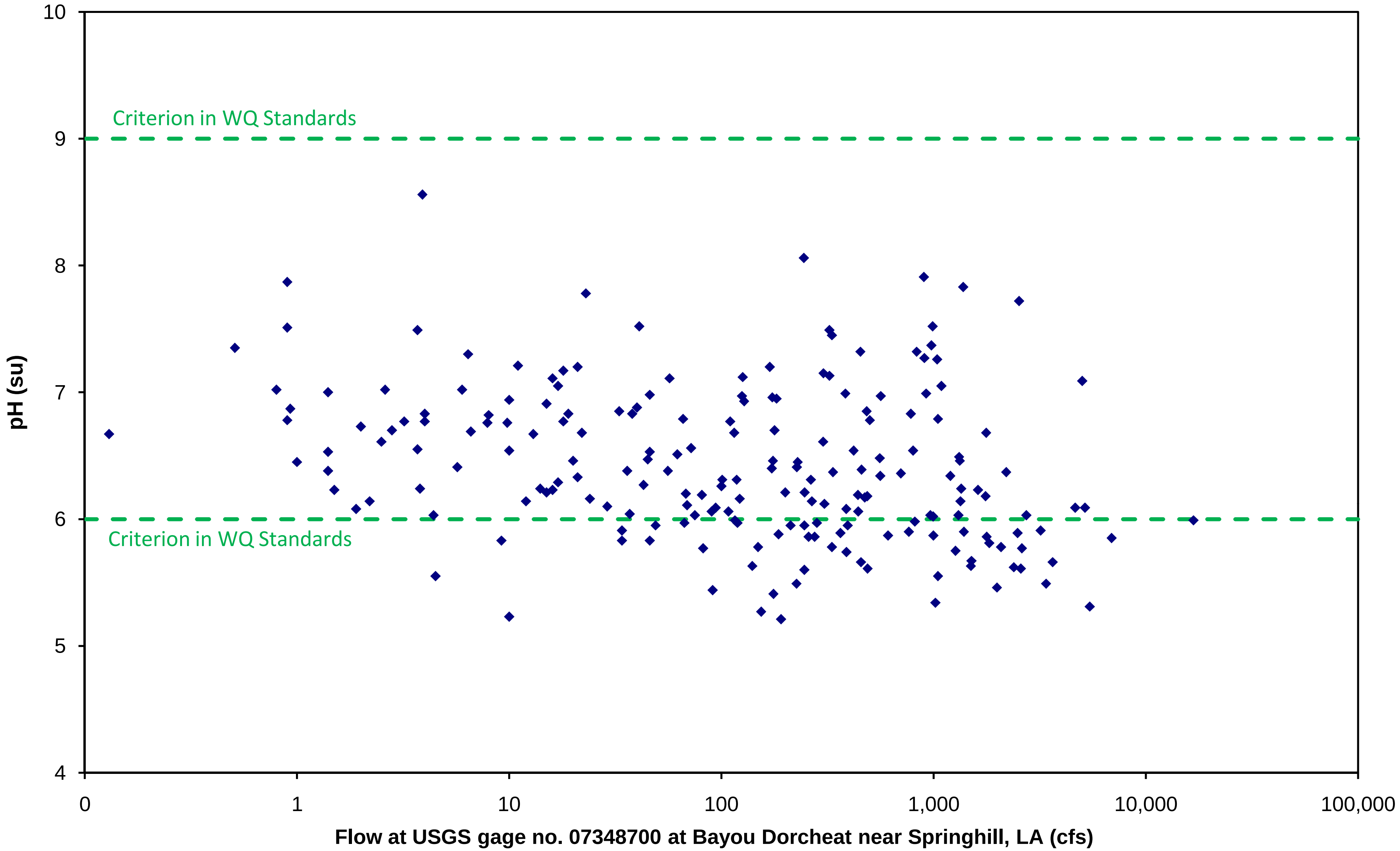
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.6 TSS Concentration versus Flow in Bodcau Creek near Lewisville (RED0027)



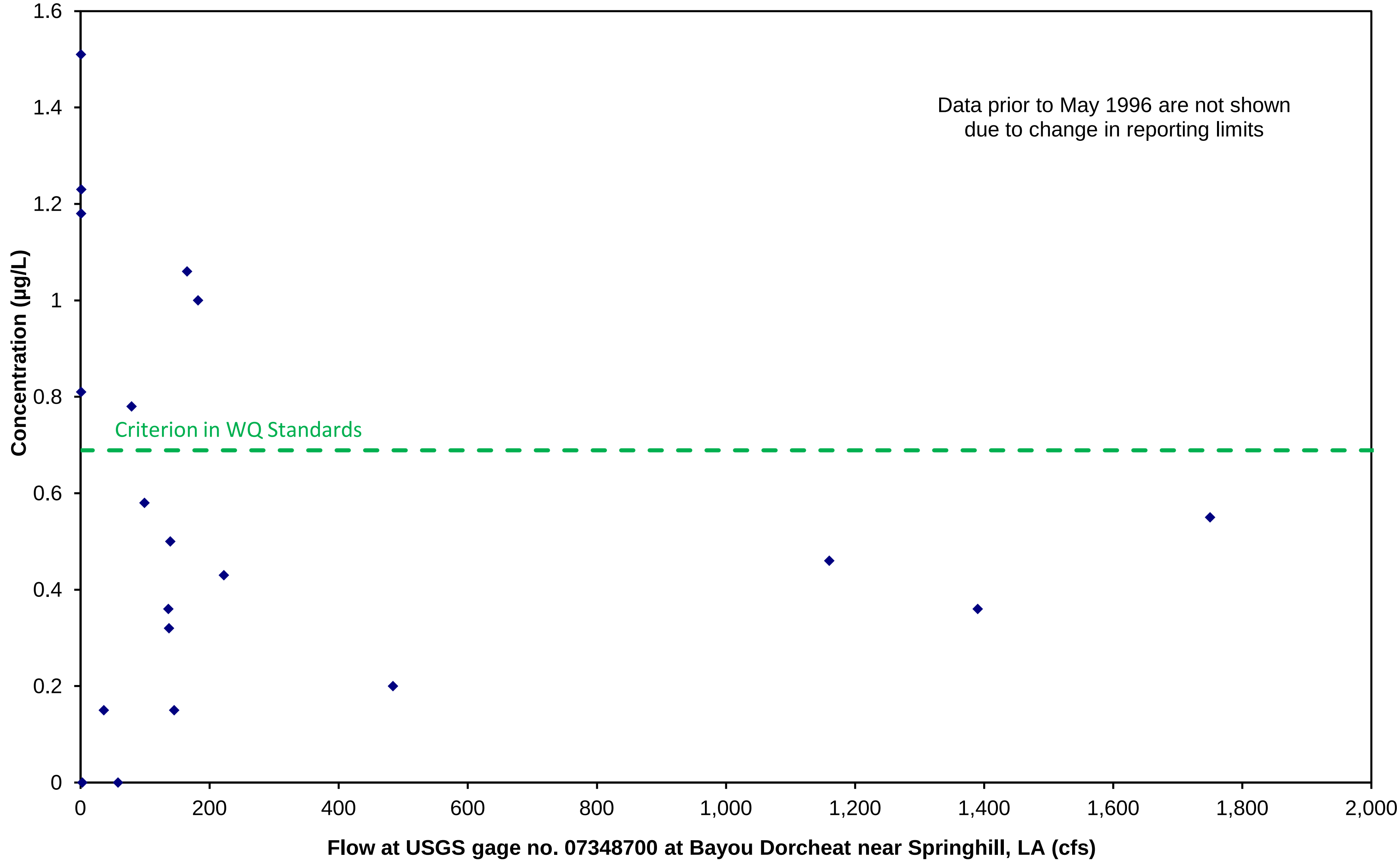
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.7 pH versus Flow in Bodcau Creek near Lewisville (RED0027)



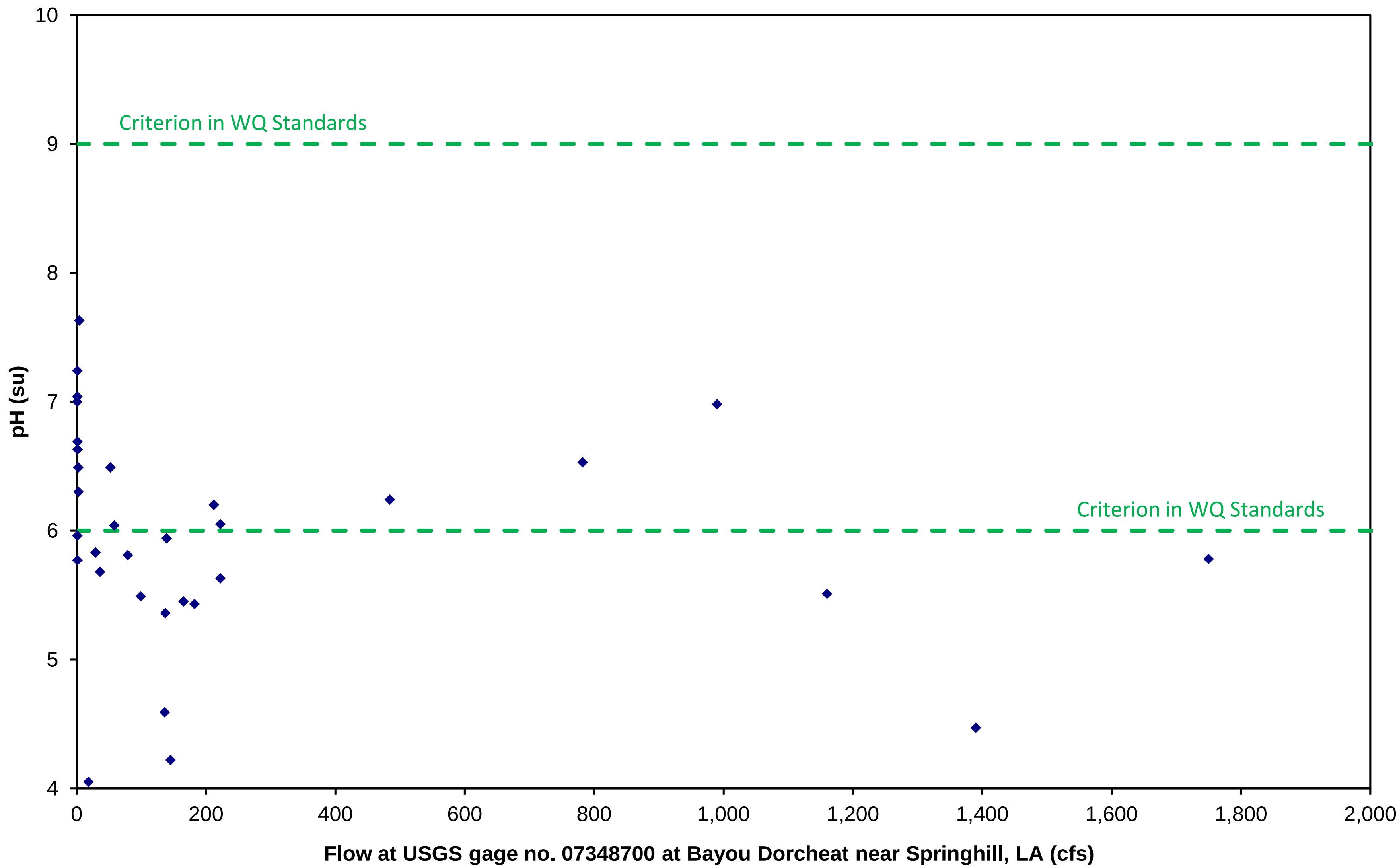
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.8 Dissolved Lead Concentration versus Flow in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)



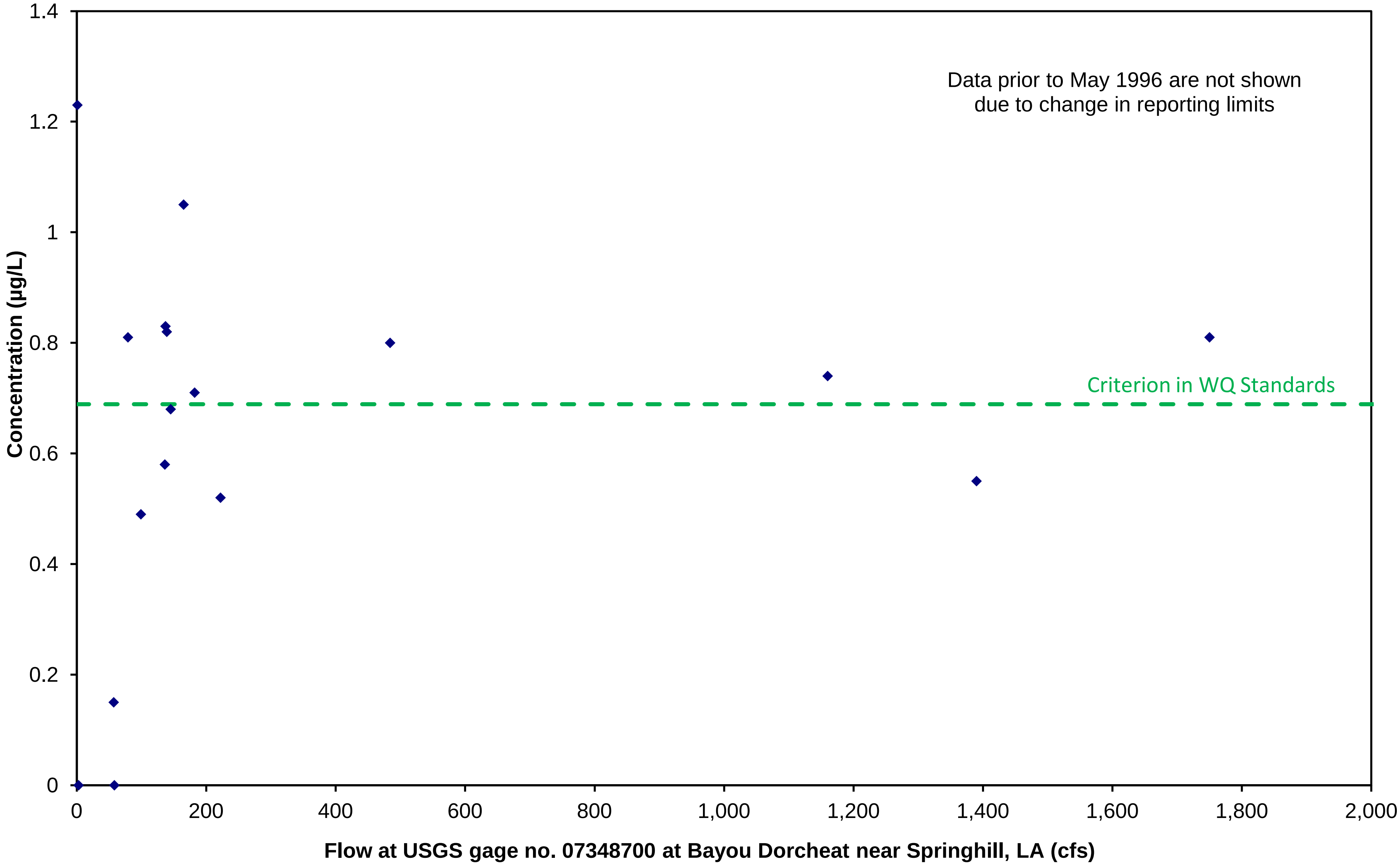
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.9 pH versus Flow in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)



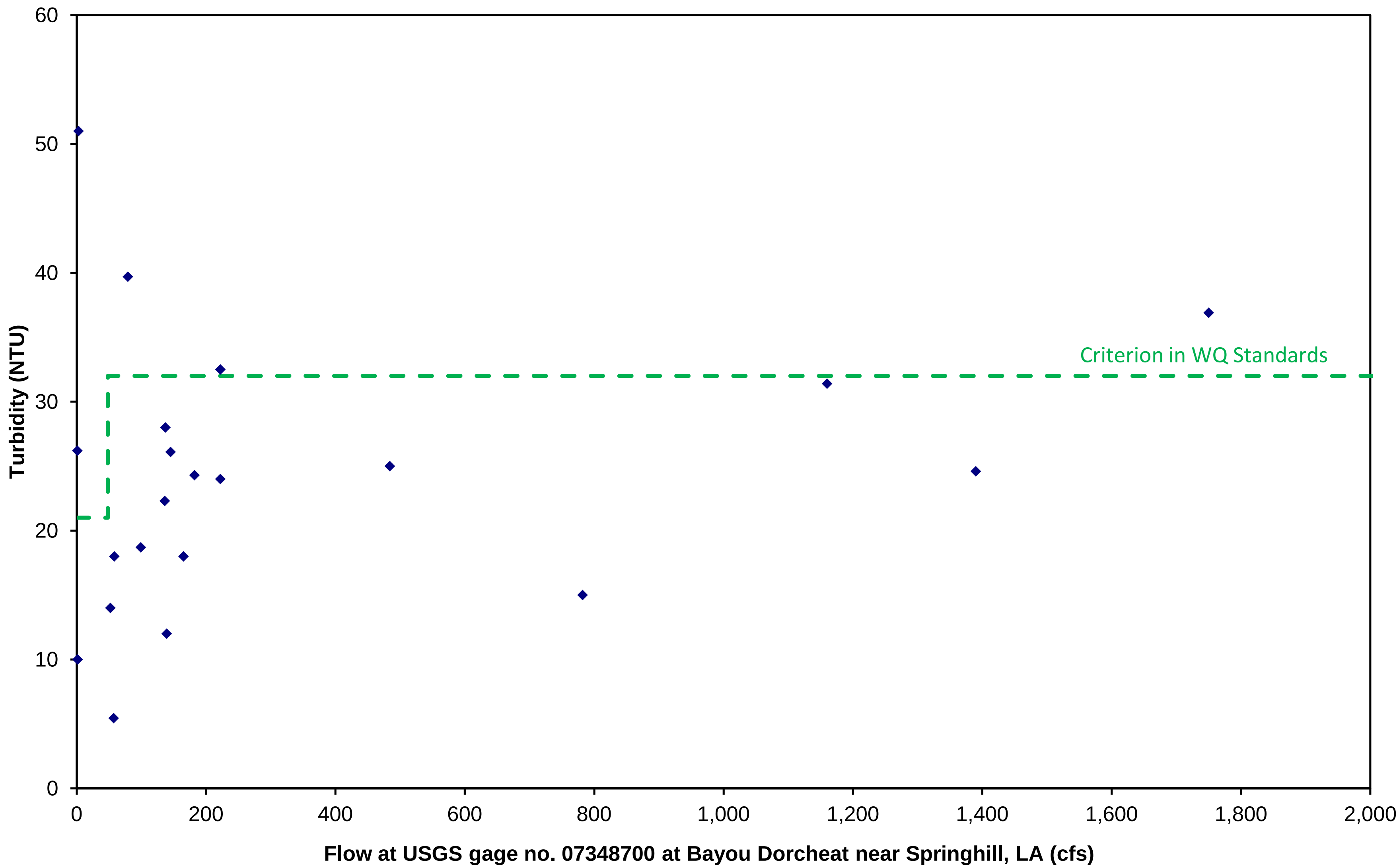
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.10 Dissolved Lead Concentration versus Flow in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)



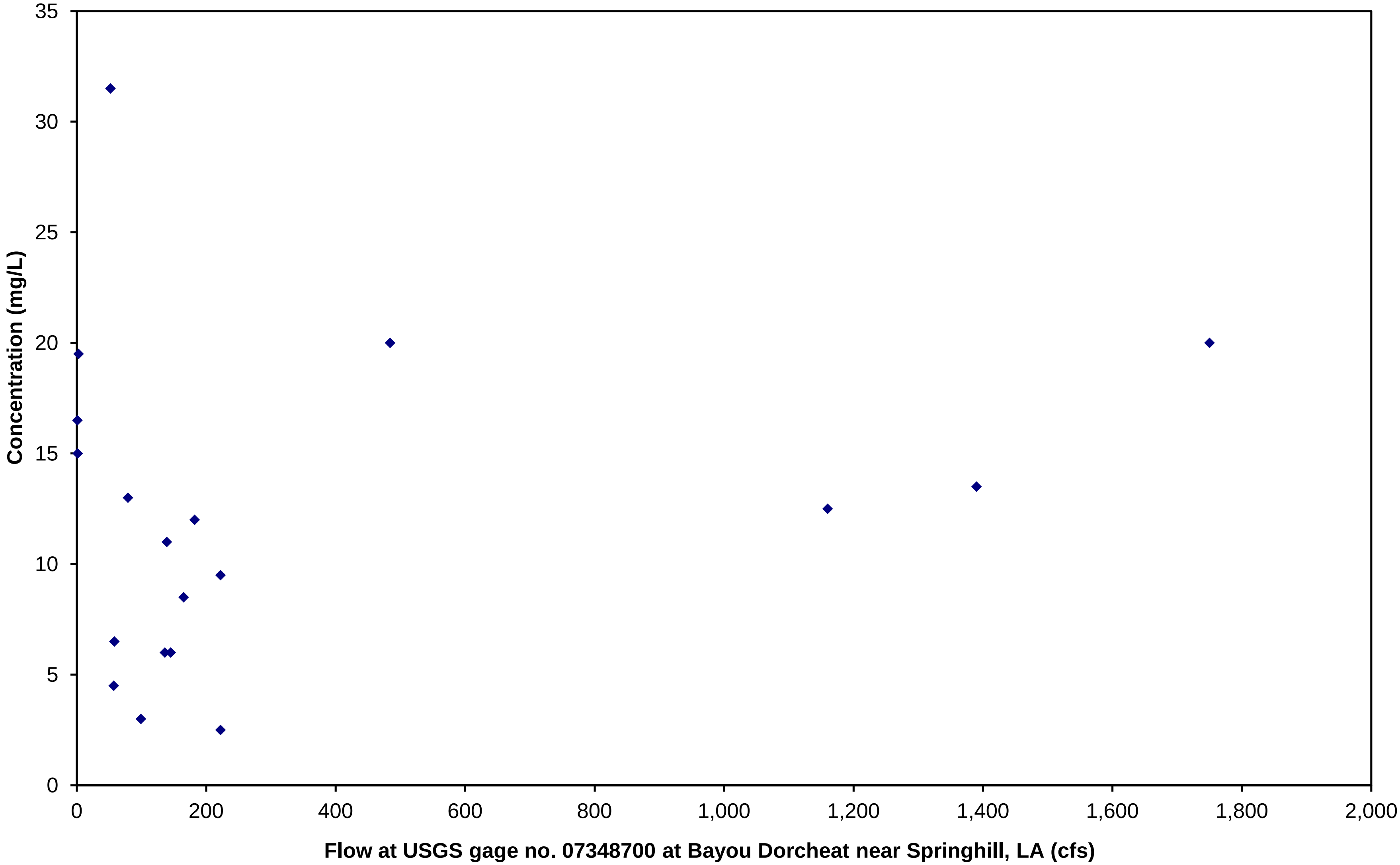
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.11 Turbidity versus Flow in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)



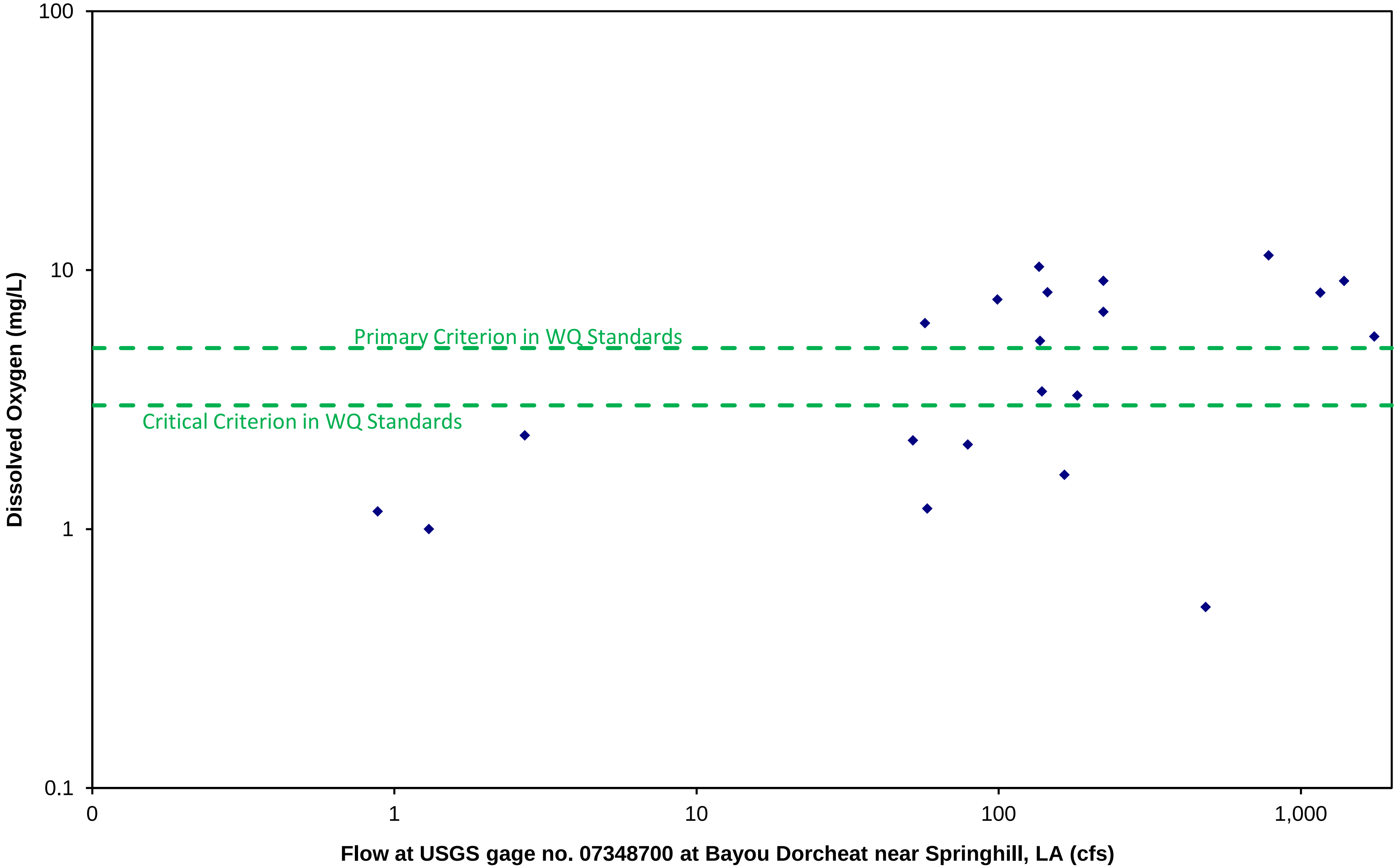
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.12 Total Suspended Solids Concentration versus Flow in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)



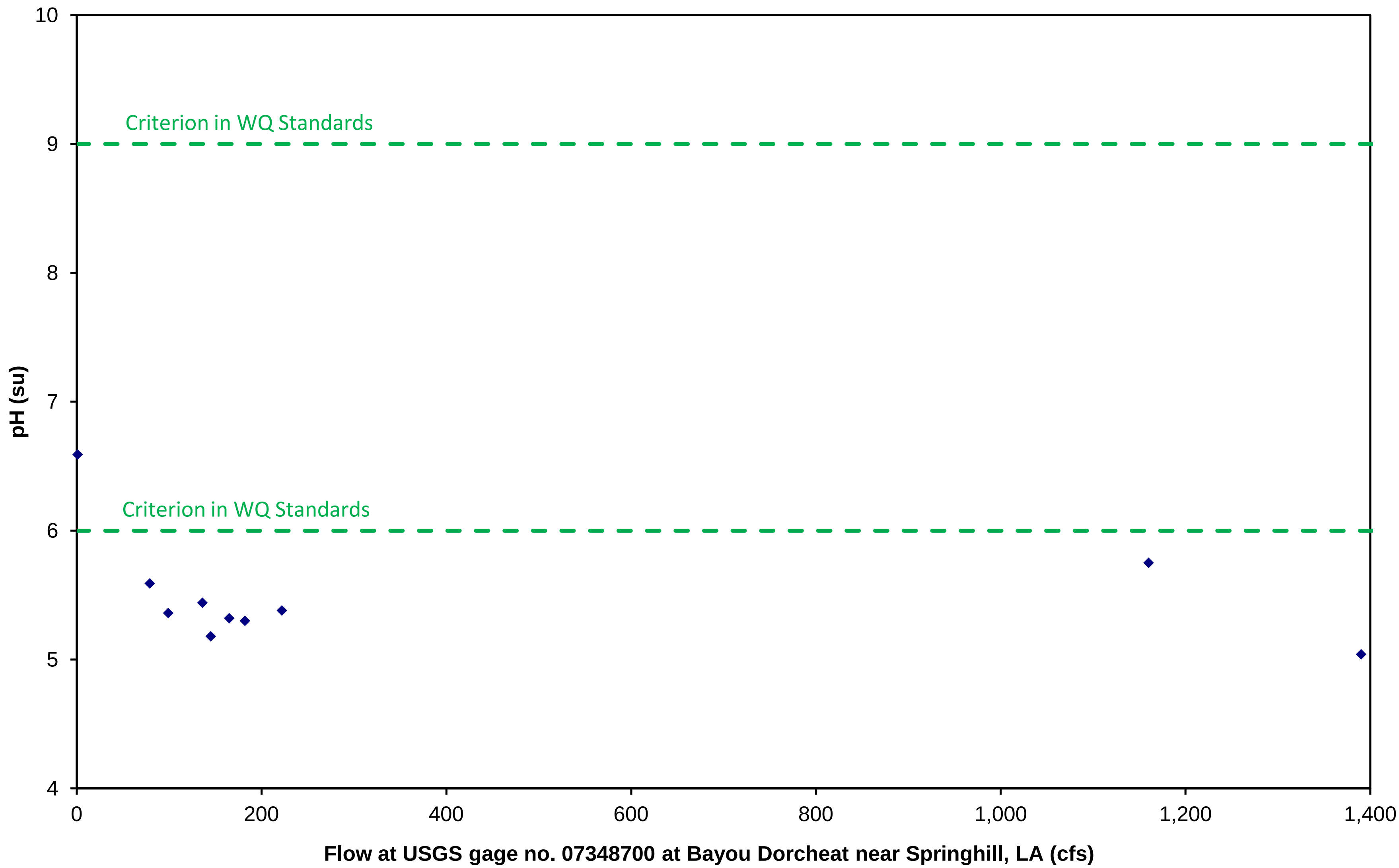
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.13 Dissolved Oxygen versus Flow in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)



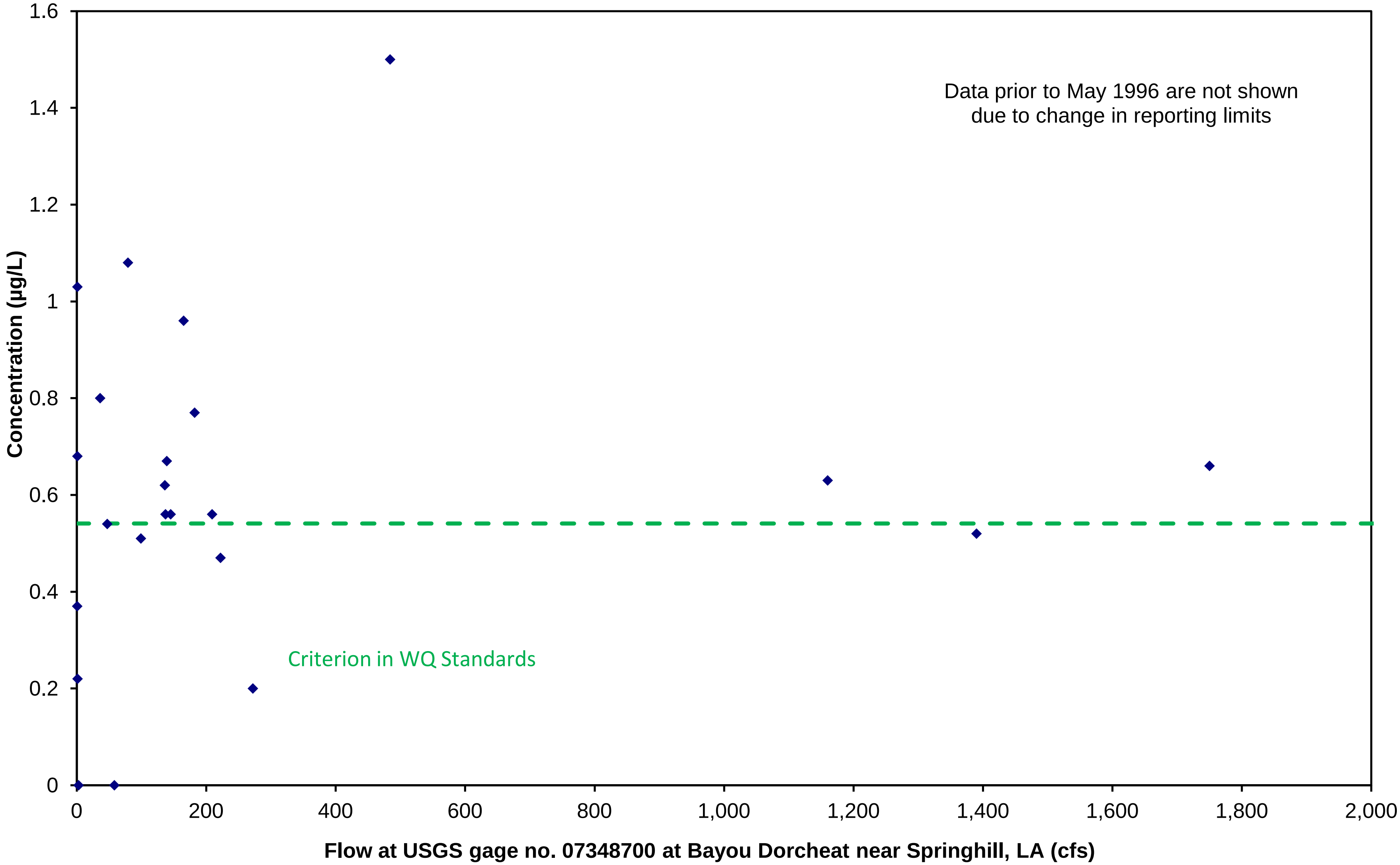
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.14 pH versus Flow in Bayou Dorcheat near Magnolia, AR (RED0065)



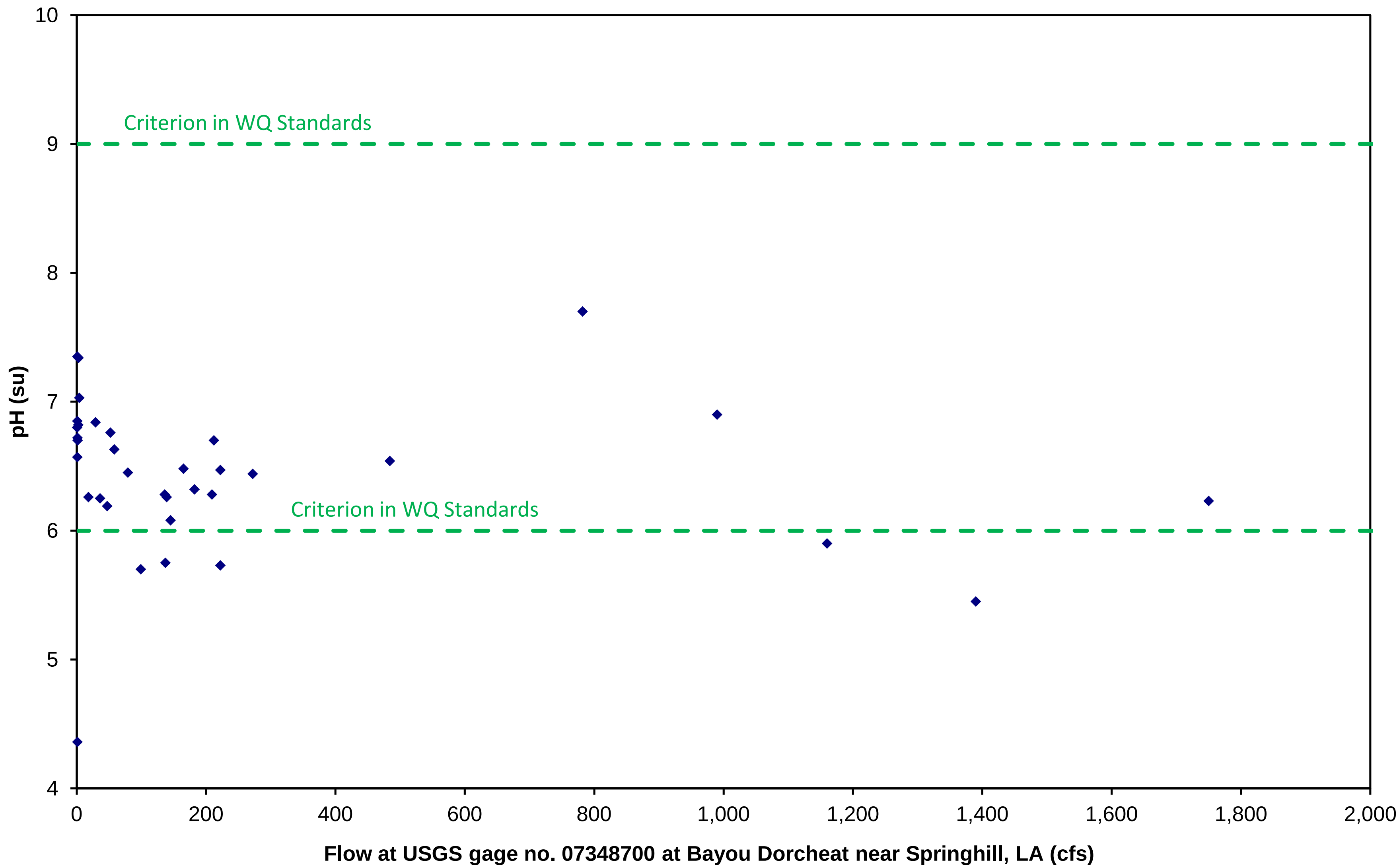
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.15 Dissolved Lead Concentration versus Flow in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)



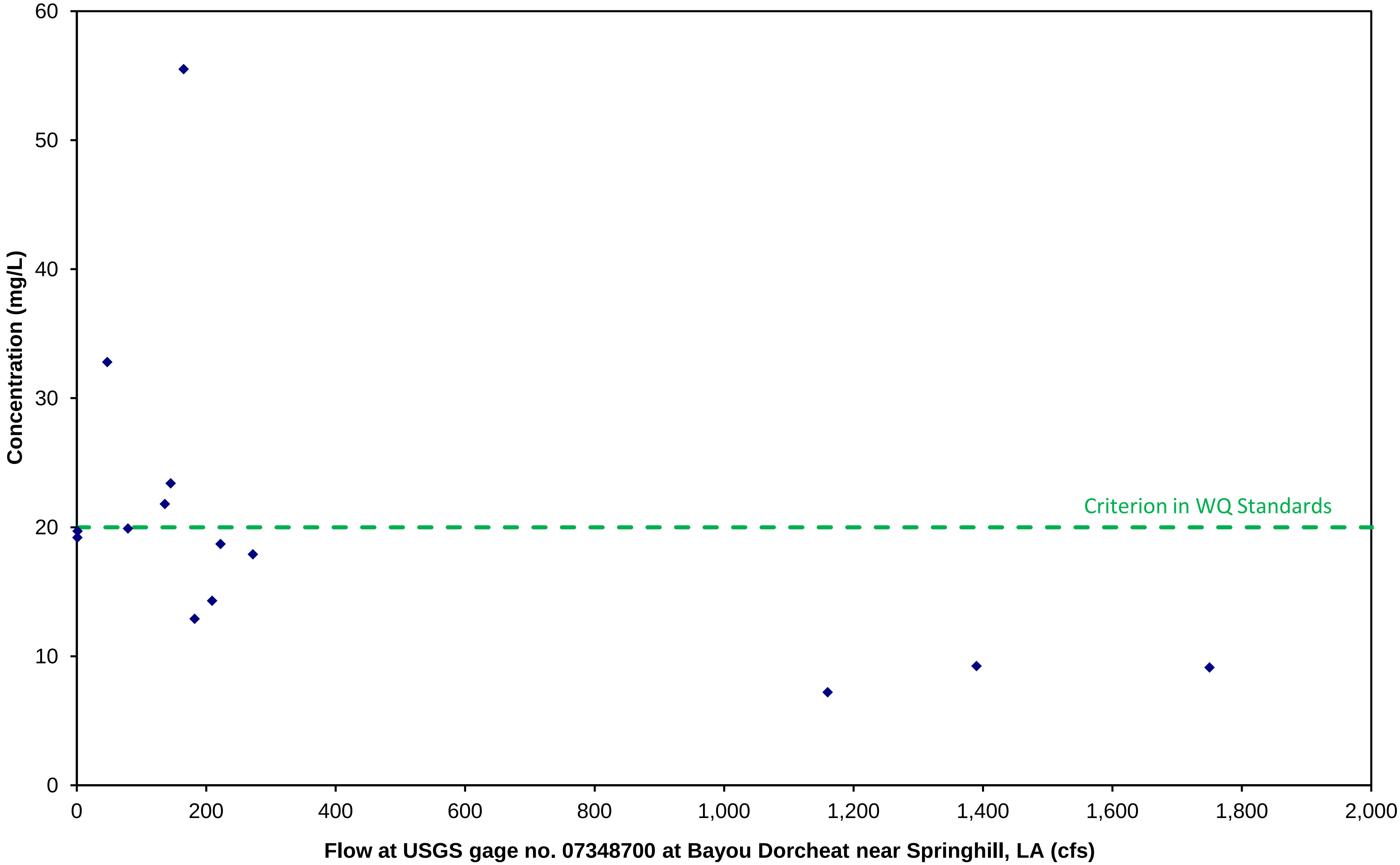
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.16 pH versus Flow in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)



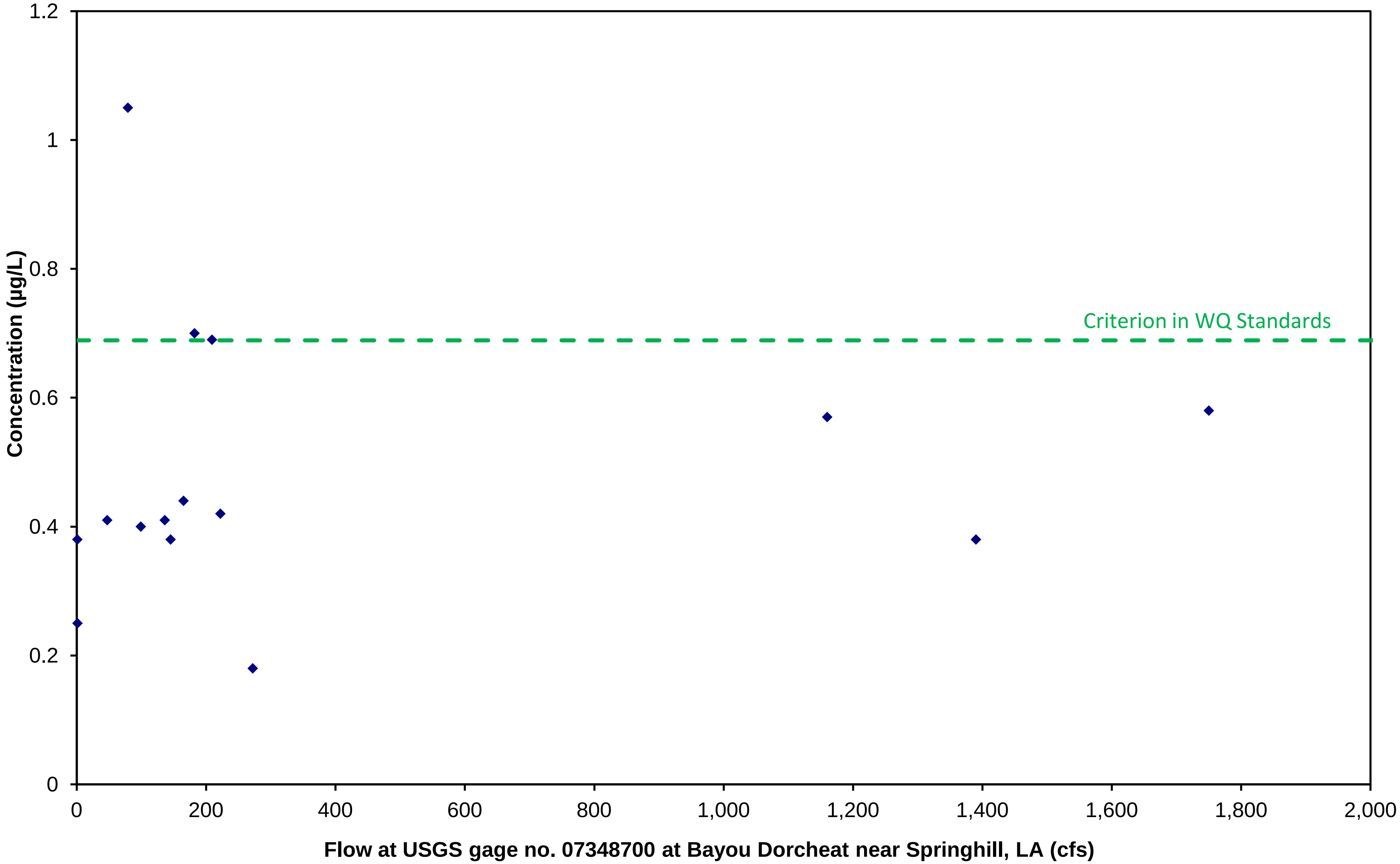
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.17 Chloride Concentration versus Flow in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)



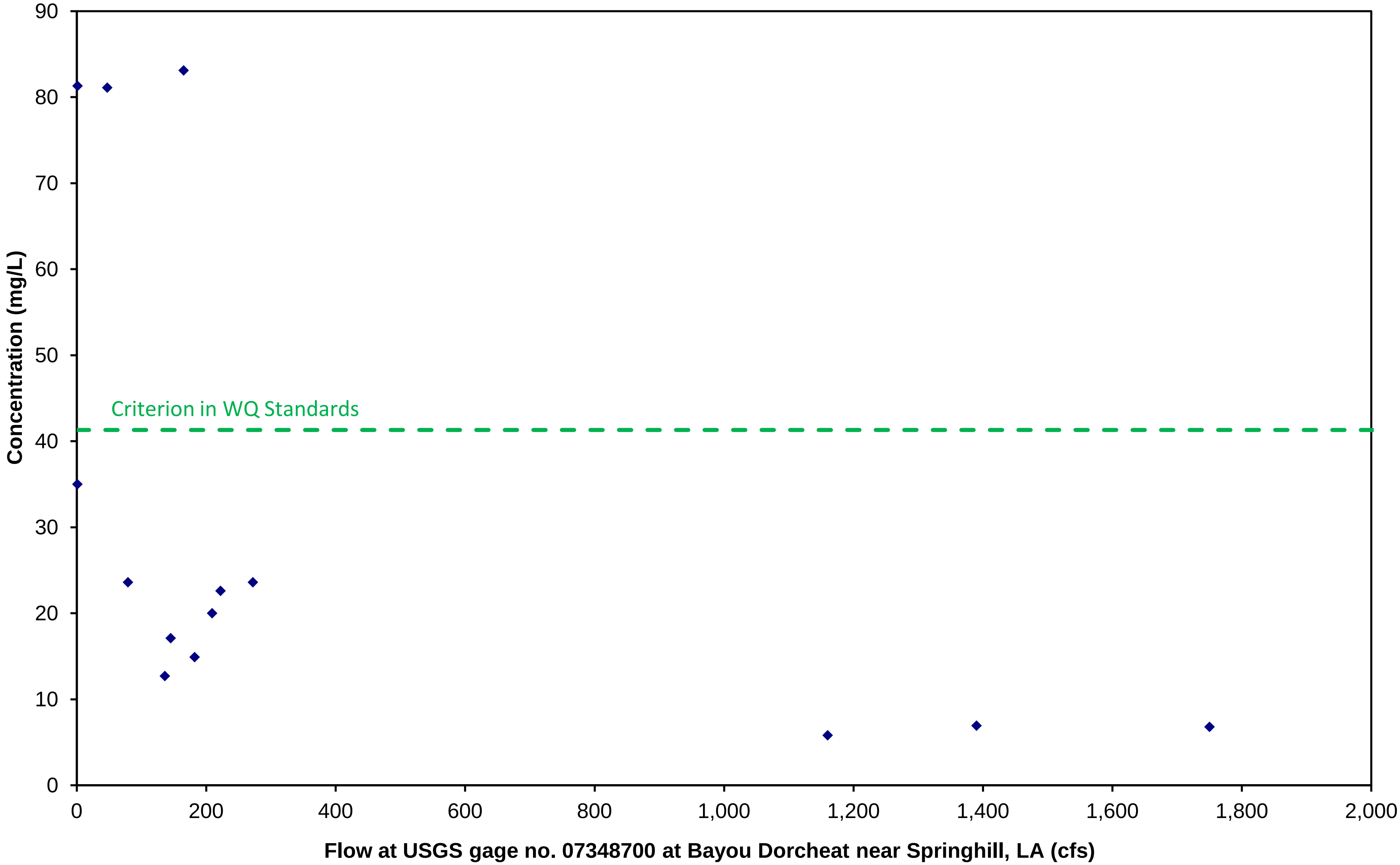
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.18 Dissolved Lead Concentration versus Flow in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)



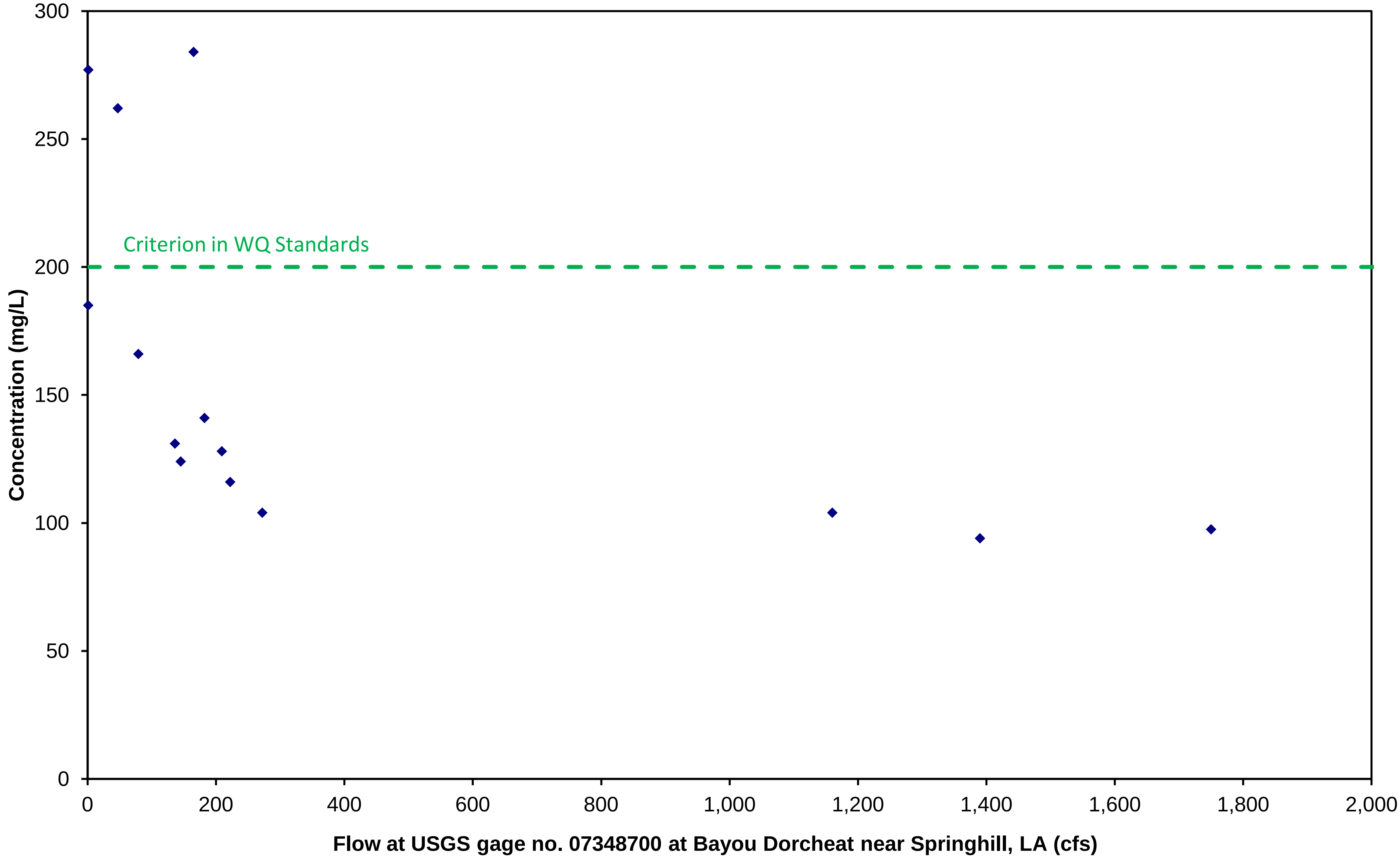
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.19 Sulfate Concentration versus Flow in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)



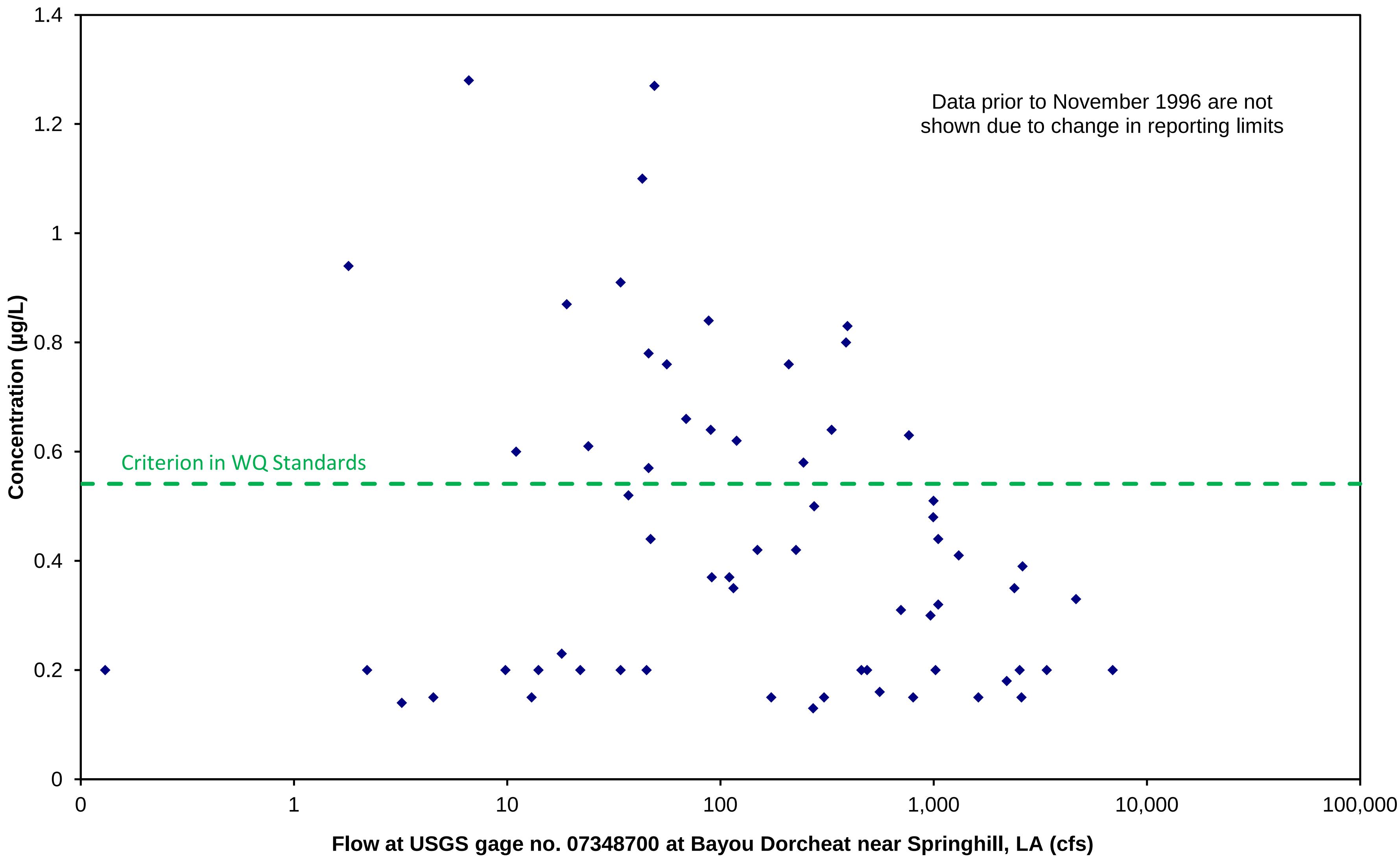
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.20 Total Dissolved Solids Concentration versus Flow in Big Creek NW of Macedonia on Columbia Co. Road 12 (UWBIG02)



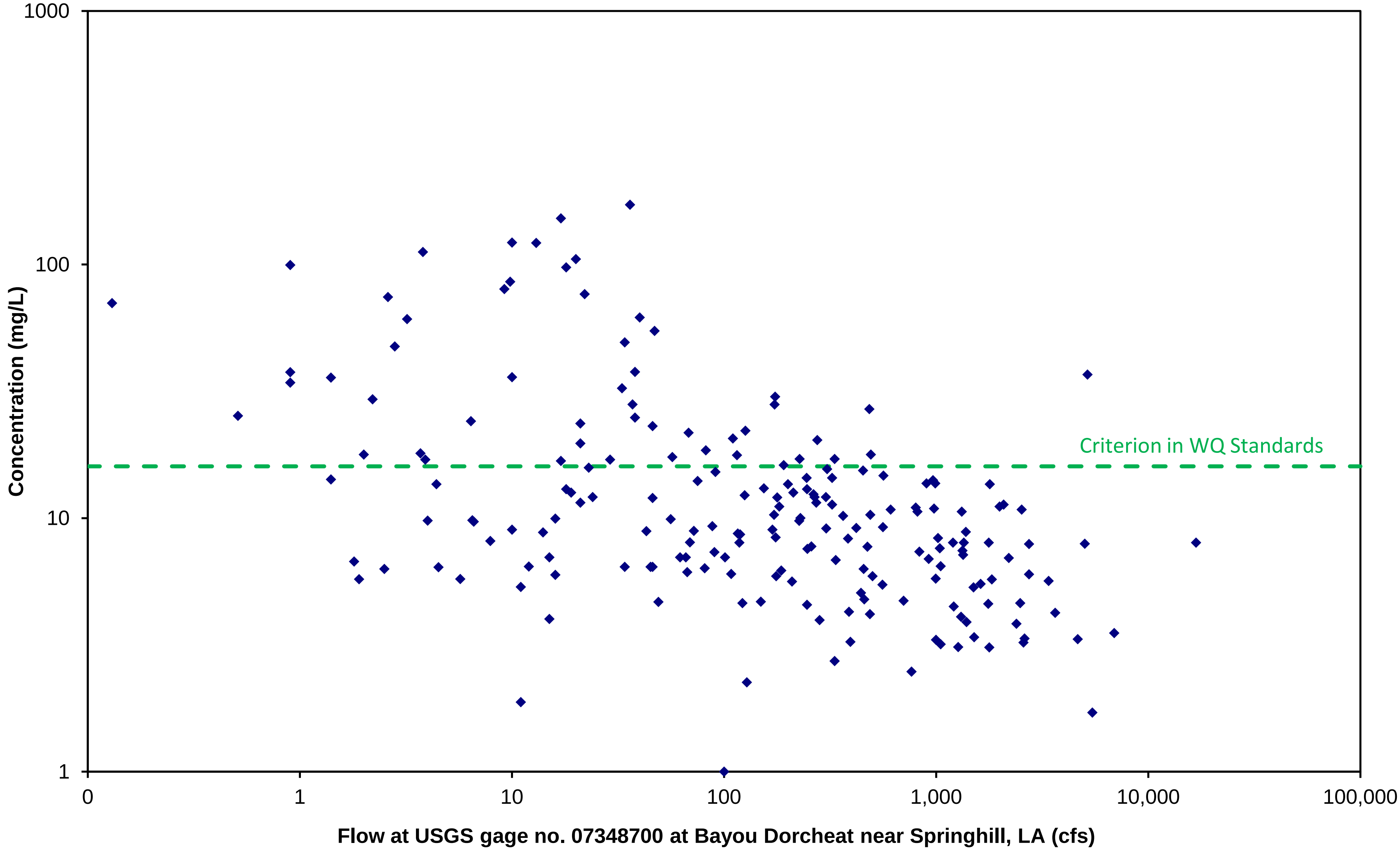
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.21 Dissolved Lead Concentration versus Flow in Dorcheat Bayou east of Taylor, AR (RED0015A)



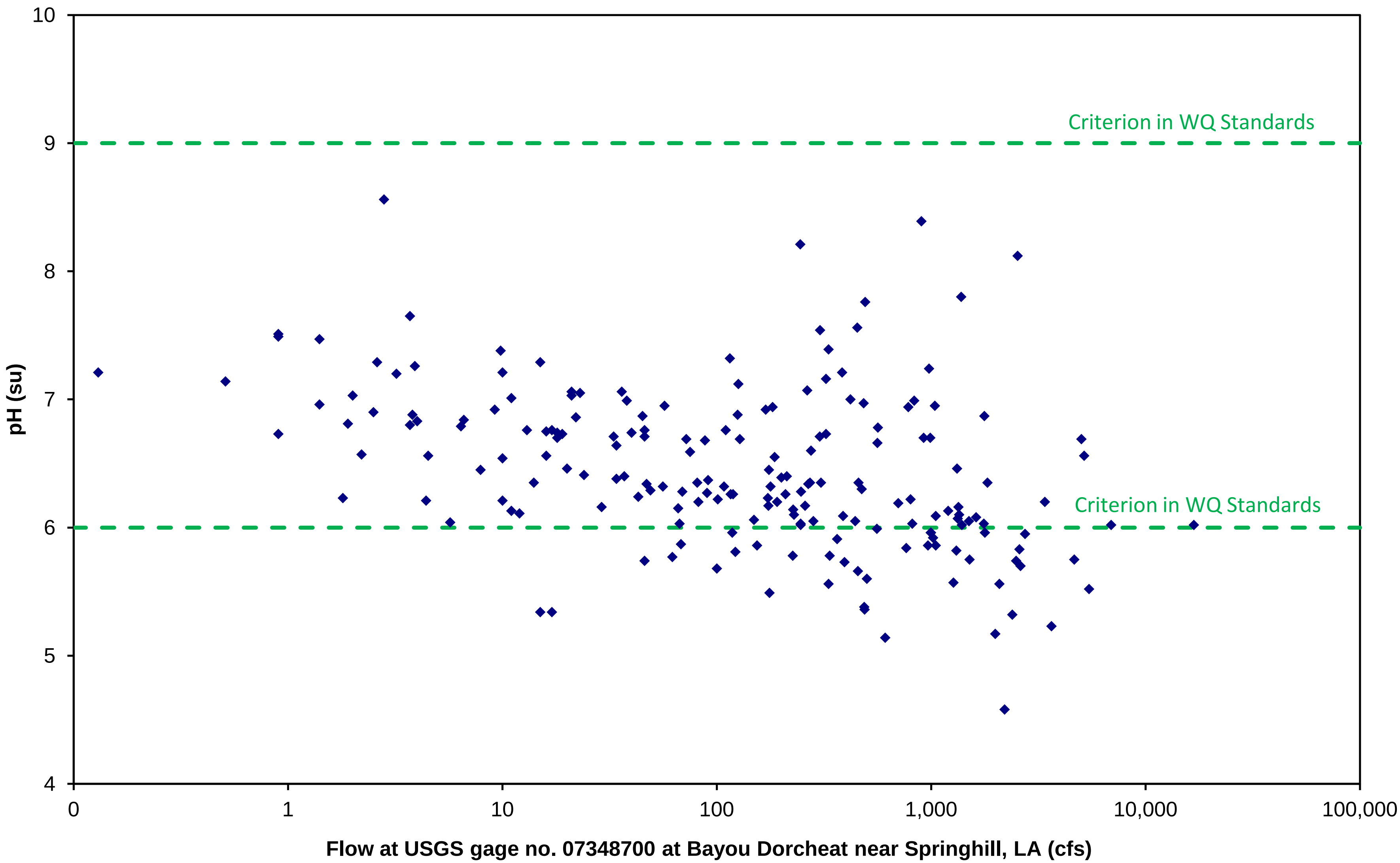
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.22 Sulfate Concentration versus Flow in Dorcheat Bayou east of Taylor, AR (RED0015A)



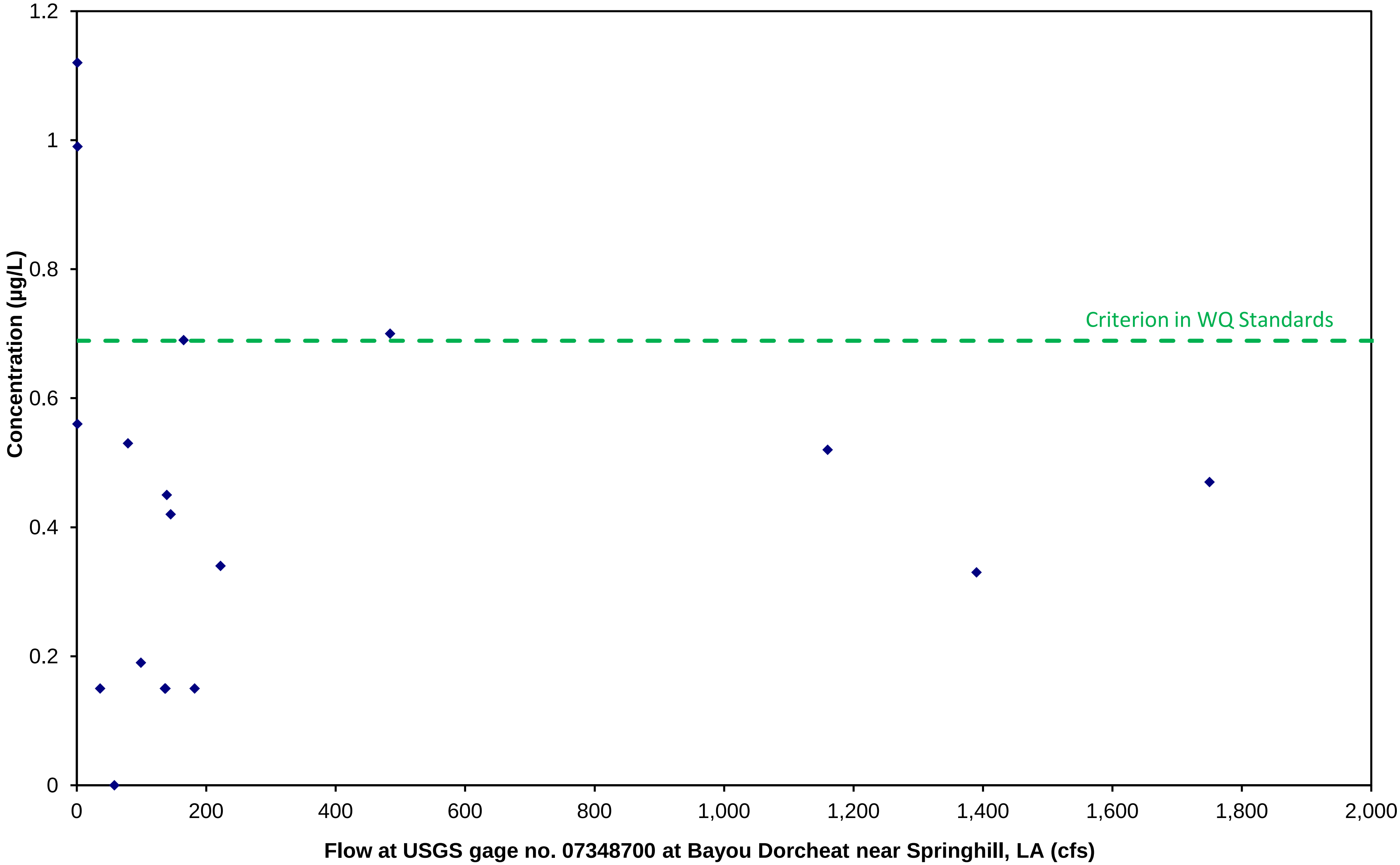
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.23 pH versus Flow in Dorcheat Bayou east of Taylor, AR (RED0015A)



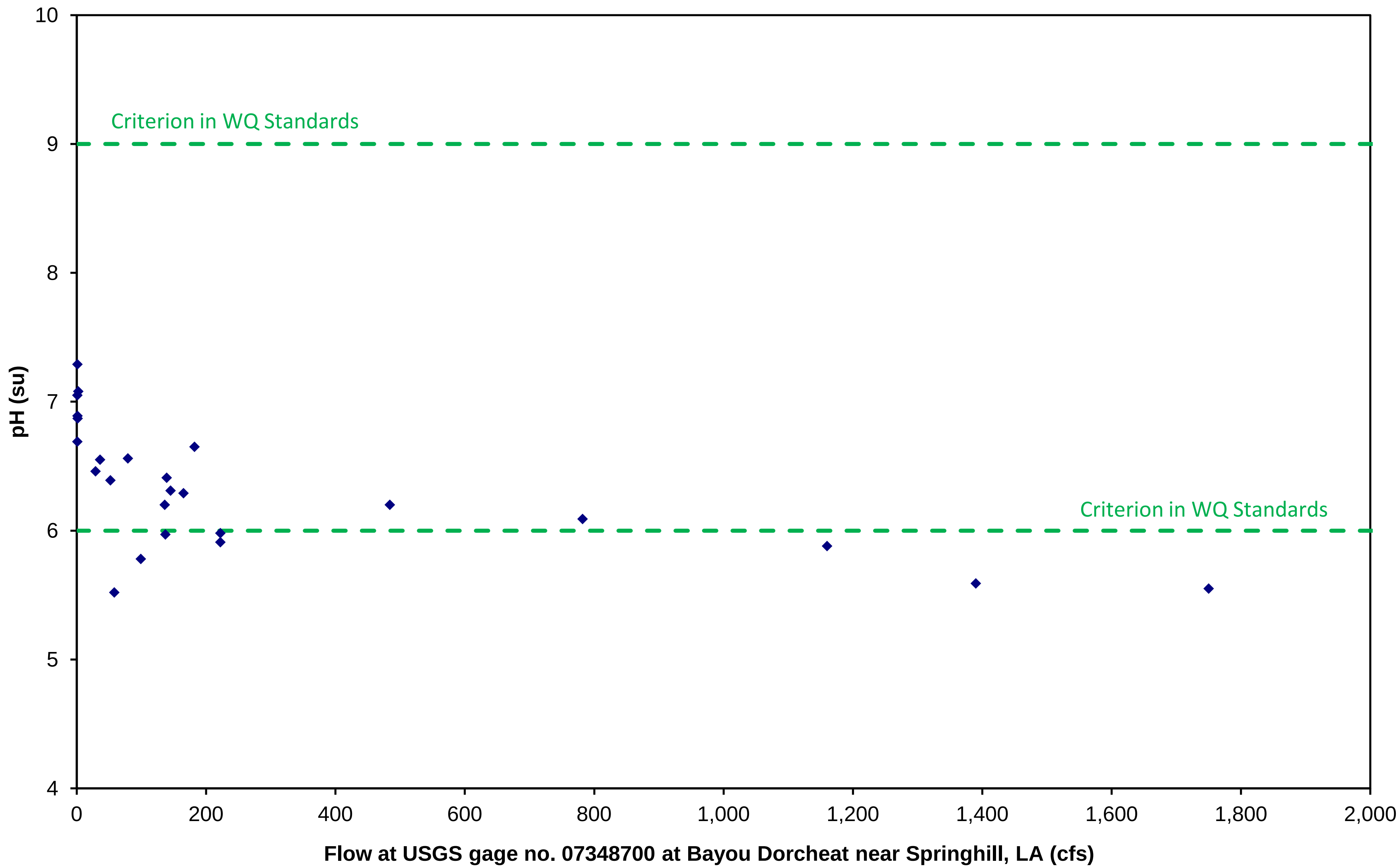
Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.24 Dissolved Lead Concentration versus Flow in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)



Note: Data points shown only for those dates when both concentration and flow are available.

Figure D.25 pH versus Flow in Horsehead Creek at Hwy 19 N of Walkerville, AR (UWHHC01)



Note: Data points shown only for those dates when both concentration and flow are available.

APPENDIX E

Relationships Among Parameters

Figure E.1 Turbidity versus Total Suspended Solids in Bodcau Creek near Lewisville, AR (RED0027)

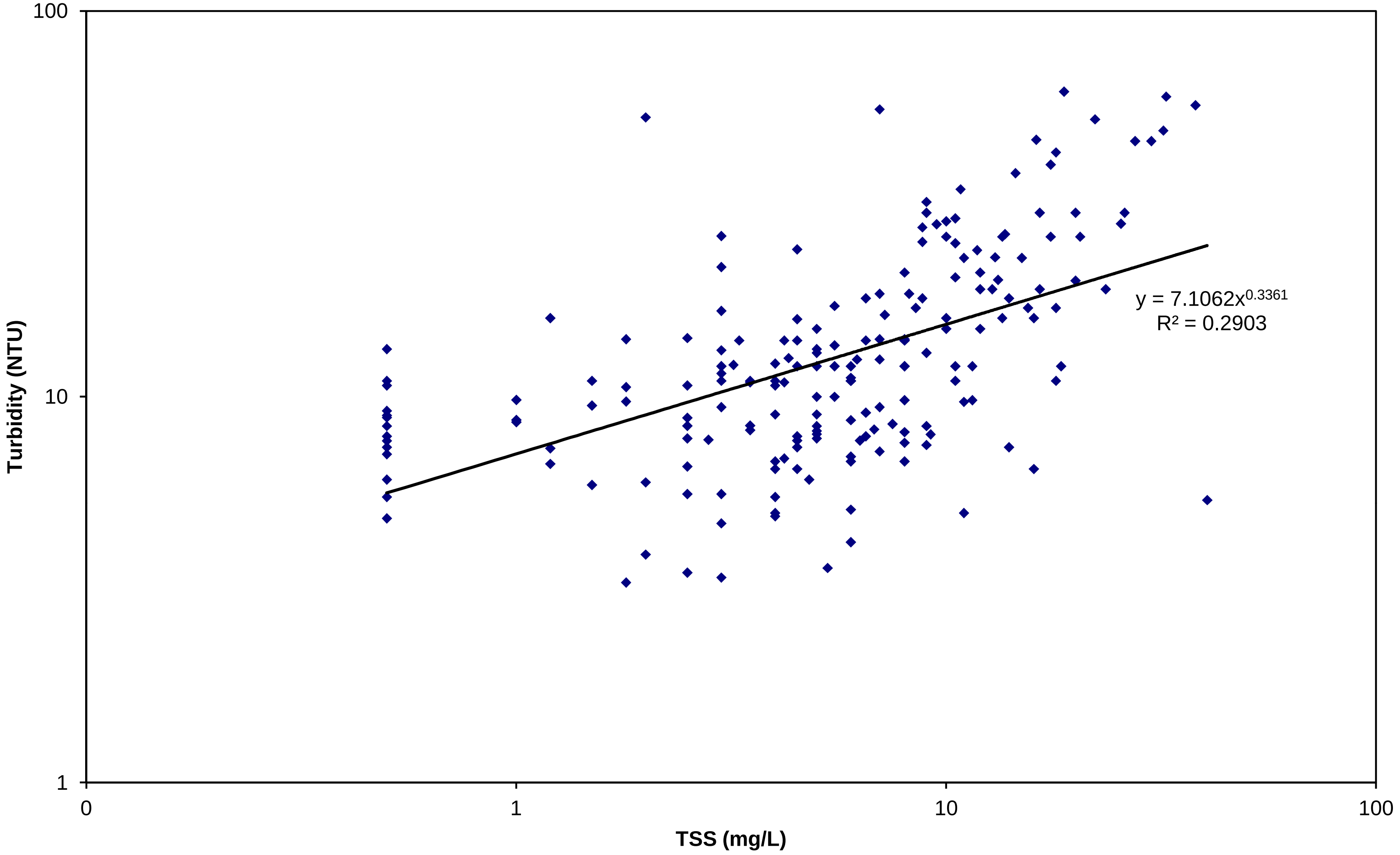


Figure E.2 Dissolved Copper Conc. versus pH in Bodcau Creek near Lewisville (RED0027)

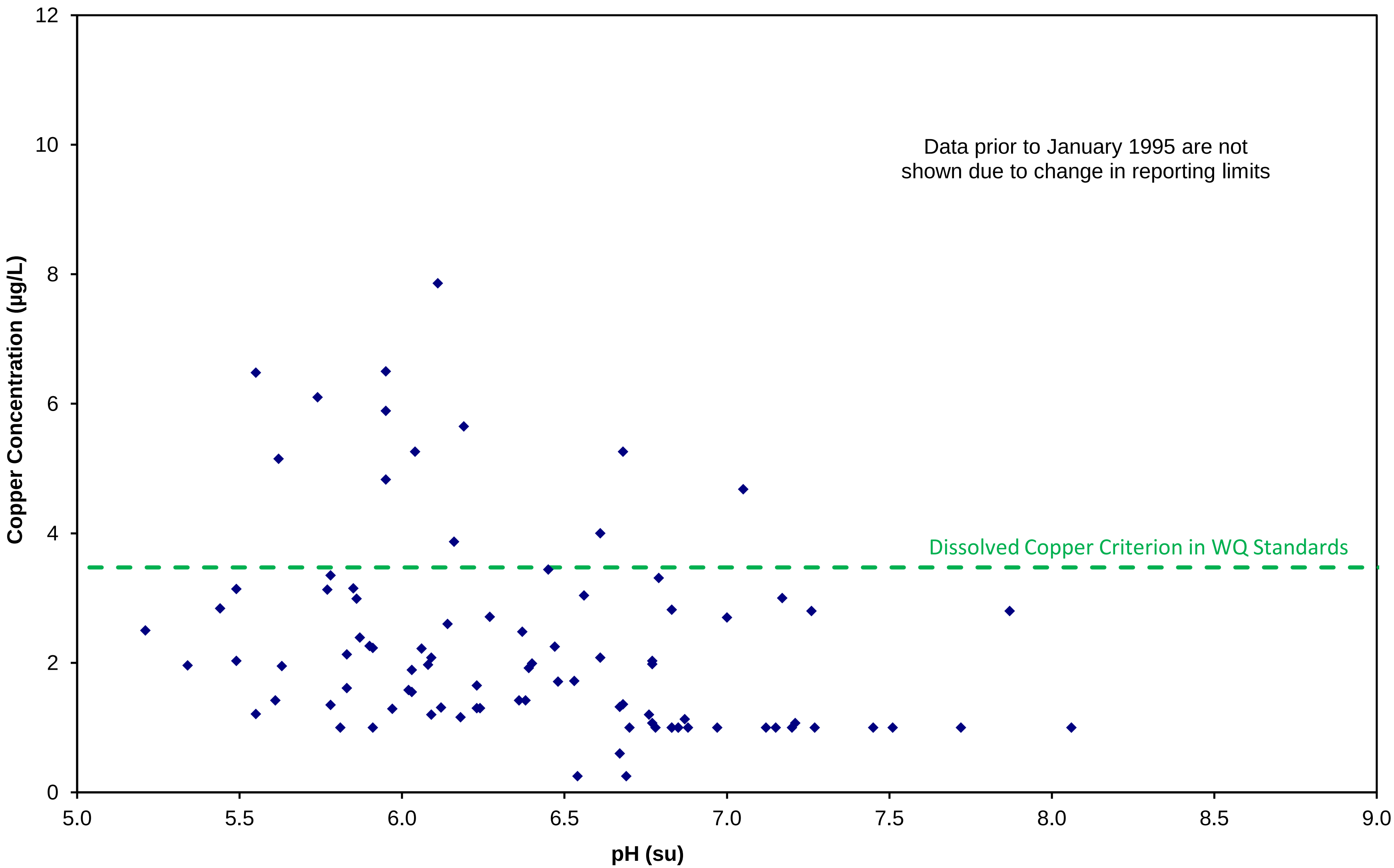


Figure E.3 Dissolved Lead Conc. versus pH in Bodcau Creek near Lewisville (RED0027)

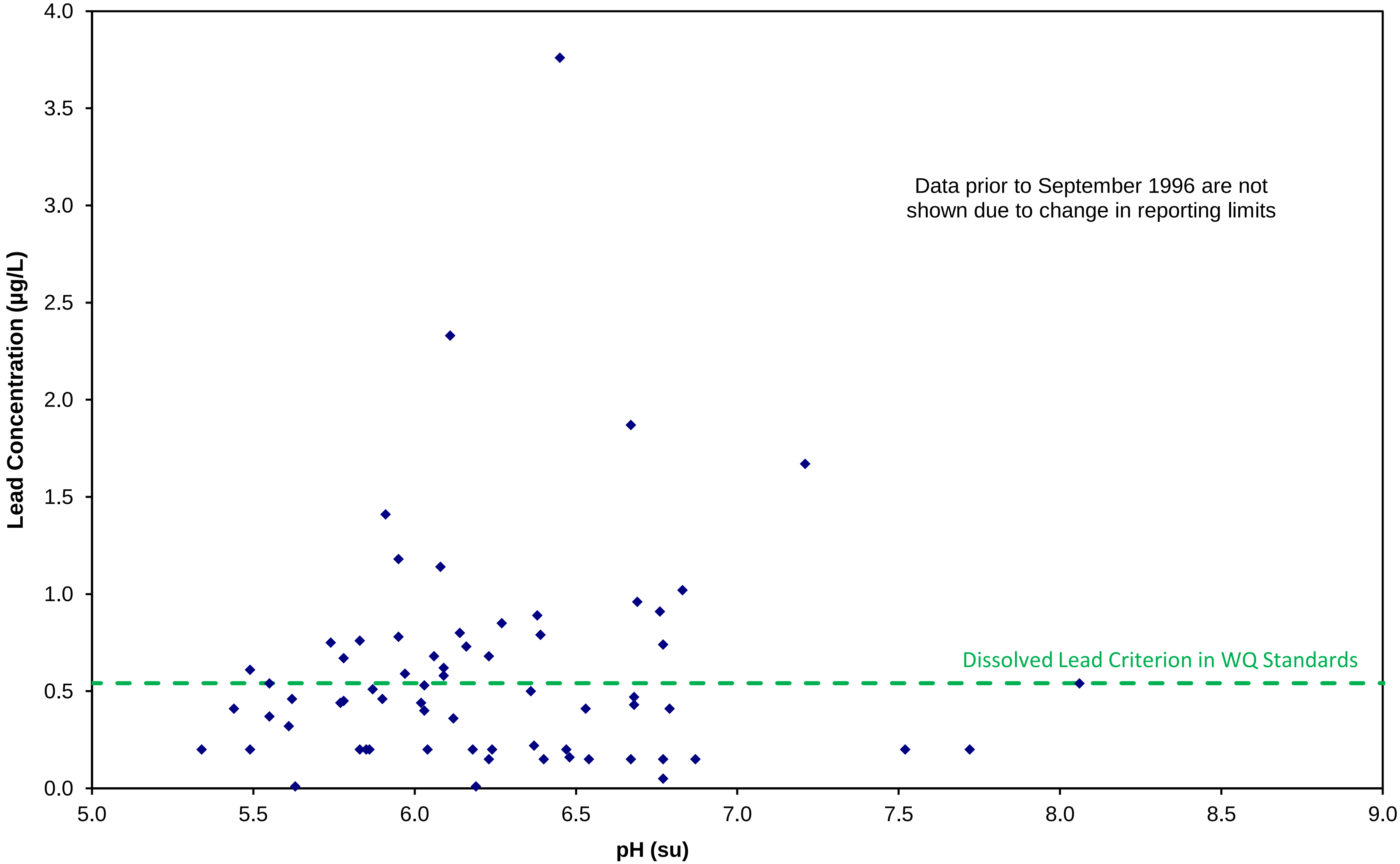


Figure E.4 Dissolved Lead Concentration versus pH in Bayou Dorcheat at Hwy 82; 6 mi W of Waldo, AR (UWBDT02)

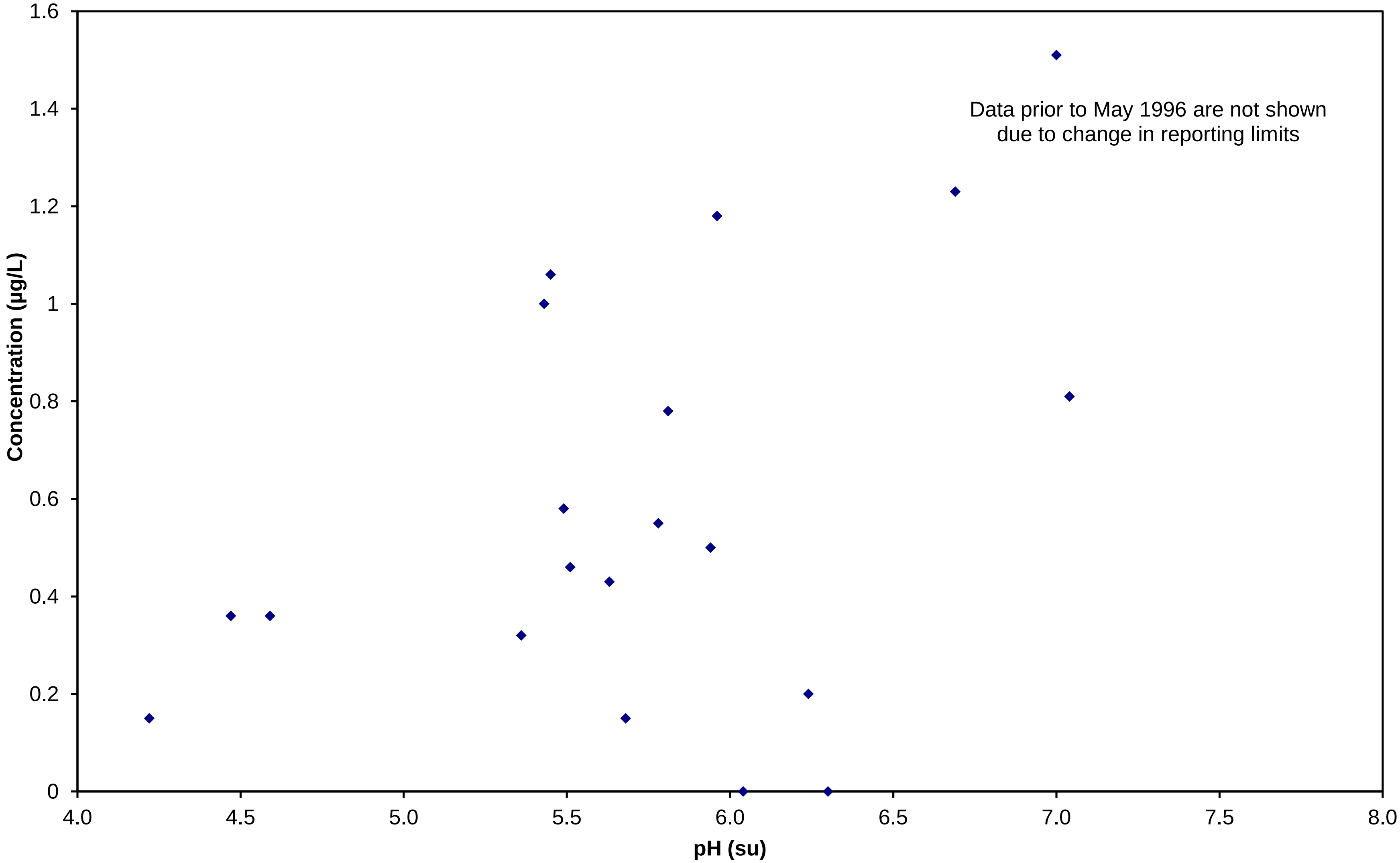


Figure E.5 Turbidity versus Total Suspended Solids in Beech Creek at Hwy 82 near Waldo, AR (UWBCH01)

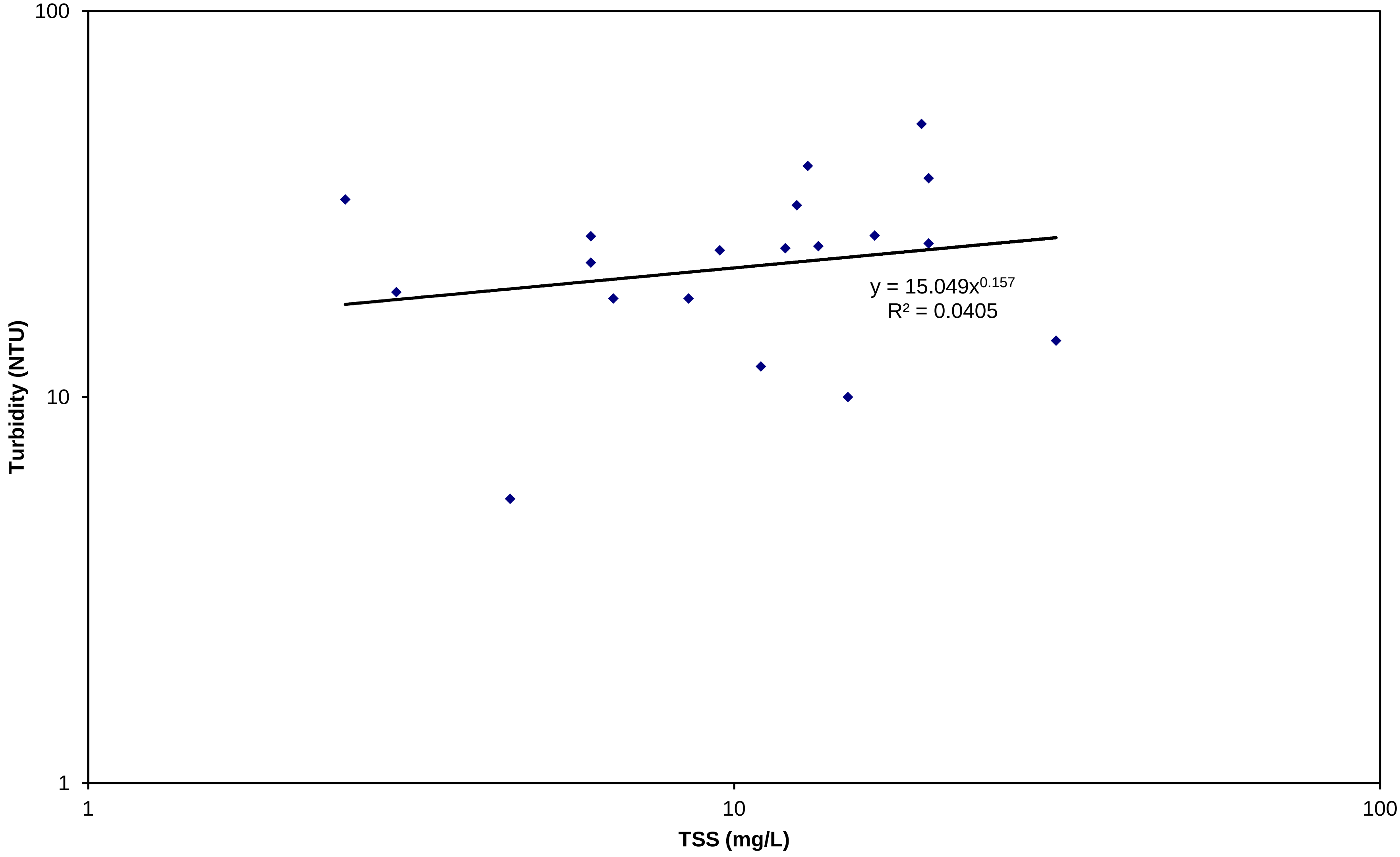


Figure E.6 Dissolved Lead Concentration versus pH in Big Creek at Hwy 132 at Magnolia, AR (UWBIG01)

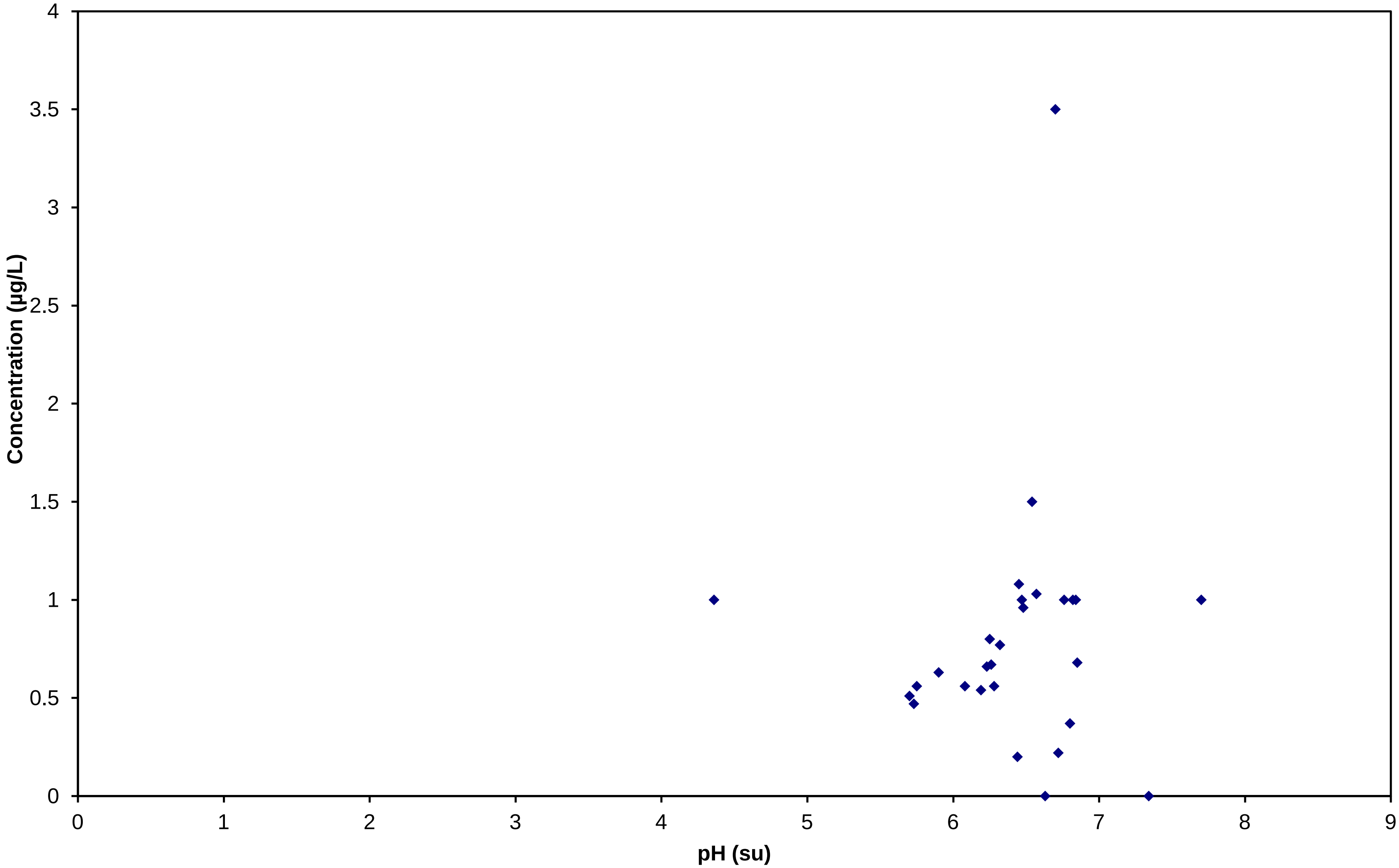
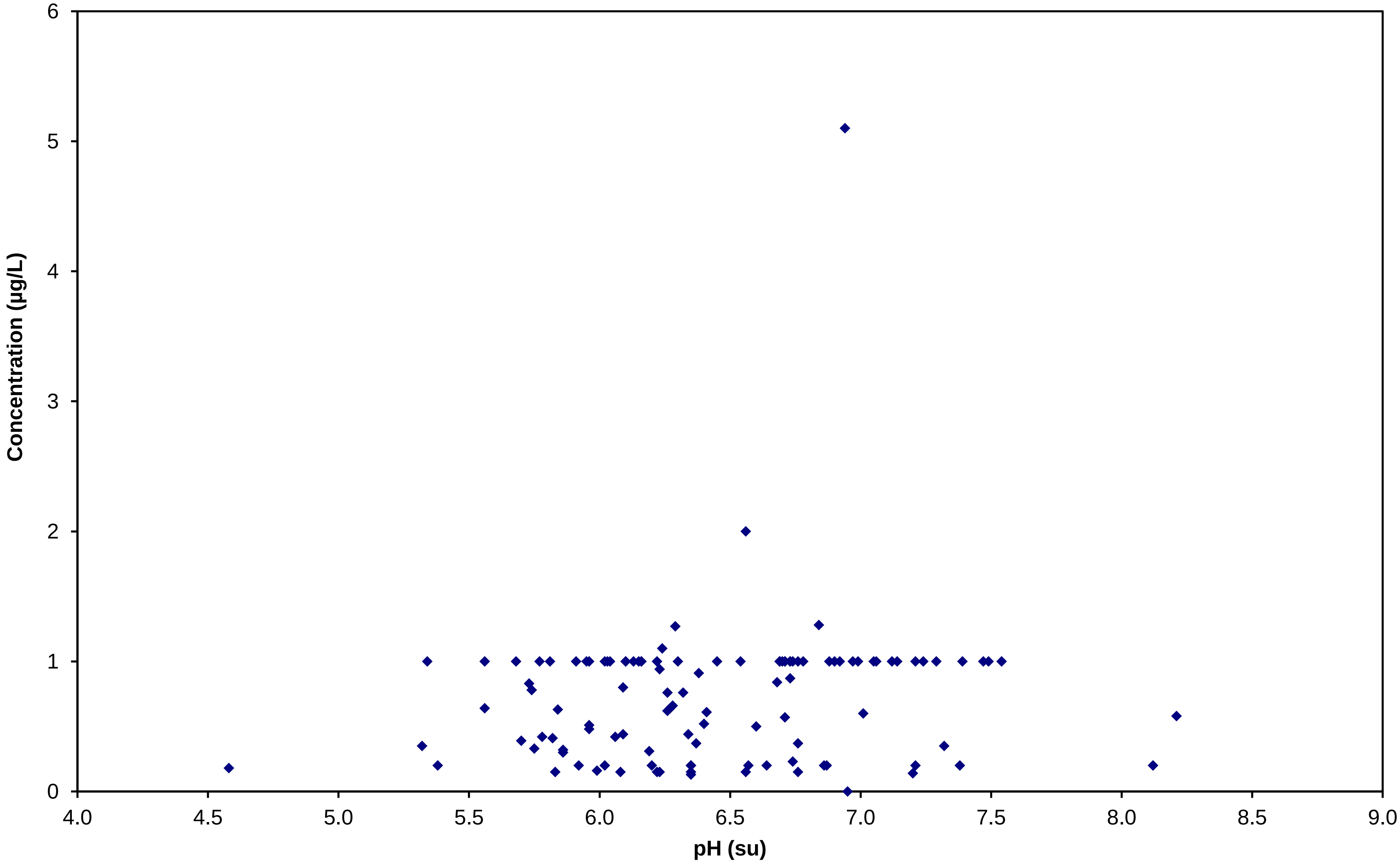


Figure E.7 Dissolved Lead Concentration versus pH in Dorcheat Bayou east of Taylor, AR (RED0015A)



APPENDIX F

TMDL Calculations for Reach 11140205-007

TABLE F.1 ALLOWABLE LOADS OF DISSOLVED LEAD FOR BODCAU CREEK REACH 11140205-007

Drainage area at Bayou Dorcheat gage near Springhill, LA = 605 square miles
Drainage area at downstream end of reach 11140205-007 = 141 square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA = 0.60 cfs
Sum of design flows for non-storm point sources for this reach = 0 MGD = 0.000 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-007 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.058	0.000	0.058	0.00022
99	0.500	0.117	0.000	0.117	0.00043
98.4	0.600	0.140	0.000	0.140	0.00052
96	1.00	0.233	0.000	0.233	0.00087
94	1.40	0.326	0.000	0.326	0.0012
92	1.80	0.420	0.000	0.420	0.0016
90	2.10	0.489	0.000	0.489	0.0018
88	2.50	0.583	0.000	0.583	0.0022
86	3.20	0.746	0.000	0.746	0.0028
84	3.90	0.909	0.000	0.909	0.0034
82	4.80	1.12	0.000	1.12	0.0042
80	5.80	1.35	0.000	1.35	0.0050
78	6.90	1.61	0.000	1.61	0.0060
76	8.00	1.86	0.000	1.86	0.0069
74	9.70	2.26	0.000	2.26	0.0084
72	12.0	2.80	0.000	2.80	0.0104
70	15.0	3.50	0.000	3.50	0.0130
68	18.0	4.20	0.000	4.20	0.0156
66	24.0	5.59	0.000	5.59	0.0208
64	31.0	7.22	0.000	7.22	0.0268
62	39.0	9.09	0.000	9.09	0.0338
60	48.0	11.2	0.000	11.2	0.0416
58	61.0	14.2	0.000	14.2	0.0528
56	75.0	17.5	0.000	17.5	0.0650
54	90.0	21.0	0.000	21.0	0.0779
52	107	24.9	0.000	24.9	0.0927
50	123	28.7	0.000	28.7	0.107
48	144	33.6	0.000	33.6	0.125
46	166	38.7	0.000	38.7	0.144
44	188	43.8	0.000	43.8	0.163
42	218	50.8	0.000	50.8	0.189
40	250	58.3	0.000	58.3	0.217
38	287	66.8	0.000	66.8	0.248
36	326	76.0	0.000	76.0	0.282
34	369	86.0	0.000	86.0	0.320
32	414	96.4	0.000	96.4	0.358
30	465	108	0.000	108	0.403
28	522	122	0.000	122	0.452
26	609	142	0.000	142	0.527
24	697	162	0.000	162	0.603
22	797	186	0.000	186	0.690
20	922	215	0.000	215	0.799
18	1,050	245	0.000	245	0.909
16	1,210	282	0.000	282	1.05

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-007 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
14	1,390	324	0.000	324	1.20
12	1,590	371	0.000	371	1.38
10	1,850	431	0.000	431	1.60
9	1,980	461	0.000	461	1.71
8	2,110	492	0.000	492	1.83
7	2,340	545	0.000	545	2.03
6	2,592	604	0.000	604	2.24
5	2,900	676	0.000	676	2.51
4	3,403	793	0.000	793	2.95
3	4,201	979	0.000	979	3.64
2	5,684	1,325	0.000	1,325	4.92
1	8,223	1,916	0.000	1,916	7.12
0.5	11,654	2,716	0.000	2,716	10.1
0.1	19,254	4,487	0.000	4,487	16.7
0.01	29,277	6,823	0.000	6,823	25.4

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TABLE F.2 COMPONENTS OF TMDL FOR DISSOLVED LEAD FOR BODCAU CREEK REACH 11140205-007

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 1 facilities × 40 ac each = 40 ac

Tot. drain. area for reach 11140203-021 = 141 sq. mi. = 90,240 ac

Drainage area for regul. stormwater as percent of total drainage area = 0.044%

--> WLA for regulated stormwater = 0.044% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.956% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0 MGD = 0.000 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table F.1 for minimum flow within each hydrologic range (cfs) =	431	58.3	11.2	0.49	0.14

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (μg/L) =	0.41	0.41	0.55	0.68	1.00
Existing load from diffuse sources (lbs/day) =	0.953	0.129	0.0332	0.0018	0.00075
Allowable load from diffuse sources (lbs/day) =	0.953	0.129	0.0332	0.0018	0.00052
LA for non-regulated diffuse sources (lbs/day) =	0.9525	0.12894	0.03318	0.001799	0.0005197
WLA for regulated stormwater (lbs/day) =	0.0005	0.00006	0.00002	0.000001	0.0000003
Effluent conc. for non-storm point sources (μg/L) =					
WLA for non-storm point sources (lbs/day) =	0	0	0	0	0
Load reserved for future growth (lbs/day) =	0.649	0.088	0.0084	0.00002	0
TMDL from Table F.1 (lbs/day) =	1.602	0.217	0.0416	0.00182	0.00052
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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Figure F.1 Flow Duration Curve for Bodcau Creek Reach 11140205-007

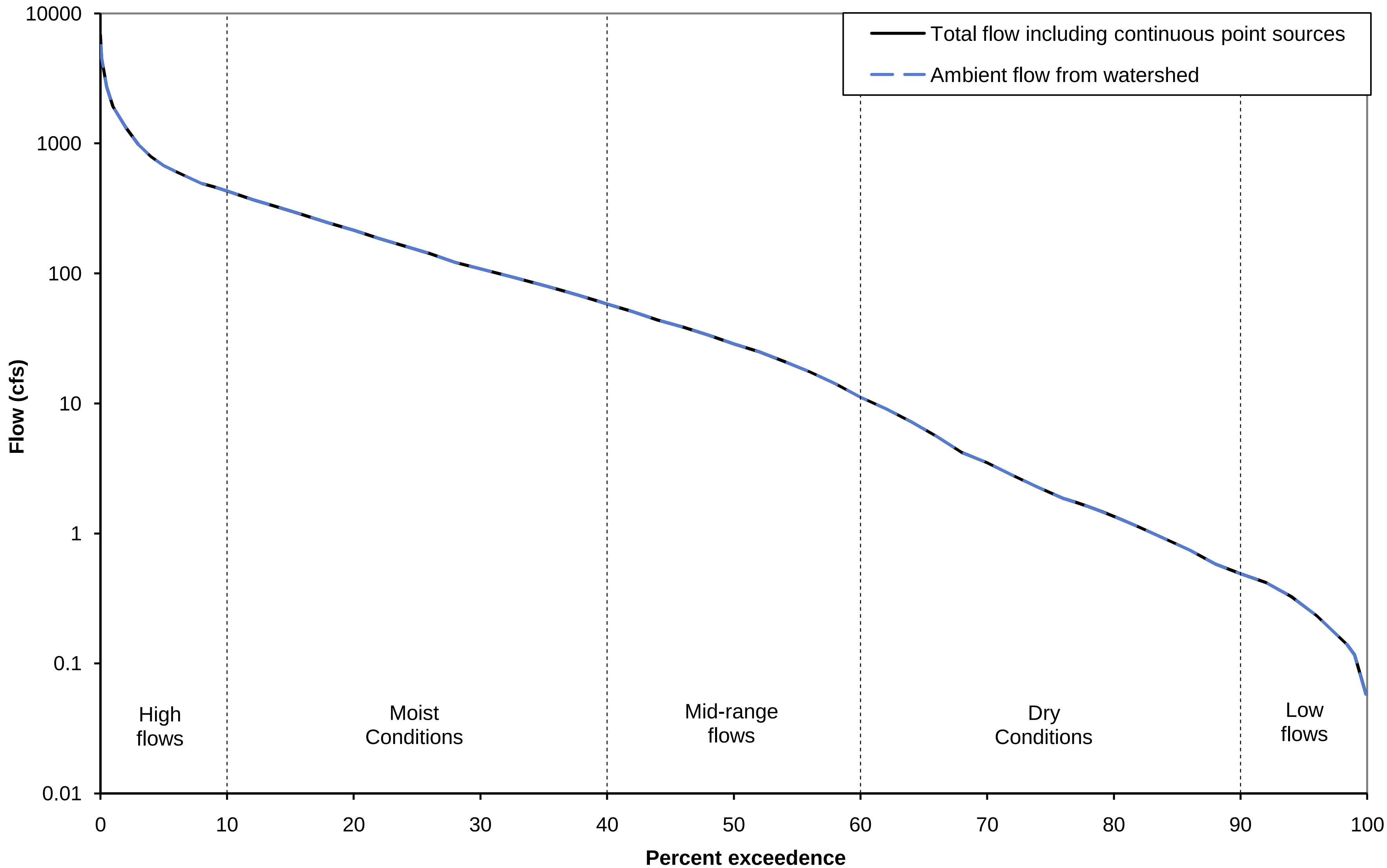
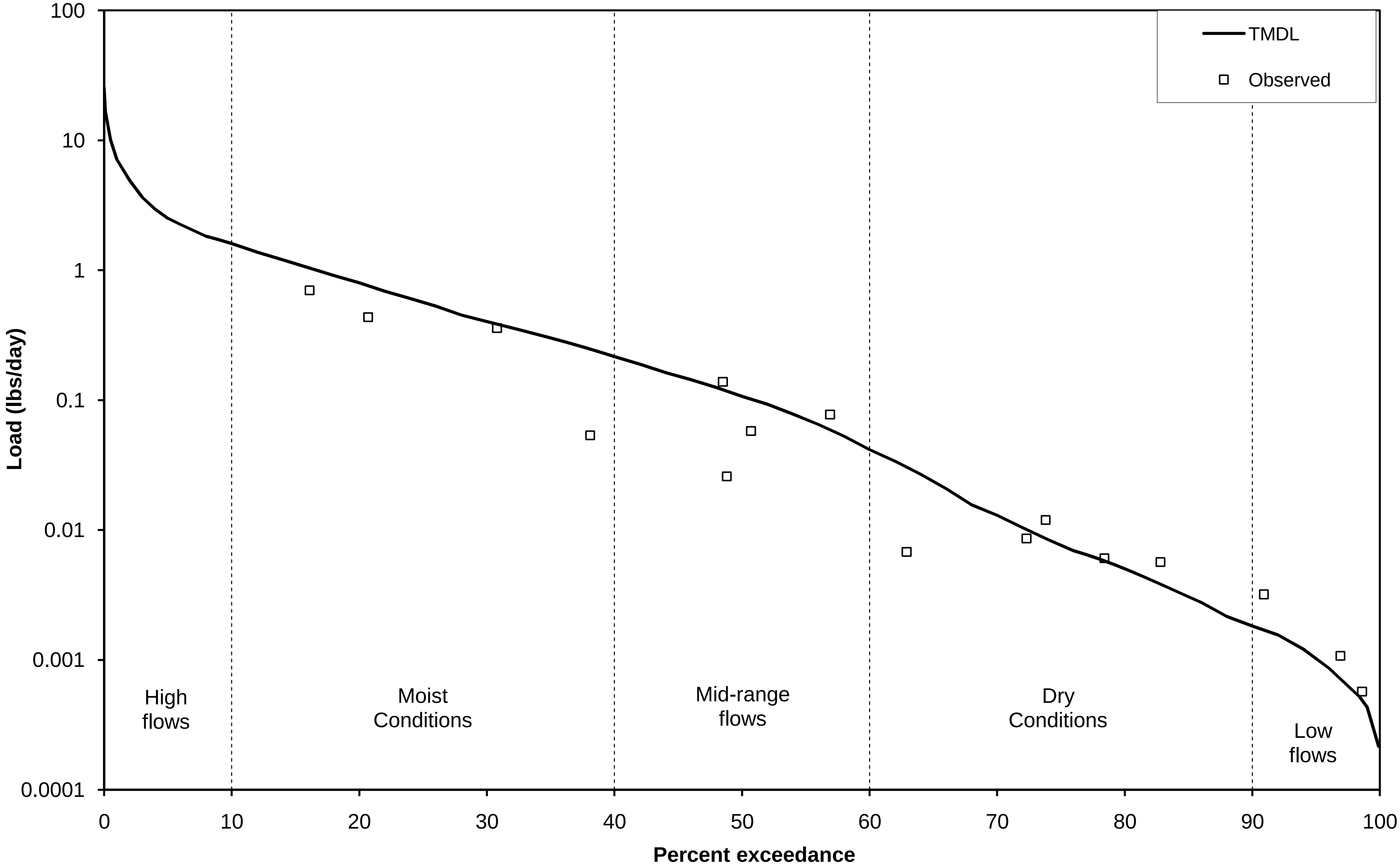


Figure F.2 Dissolved Lead Load Duration Curve for Bodcau Creek Reach 11140205-007



APPENDIX G

TMDL Calculations for Reach 11140205-010

TABLE G.1 ALLOWABLE LOADS OF DISSOLVED LEAD FOR LITTLE BODCAU CREEK REACH 11140205-010

Drainage area at flow gage (Bayou Dorcheat near Springhill, LA) =	605 square miles	
Drainage area at downstream end of reach 11140205-010 =	81 square miles	
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.60 cfs	
Sum of design flows for non-storm point sources for this reach =	0.013 MGD =	0.02 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-010 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.034	0.02	0.054	0.0002
99	0.500	0.067	0.02	0.087	0.0003
98.4	0.600	0.081	0.02	0.101	0.0004
96	1.00	0.134	0.02	0.154	0.0006
94	1.40	0.188	0.02	0.208	0.0008
92	1.80	0.242	0.02	0.262	0.0010
90	2.10	0.282	0.02	0.302	0.0011
88	2.50	0.336	0.02	0.356	0.0013
86	3.20	0.429	0.02	0.450	0.0017
84	3.90	0.523	0.02	0.544	0.0020
82	4.80	0.644	0.02	0.664	0.0025
80	5.80	0.778	0.02	0.799	0.0030
78	6.90	0.926	0.02	0.946	0.0035
76	8.00	1.07	0.02	1.09	0.0041
74	9.70	1.30	0.02	1.32	0.0049
72	12.0	1.61	0.02	1.63	0.0061
70	15.0	2.01	0.02	2.03	0.0076
68	18.0	2.42	0.02	2.44	0.0091
66	24.0	3.22	0.02	3.24	0.012
64	31.0	4.16	0.02	4.18	0.016
62	39.0	5.23	0.02	5.25	0.020
60	48.0	6.44	0.02	6.46	0.024
58	61.0	8.19	0.02	8.21	0.030
56	75.0	10.1	0.02	10.1	0.037
54	90.0	12.1	0.02	12.1	0.045
52	107	14.4	0.02	14.4	0.053
50	123	16.5	0.02	16.5	0.061
48	144	19.3	0.02	19.3	0.072
46	166	22.3	0.02	22.3	0.083
44	188	25.2	0.02	25.3	0.094
42	218	29.3	0.02	29.3	0.109
40	250	33.6	0.02	33.6	0.125
38	287	38.5	0.02	38.5	0.143
36	326	43.8	0.02	43.8	0.163
34	369	49.5	0.02	49.5	0.184
32	414	55.5	0.02	55.5	0.206
30	465	62.4	0.02	62.4	0.232
28	522	70.1	0.02	70.1	0.260
26	609	81.7	0.02	81.8	0.304
24	697	93.5	0.02	93.5	0.348
22	797	107	0.02	107	0.398
20	922	124	0.02	124	0.460
18	1,050	141	0.02	141	0.524
16	1,210	162	0.02	162	0.604
14	1,390	187	0.02	187	0.693
12	1,590	213	0.02	213	0.793

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-010 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
10	1,850	248	0.02	248	0.923
9	1,980	266	0.02	266	0.988
8	2,110	283	0.02	283	1.05
7	2,340	314	0.02	314	1.17
6	2,592	348	0.02	348	1.29
5	2,900	389	0.02	389	1.45
4	3,403	457	0.02	457	1.70
3	4,201	564	0.02	564	2.10
2	5,684	763	0.02	763	2.84
1	8,223	1,104	0.02	1,104	4.10
0.5	11,654	1,564	0.02	1,564	5.81
0.1	19,254	2,584	0.02	2,584	9.60
0.01	29,277	3,929	0.02	3,929	14.6

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TABLE G.2 COMPONENTS OF TMDL FOR DISSOLVED LEAD FOR LITTLE BODCAU CREEK REACH 11140205-010

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 2 facilities × 40 ac each =			80	ac
Tot. drain. area for reach 11140205-010 =	81	sq. mi. =	51,968	ac
Drainage area for regul. stormwater as percent of total drainage area =			0.15%	

--> WLA for regulated stormwater = 0.15% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.85% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0.013 MGD = 0.02 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

Ambient flow at downstream end of reach from Table G.1 for minimum flow within each hydrologic range (cfs) =	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
	248	33.6	6.44	0.28	0.08

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (µg/L) =	0.58	0.58	0.68	0.67	0.67
Existing load from diffuse sources (lbs/day) =	0.777	0.105	0.0236	0.00102	0.00029
Allowable load from diffuse sources (lbs/day) =	0.777	0.105	0.0236	0.00102	0.00029
LA for non-regulated diffuse sources (lbs/day) =	0.7758	0.1048	0.02356	0.001018	0.0002895
WLA for regulated stormwater (lbs/day) =	0.0012	0.0002	0.00004	0.000002	0.0000005
Effluent conc. for non-storm point sources (µg/L) =	0.73	0.73	0.73	0.73	0.73
WLA for non-storm point sources (lbs/day) =	0.00008	0.00008	0.00008	0.00008	0.00008
Load reserved for future growth (lbs/day) =	0.14592	0.01992	0.00032	0.00002	0.000004
TMDL from Table G.1 (lbs/day) =	0.923	0.125	0.024	0.00112	0.000374
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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Figure G.1 Flow Duration Curve for Little Bodcau Creek Reach 11140205-010

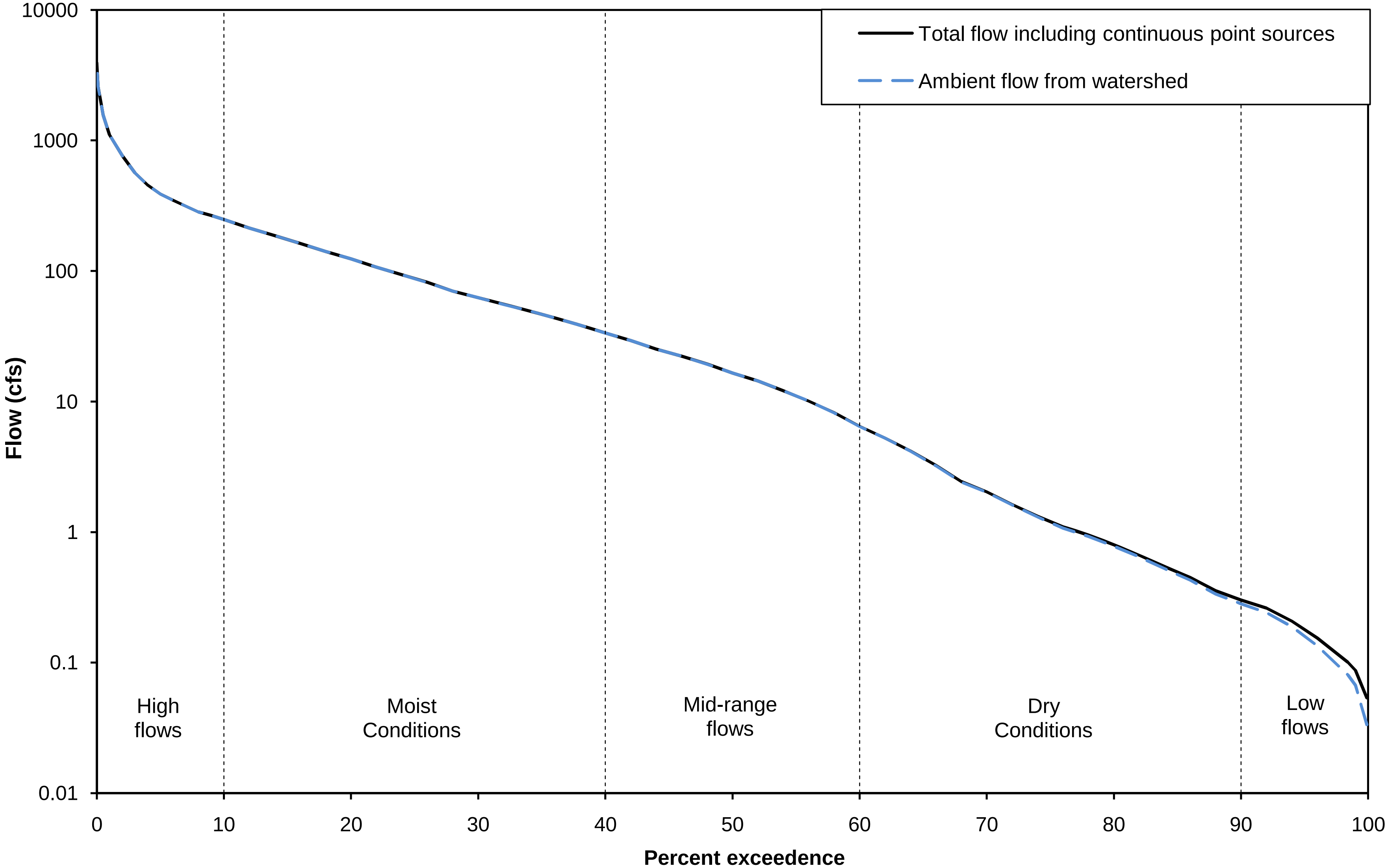
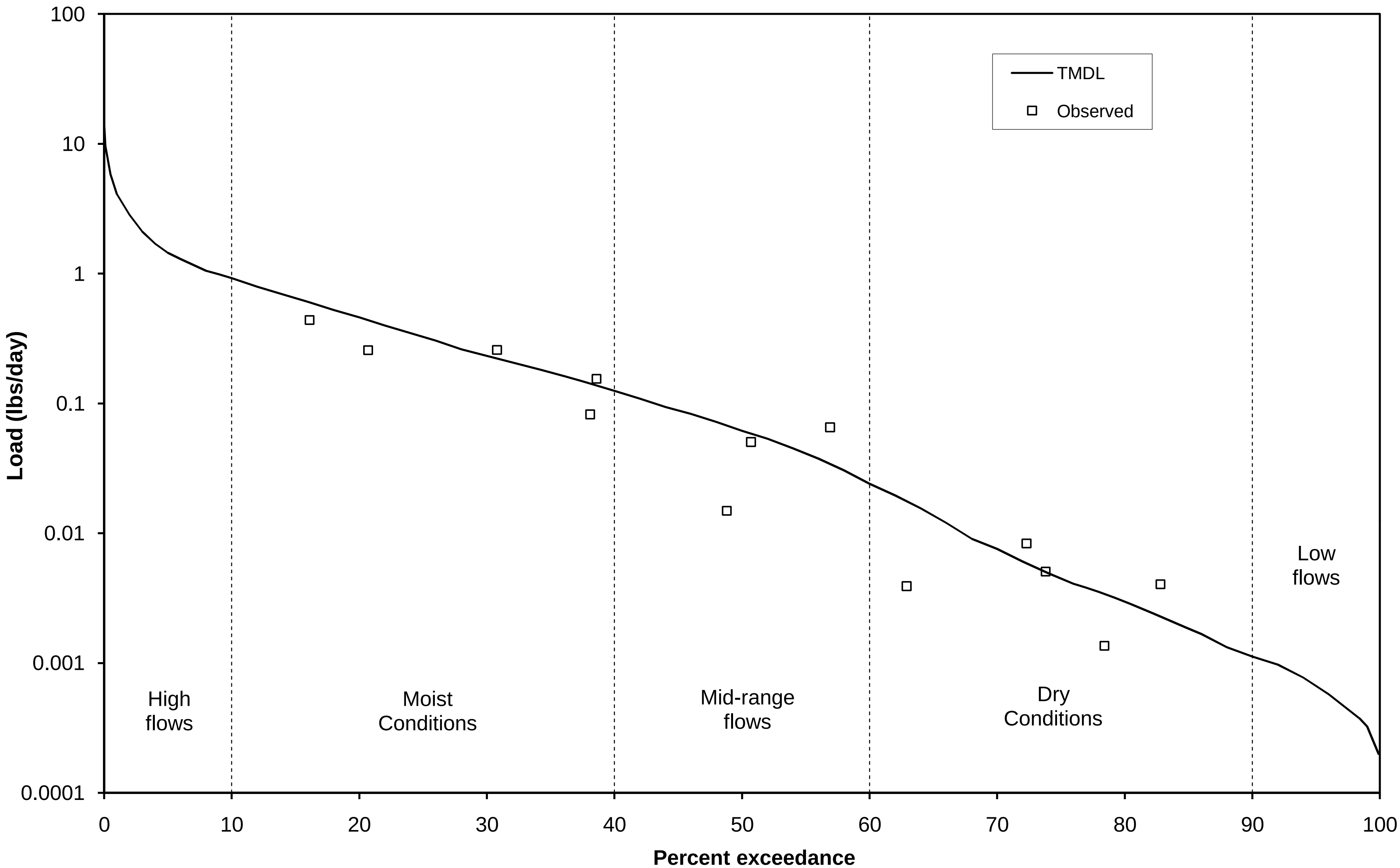


Figure G.2 Dissolved Lead Load Duration Curve for Little Bodcau Creek Reach 11140205-010



APPENDIX H

TMDL Calculations for Reaches 11140205-006 and 11140205-002

TABLE H.1 ALLOWABLE LOADS OF COPPER, LEAD, AND TSS FOR BODCAU CREEK REACH 11140205-006

Drainage area at Bayou Dorcheat gage near Springhill, LA = 605 square miles
Drainage area at downstream end of reach 11140205-006 = 333 square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA = 0.6 cfs
Sum of design flows for non-HCR non-storm point sources for this reach = 1.0995 MGD = 1.70 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-006 (cfs)	Flow from non-storm point sources* (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. copper (lbs/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)	Flow Category	Target TSS (mg/L)	Total allowable load (i.e., TMDL) for TSS (tons/day)
99.9	0.250	0.138	1.72	1.86	0.035	0.005	Base	13.4	0.067
99	0.500	0.275	1.74	2.01	0.038	0.006	Base	13.4	0.073
98.4	0.600	0.330	1.75	2.08	0.039	0.006	Base	13.4	0.075
96	1.00	0.550	1.78	2.33	0.044	0.007	Base	13.4	0.084
94	1.40	0.771	1.81	2.58	0.048	0.008	Base	13.4	0.093
92	1.80	0.991	1.84	2.83	0.053	0.008	Base	13.4	0.102
90	2.10	1.16	1.86	3.02	0.057	0.009	Base	13.4	0.109
88	2.50	1.38	1.89	3.27	0.061	0.010	Base	13.4	0.118
86	3.20	1.76	1.95	3.71	0.069	0.011	Base	13.4	0.134
84	3.90	2.15	2.00	4.15	0.078	0.012	Base	13.4	0.150
82	4.80	2.64	2.07	4.71	0.088	0.014	Base	13.4	0.170
80	5.80	3.19	2.15	5.34	0.100	0.016	Base	13.4	0.193
78	6.90	3.80	2.23	6.03	0.113	0.018	Base	13.4	0.218
76	8.00	4.40	2.32	6.72	0.126	0.020	Base	13.4	0.243
74	9.70	5.34	2.45	7.79	0.146	0.023	Base	13.4	0.281
72	12.0	6.60	2.63	9.23	0.173	0.027	Base	13.4	0.334
70	15.0	8.26	2.86	11.1	0.208	0.032	Base	13.4	0.402
68	18.0	9.91	3.09	13.0	0.243	0.038	Base	13.4	0.470
66	24.0	13.2	3.55	16.8	0.314	0.049	Base	13.4	0.606
64	31.0	17.1	4.09	21.2	0.396	0.062	Base	13.4	0.764
62	39.0	21.5	4.60	26.1	0.488	0.076	Base	13.4	0.942
60	48.0	26.4	4.60	31.0	0.581	0.091	Base	13.4	1.12
59.9	49.0	27.0	4.60	31.6	0.591	0.092	Storm	24	2.04
58	61.0	33.6	4.60	38.2	0.715	0.111	Storm	24	2.47
56	75.0	41.3	4.60	45.9	0.859	0.134	Storm	24	2.97
54	90.0	49.5	4.60	54.1	1.014	0.158	Storm	24	3.50
52	107	58.9	4.60	63.5	1.19	0.185	Storm	24	4.11
50	123	67.7	4.60	72.3	1.35	0.211	Storm	24	4.68
48	144	79.3	4.60	83.9	1.57	0.245	Storm	24	5.43

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140205-006 (cfs)	Flow from non-storm point sources* (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. copper (lbs/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)	Flow Category	Target TSS (mg/L)	Total allowable load (i.e., TMDL) for TSS (tons/day)
46	166	91.4	4.60	96.0	1.80	0.280	Storm	24	6.21
44	188	103	4.60	108	2.02	0.315	Storm	24	7.00
42	218	120	4.60	125	2.33	0.364	Storm	24	8.07
40	250	138	4.60	142	2.66	0.415	Storm	24	9.20
38	287	158	4.60	162	3.04	0.474	Storm	24	10.5
36	326	179	4.60	184	3.45	0.537	Storm	24	11.9
34	369	203	4.60	208	3.89	0.606	Storm	24	13.4
32	414	228	4.60	232	4.35	0.678	Storm	24	15.0
30	465	256	4.60	261	4.88	0.760	Storm	24	16.9
28	522	287	4.60	292	5.47	0.852	Storm	24	18.9
26	609	335	4.60	340	6.36	0.991	Storm	24	22.0
24	697	383	4.60	388	7.27	1.13	Storm	24	25.1
22	797	439	4.60	443	8.30	1.29	Storm	24	28.7
20	922	508	4.60	512	9.59	1.49	Storm	24	33.2
18	1,050	578	4.60	583	10.9	1.70	Storm	24	37.7
16	1,210	666	4.60	671	12.6	1.96	Storm	24	43.4
14	1,390	765	4.60	770	14.4	2.25	Storm	24	49.8
12	1,590	875	4.60	880	16.5	2.57	Storm	24	56.9
10	1,850	1,018	4.60	1,023	19.2	2.98	Storm	24	66.2
9	1,980	1,090	4.60	1,094	20.5	3.19	Storm	24	70.8
8	2,110	1,161	4.60	1,166	21.8	3.40	Storm	24	75.5
7	2,340	1,288	4.60	1,293	24.2	3.77	Storm	24	83.7
6	2,592	1,426	4.60	1,431	26.8	4.18	Storm	24	92.6
5	2,900	1,596	4.60	1,601	30.0	4.67	Storm	24	104
4	3,403	1,873	4.60	1,878	35.2	5.48	Storm	24	122
3	4,201	2,312	4.60	2,317	43.4	6.76	Storm	24	150
2	5,684	3,129	4.60	3,133	58.7	9.14	Storm	24	203
1	8,223	4,526	4.60	4,531	84.8	13.2	Storm	24	293
0.5	11,654	6,415	4.60	6,419	120	18.7	Storm	24	415
0.1	19,254	10,598	4.60	10,602	199	30.9	Storm	24	686
0.01	29,277	16,114	4.60	16,119	302	47.0	Storm	24	1,043

* Includes 1.70 cfs of flow from non-HCR discharges plus City of Stamps WWTP flow (14% of ambient flow up to maximum of 2.90 cfs).

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TABLE H.2 COMPONENTS OF TMDLS FOR COPPER, LEAD, AND TURBIDITY FOR BODCAU CREEK REACH 11140205-006

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 4 facilities × 40 ac each = 160 ac

Tot. drain. area for reach 11140205-006 = 333 sq. mi. = 213,120 ac

Drainage area for regul. stormwater as percent of total drainage area = 0.08%

--> WLA for regulated stormwater = 0.08% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.92% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 1.0995 MGD = 1.701 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table H.1 for minimum flow within each hydrologic range (cfs) =	1018	138	26.4	1.16	0.33

DISSOLVED COPPER

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (µg/L) =	3.97	3.91	4.64	4.98	1.85
Existing load from diffuse sources (lbs/day) =	21.78	2.904	0.66176	0.03107	0.0033
Allowable load from diffuse sources (lbs/day) =	19.0688	2.5769	0.49476	0.02165	0.0033
LA for non-regulated diffuse sources (lbs/day) =	19.0535	2.57483	0.49436	0.02163	0.003297
WLA for regulated stormwater (lbs/day) =	0.0153	0.00207	0.0004	0.00002	0.000003
Effluent conc. for non-storm point sources (µg/L) =	3.47	3.47	3.47	3.47	3.47
Sum of design flows plus HCR flow (cfs) =	4.60	4.60	4.60	1.86	1.75
WLA for non-storm point sources (lbs/day) =	0.08612	0.08612	0.08612	0.03487	0.03271
Load reserved for future growth (lbs/day) =	0.00008	0.00001	0.00004	0.00001	0.0029
TMDL from Table H.1 (lbs/day) =	19.155	2.66303	0.58092	0.05653	0.03891
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (µg/L) =	0.555	0.771	0.838	0.859	1.31
Existing load from diffuse sources (lbs/day) =	3.05	0.572	0.119	0.0054	0.00233
Allowable load from diffuse sources (lbs/day) =	2.971	0.4015	0.07709	0.00337	0.00096
LA for non-regulated diffuse sources (lbs/day) =	2.968	0.4011	0.07702	0.003367	0.0009592
WLA for regulated stormwater (lbs/day) =	0.003	0.0004	0.00007	0.000003	0.0000008
Effluent conc. for non-storm point sources (µg/L) =	0.54	0.54	0.54	0.54	0.54
Sum of design flows plus HCR flow (cfs) =	4.60	4.60	4.60	1.86	1.75
WLA for non-storm point sources (lbs/day) =	0.01341	0.01341	0.01341	0.00543	0.00509
Load reserved for future growth (lbs/day) =	0.00059	0.00009	0	0.00001	0.00001
TMDL from Table H.1 (lbs/day) =	2.985	0.415	0.0905	0.00881	0.00606
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

TSS (surrogate for turbidity)

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
TSS target (mg/L) =	24.0	24.0	13.4	13.4	13.4
Average existing conc. from diffuse sources (mg/L) =	12.9	10.7	9.8	21.5	31.5
Existing load from diffuse sources (tons/day) =	35.6	3.98	0.7	0.067	0.0281
Allowable load from diffuse sources (tons/day) =	35.6	3.98	0.7	0.042	0.0119
LA for non-regulated diffuse sources (tons/day) =	35.571	3.9768	0.69944	0.041966	0.01189
WLA for regulated stormwater (tons/day) =	0.029	0.0032	0.00056	0.000034	0.00001
Effluent conc. for non-storm point sources (mg/L) =					
WLA for non-storm point sources (tons/day) =	0	0	0	0	0
Load reserved for future growth (tons/day) =	30.6	5.22	0.42	0.067	0.0632
TMDL from Table H.1 (tons/day) =	66.2	9.2	1.12	0.109	0.0751
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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TABLE H.3 COMPONENTS OF TMDLS FOR COPPER, LEAD, AND TURBIDITY FOR BODCAU CREEK REACH 11140205-002

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 1 facilities × 40 ac each =			40	ac
Tot. drain. area for reach 11140205-002 =	415	sq. mi. =	265,600	ac
Drainage area for regul. stormwater as percent of total drainage area =			0.02%	
--> WLA for regulated stormwater =	0.02% of allowable load from diffuse sources			
--> LA for non-regulated diffuse sources =	99.98% of allowable load from diffuse sources			

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0.018 MGD = 0.028 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

Ambient flow at downstream end of reach calculated from	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Table H.2 for minimum flow within each hydrologic range (cfs) =	1269	171	32.9	1.44	0.41

DISSOLVED COPPER

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (μg/L) =	3.97	3.91	4.64	4.98	1.85
Existing load from diffuse sources (lbs/day) =	27.14	3.619	0.82472	0.0387165	0.0041
Allowable load from diffuse sources (lbs/day) =	23.76	3.211	0.61659	0.0269758	0.0041
LA for non-regulated diffuse sources (lbs/day) =	23.7552	3.21035	0.616466	0.0269704	0.0040991
WLA for regulated stormwater (lbs/day) =	0.0048	0.00065	0.000124	0.0000054	0.0000009
Effluent conc. for non-storm point sources (μg/L) =	3.47	3.47	3.47	3.47	3.47
WLA for non-storm point sources (lbs/day) =	0.0005213	0.0005213	0.0005213	0.0005213	0.0005213
Load reserved for future growth (lbs/day) =	0.0044787	0.0003787	0.0000007	0.0000003	0.0036076
TMDL calc. from Table H.1 (lbs/day) =	23.765	3.2119	0.617112	0.0274974	0.0082289
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (µg/L) =	0.555	0.771	0.838	0.859	1.31
Existing load from diffuse sources (lbs/day) =	3.7988	0.7135	0.1487	0.0067	0.0029
Allowable load from diffuse sources (lbs/day) =	3.7028	0.5	0.096	0.004	0.001
LA for non-regulated diffuse sources (lbs/day) =	3.702	0.4999	0.09598	0.0039992	0.0009998
WLA for regulated stormwater (lbs/day) =	0.0008	0.0001	0.00002	0.0000008	0.0000002
Effluent conc. for non-storm point sources (µg/L) =	0.54	0.54	0.54	0.54	0.54
WLA for non-storm point sources (lbs/day) =	0.000082	0.000082	0.000082	0.000082	0.000082
Load reserved for future growth (lbs/day) =	0.000118	0.000418	0.000068	0.000198	0.000198
TMDL calc. from Table H.1 (lbs/day) =	3.703	0.5005	0.09615	0.00428	0.00128
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

TSS (surrogate for turbidity)

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
TSS target (mg/L) =	24.0	24.0	13.4	13.4	13.4
Average existing conc. from diffuse sources (mg/L) =	12.9	10.7	9.8	21.5	31.5
Existing load from diffuse sources (tons/day) =	44.3	4.97	0.872	0.084	0.035
Allowable load from diffuse sources (tons/day) =	44.3	4.97	0.872	0.0521	0.0149
LA for non-regulated diffuse sources (tons/day) =	44.291	4.969	0.8718	0.05208	0.014897
WLA for regulated stormwater (tons/day) =	0.009	0.001	0.0002	0.00002	0.000003
Effluent conc. for non-storm point sources (mg/L) =					
WLA for non-storm point sources (tons/day) =	0	0	0	0	0
Load reserved for future growth (tons/day) =	37.8	6.13	0.319	0.001	0.001
TMDL calc. from Table H.1 (tons/day) =	82.1	11.1	1.191	0.0531	0.0159
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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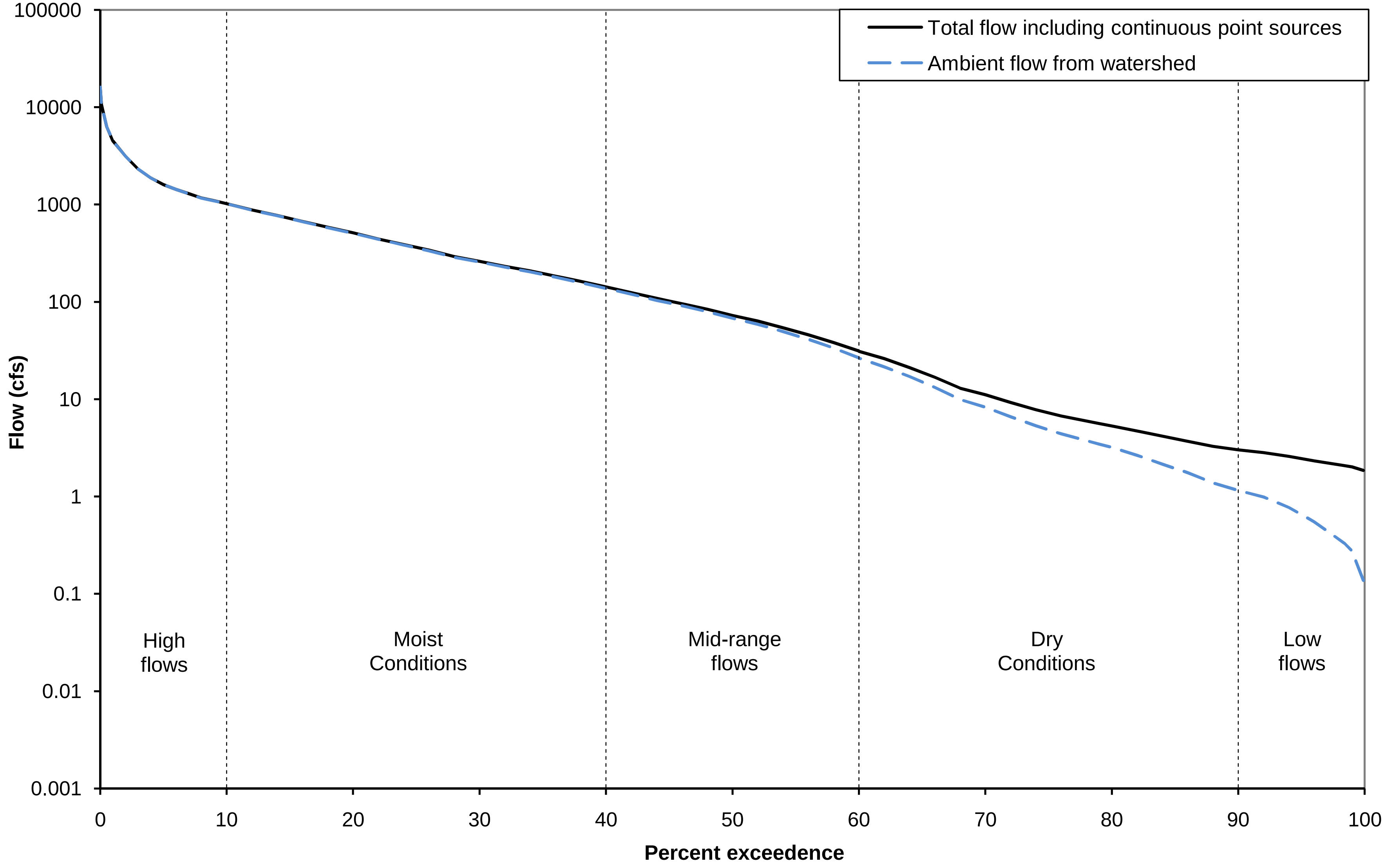
Figure H.1 Flow Duration Curve for Bodcau Creek Reach 11140205-006



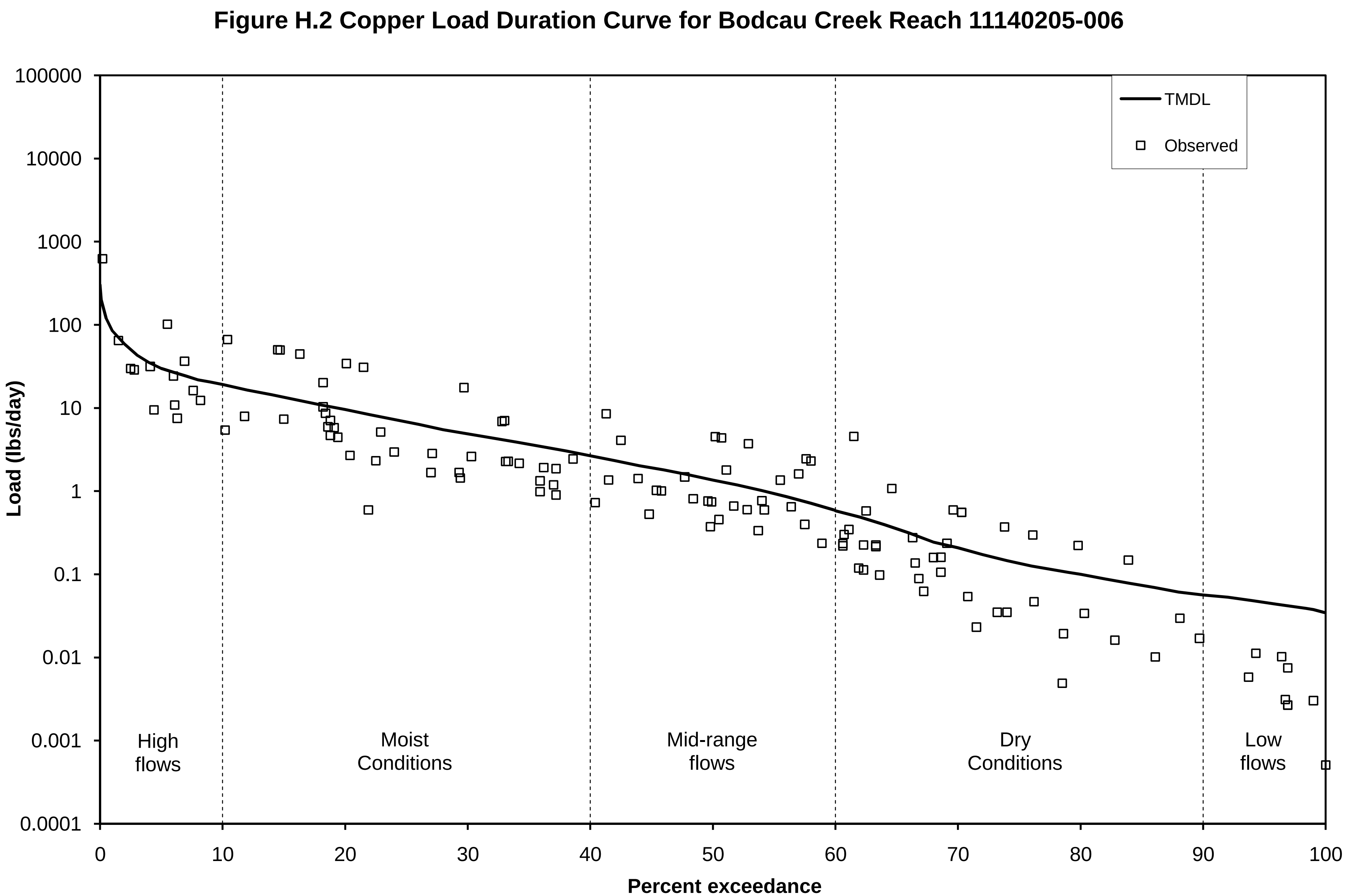


Figure H.2 Copper Load Duration Curve for Bodcau Creek Reach 11140205-006
TMDL
Observed
Load (lbs/day)
100000
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
0
10
20
30
40
50
60
70
80
90
100
Percent exceedance
High flows
Moist Conditions
Mid-range flows
Dry Conditions
Low flows

Figure H.3 Lead Load Duration Curve for Bodcau Creek Reach 11140205-006

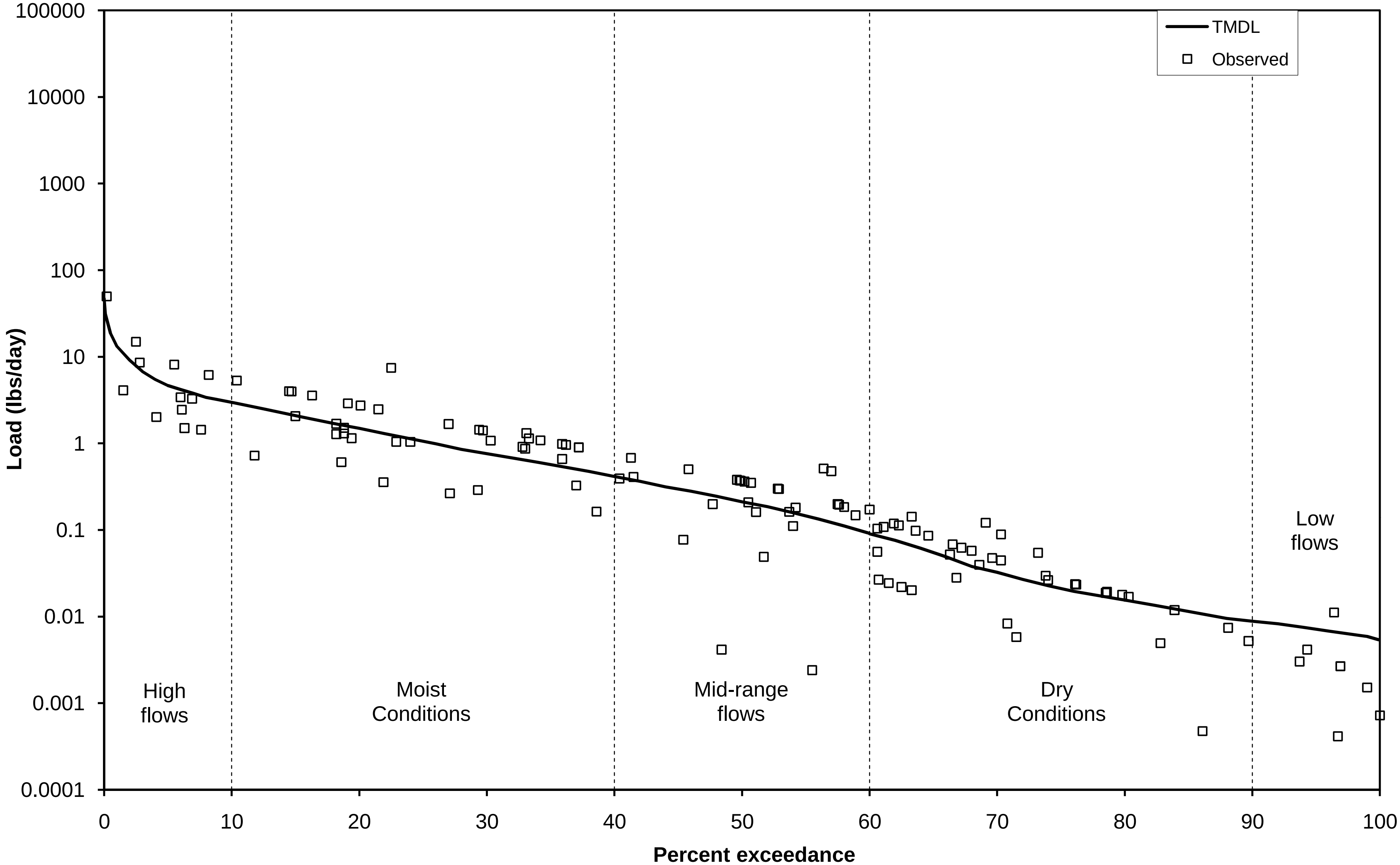
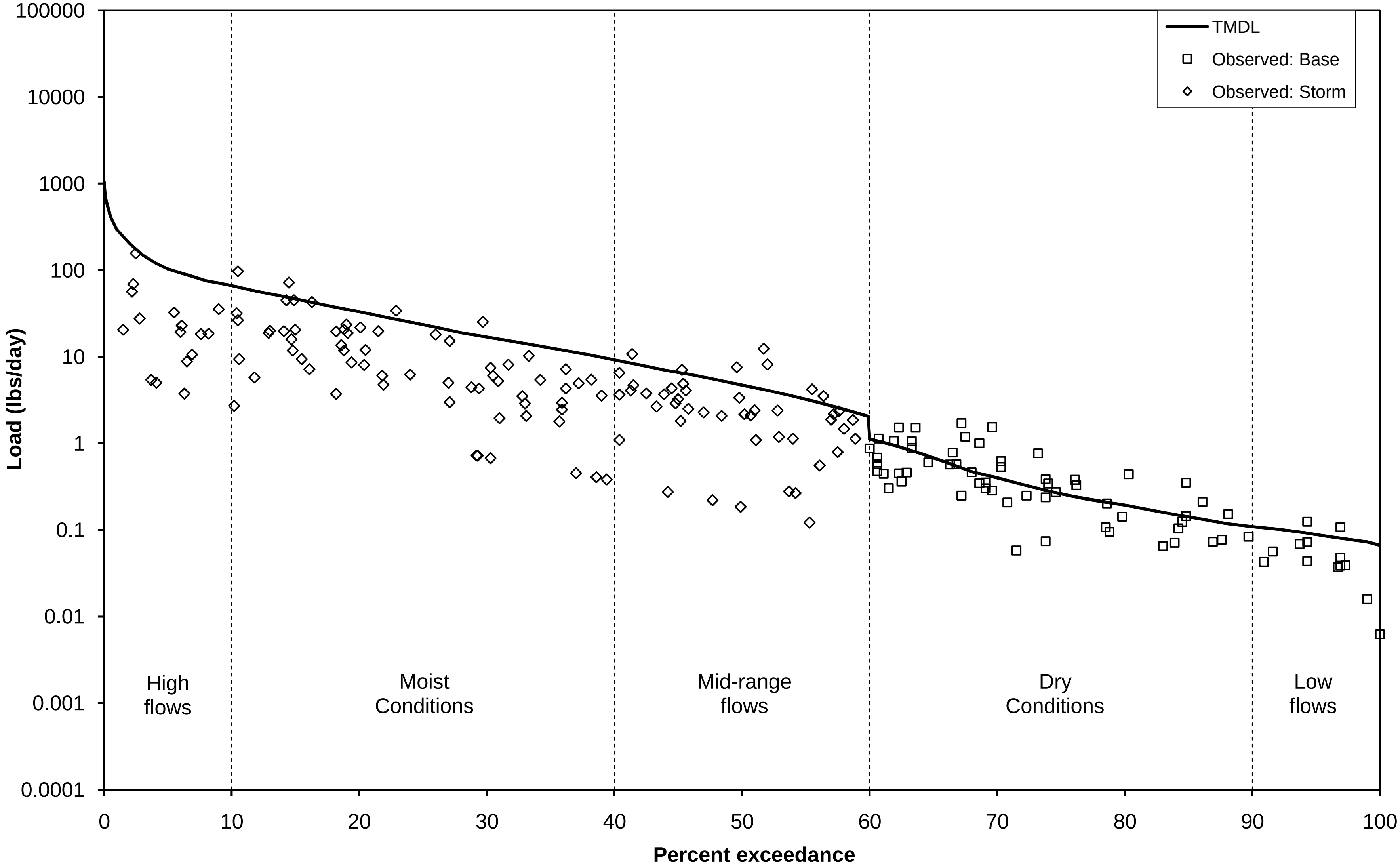


Figure H.4 Turbidity Load Duration Curve for Bodcau Creek Reach 11140205-006



APPENDIX I

TMDL Calculations for Reach 11140203-026

TABLE I.1 ALLOWABLE LOADS OF DISSOLVED LEAD FOR DORCHEAT BAYOU REACH 11140203-026

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles
Drainage area at downstream end of reach 11140203-026 =	152	square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.6	cfs
Sum of design flows for non-storm point sources for this reach =	1.2	MGD = 1.86 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-026 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.063	1.86	1.92	0.007
99	0.500	0.126	1.86	1.98	0.007
98.4	0.600	0.151	1.86	2.01	0.007
96	1.00	0.251	1.86	2.11	0.008
94	1.40	0.352	1.86	2.21	0.008
92	1.80	0.452	1.86	2.31	0.009
90	2.10	0.528	1.86	2.38	0.009
88	2.50	0.628	1.86	2.48	0.009
86	3.20	0.804	1.86	2.66	0.010
84	3.90	0.980	1.86	2.84	0.011
82	4.80	1.21	1.86	3.06	0.011
80	5.80	1.46	1.86	3.31	0.012
79.0	6.27	1.58	1.86	3.43	0.013
76	8.00	2.01	1.86	3.87	0.014
74	9.70	2.44	1.86	4.29	0.016
72	12.0	3.01	1.86	4.87	0.018
70	15.0	3.77	1.86	5.63	0.021
68	18.0	4.52	1.86	6.38	0.024
66	24.0	6.03	1.86	7.89	0.029
64	31.0	7.79	1.86	9.65	0.036
62	39.0	9.80	1.86	11.7	0.043
60	48.0	12.1	1.86	13.9	0.052
58	61.0	15.3	1.86	17.2	0.064
56	75.0	18.8	1.86	20.7	0.077
54	90.0	22.6	1.86	24.5	0.091
52	107	26.9	1.86	28.7	0.107
50	123	30.9	1.86	32.8	0.122
48	144	36.2	1.86	38.0	0.141
46	166	41.7	1.86	43.6	0.162
44	188	47.2	1.86	49.1	0.182
42	218	54.8	1.86	56.7	0.211
40	250	62.8	1.86	64.7	0.240
38	287	72.0	1.86	73.9	0.275
36	326	81.9	1.86	83.8	0.311
34	369	92.7	1.86	94.6	0.351
32	414	104	1.86	106	0.393
30	465	117	1.86	119	0.441
28	522	131	1.86	133	0.494
26	609	153	1.86	155	0.575
24	697	175	1.86	177	0.657
22	797	200	1.86	202	0.751
20	922	232	1.86	234	0.868

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-026 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
18	1,050	264	1.86	266	0.987
16	1,210	304	1.86	306	1.14
14	1,390	349	1.86	351	1.30
12	1,590	399	1.86	401	1.49
10	1,850	465	1.86	467	1.73
9	1,980	497	1.86	499	1.86
8	2,110	530	1.86	532	1.98
7	2,340	588	1.86	590	2.19
6	2,592	651	1.86	653	2.43
5	2,900	729	1.86	730	2.71
4	3,403	855	1.86	857	3.18
3	4,201	1,055	1.86	1,057	3.93
2	5,684	1,428	1.86	1,430	5.31
1	8,223	2,066	1.86	2,068	7.68
0.5	11,654	2,928	1.86	2,930	10.9
0.1	19,254	4,837	1.86	4,839	18.0
0.01	29,277	7,356	1.86	7,357	27.3

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TABLE I.2 COMPONENTS OF TMDL FOR LEAD FOR DORCHEAT BAYOU REACH 11140203-026

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)
Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 1 facilities × 40 ac each = 40 ac
Tot. drain. area for reach 11140203-026 = 152 sq. mi. = 97,280 ac
Drainage area for regul. stormwater as percent of total drainage area = 0.04%
--> WLA for regulated stormwater = 0.04% of allowable load from diffuse sources
--> LA for non-regulated diffuse sources = 99.96% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 1.2 MGD = 1.86 cfs
Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL
WLA for continous point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table I.1 for minimum flow within each hydrologic range (cfs) =	465	62.8	12.1	0.53	0.15

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (μg/L) =	0.51	0.51	0.65	0.72	1.12
Existing load from diffuse sources (lbs/day) =	1.28	0.173	0.042	0.0020	0.0009
Allowable load from diffuse sources (lbs/day) =	1.28	0.173	0.042	0.0020	0.0006
LA for non-regulated diffuse sources (lbs/day) =	1.2794	0.17293	0.041983	0.0019992	0.0005997
WLA for regulated stormwater (lbs/day) =	0.0006	0.00007	0.000017	0.0000008	0.0000003
Effluent conc. for non-storm point sources (μg/L) =	0.69	0.69	0.69	0.69	0.69
WLA for non-storm point sources (lbs/day) =	0.0069	0.0069	0.0069	0.0069	0.0069
Load reserved for future growth (lbs/day) =	0.4431	0.0601	0.0031	0	0
TMDL from Table I.1 (lbs/day) =	1.73	0.240	0.052	0.0089	0.0075
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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Figure I.1 Flow Duration Curve for Bayou Dorcheat Reach 11140203-026

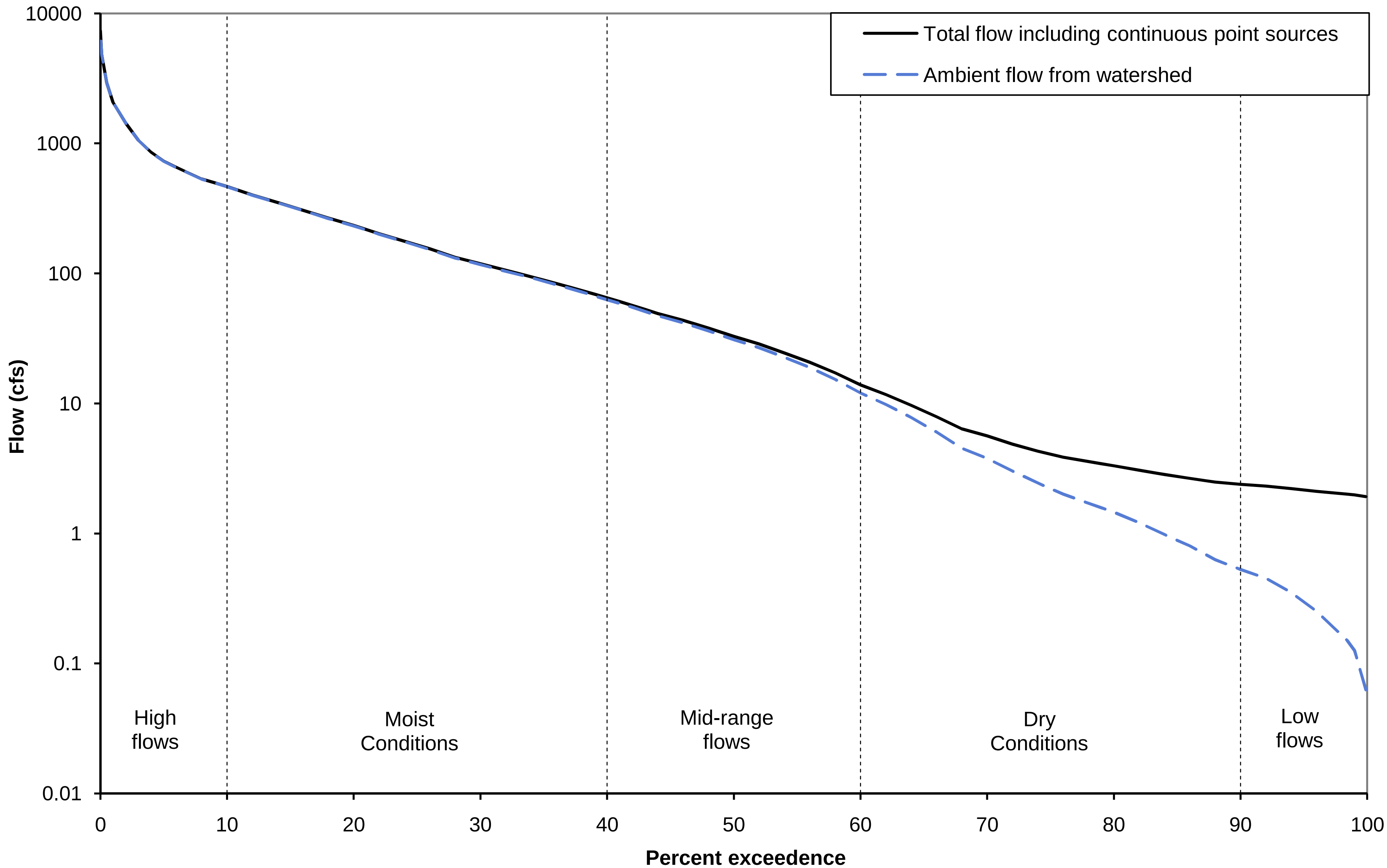
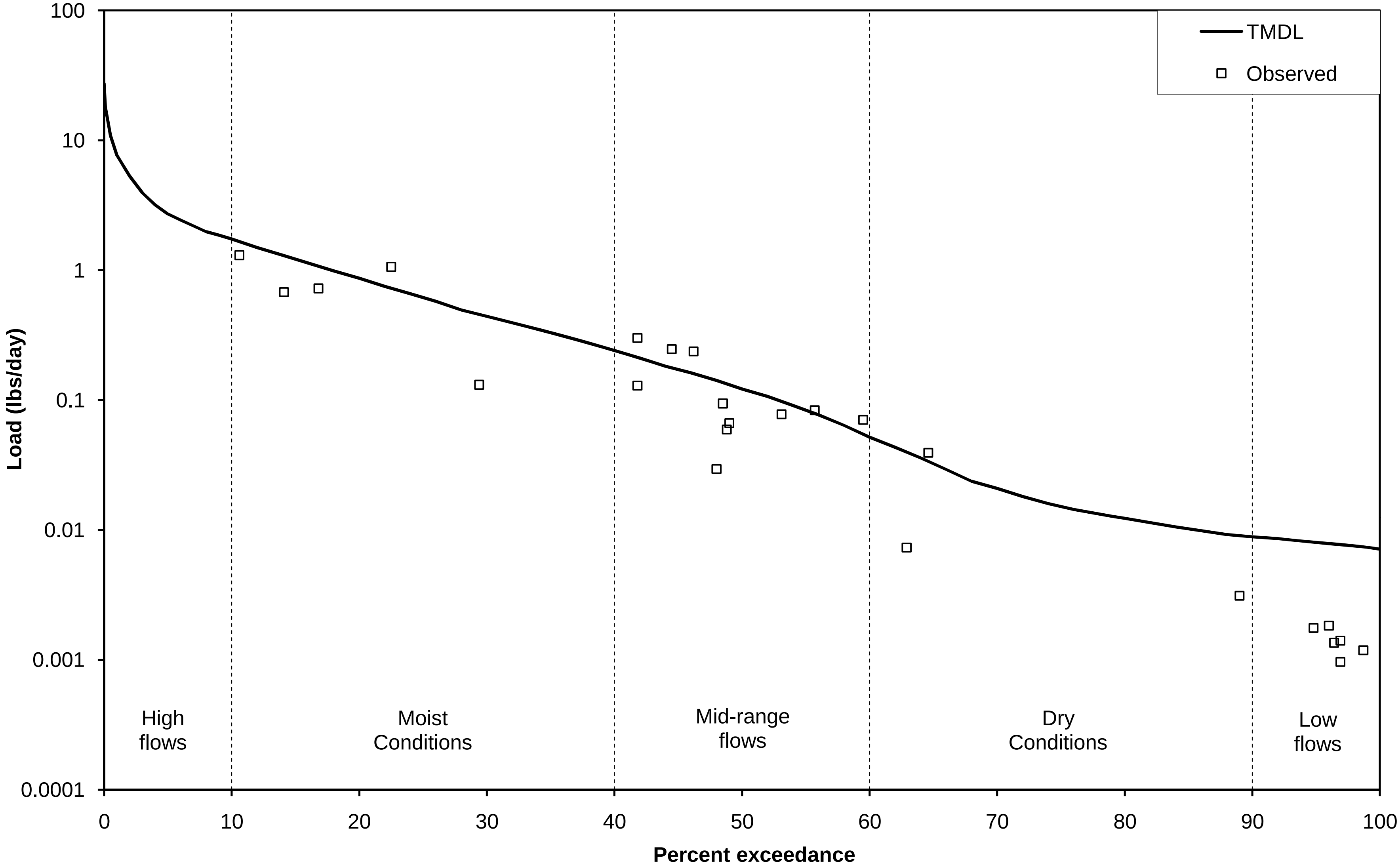


Figure I.2 Lead Load Duration Curve for Bayou Dorcheat Reach 11140203-026



APPENDIX J

TMDL Calculations for Reach 11140203-025

TABLE J.1 ALLOWABLE LOADS OF DISSOLVED LEAD FOR BEECH CREEK REACH 11140203-025

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles	
Drainage area at downstream end of reach 11140203-025 =	49.9	square miles	
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.6	cfs	
Sum of effluent flows for non-stormwater point sources for this reach =	0.4	MGD =	0.62 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-025 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.021	0.62	0.640	0.0024
99	0.500	0.041	0.62	0.660	0.0025
98.4	0.600	0.049	0.62	0.668	0.0025
96	1.00	0.082	0.62	0.701	0.0026
94	1.40	0.115	0.62	0.734	0.0027
92	1.80	0.148	0.62	0.767	0.0029
90	2.10	0.173	0.62	0.792	0.0029
88	2.50	0.206	0.62	0.825	0.0031
86	3.20	0.264	0.62	0.883	0.0033
84	3.90	0.322	0.62	0.941	0.0035
82	4.80	0.396	0.62	1.015	0.0038
80	5.80	0.478	0.62	1.097	0.0041
78	6.90	0.569	0.62	1.19	0.0044
76	8.00	0.660	0.62	1.28	0.0048
74	9.70	0.800	0.62	1.42	0.0053
72	12.0	0.990	0.62	1.61	0.0060
70	15.0	1.24	0.62	1.86	0.0069
68	18.0	1.48	0.62	2.10	0.0078
66	24.0	1.98	0.62	2.60	0.0097
64	31.0	2.56	0.62	3.18	0.0118
62	39.0	3.22	0.62	3.84	0.0143
60	48.0	3.96	0.62	4.58	0.0170
59.9	49.0	4.04	0.62	4.66	0.0173
58	61.0	5.03	0.62	5.65	0.0210
56	75.0	6.19	0.62	6.80	0.0253
54	90.0	7.42	0.62	8.04	0.0299
52	107	8.83	0.62	9.44	0.0351
50	123	10.1	0.62	10.8	0.0400
48	144	11.9	0.62	12.5	0.0464
46	166	13.7	0.62	14.3	0.0532
44	188	15.5	0.62	16.1	0.0599
42	218	18.0	0.62	18.6	0.0691
40	250	20.6	0.62	21.2	0.0789
38	287	23.6	0.62	24.3	0.0902
36	326	26.9	0.62	27.5	0.102
34	369	30.4	0.62	31.1	0.115
32	414	34.1	0.62	34.7	0.129
30	465	38.4	0.62	39.0	0.145
28	522	43.1	0.62	43.7	0.162
26	609	50.2	0.62	50.8	0.189
24	697	57.5	0.62	58.1	0.216

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-025 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
22	797	65.7	0.62	66.3	0.247
20	922	76.1	0.62	76.7	0.285
18	1,050	86.6	0.62	87.2	0.324
16	1,210	99.8	0.62	100	0.373
14	1,390	115	0.62	115	0.428
12	1,590	131	0.62	132	0.490
10	1,850	153	0.62	153	0.569
9	1,980	163	0.62	164	0.609
8	2,110	174	0.62	175	0.649
7	2,340	193	0.62	194	0.719
6	2,592	214	0.62	214	0.797
5	2,900	239	0.62	240	0.891
4	3,403	281	0.62	281	1.05
3	4,201	346	0.62	347	1.29
2	5,684	469	0.62	469	1.74
1	8,223	678	0.62	679	2.52
0.5	11,654	961	0.62	962	3.57
0.1	19,254	1,588	0.62	1,589	5.90
0.01	29,277	2,415	0.62	2,415	8.98

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TABLE J.2 ALLOWABLE LOADS OF TSS FOR BEECH CREEK REACH 11140203-025

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles
Drainage area at downstream end of reach 11140203-025 =	49.9	square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.6	cfs
Sum of effluent flows for non-stormwater point sources for this reach =	0	MGD = 0.00 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-025 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Flow Category	Target TSS (mg/L)	Total allowable load (i.e., TMDL) for TSS (tons/day)
99.9	0.250	0.021	0.00	0.021	Base	21	0.0012
99	0.500	0.041	0.00	0.041	Base	21	0.0023
98.4	0.600	0.049	0.00	0.049	Base	21	0.0028
96	1.00	0.082	0.00	0.082	Base	21	0.0047
94	1.40	0.115	0.00	0.115	Base	21	0.0065
92	1.80	0.148	0.00	0.148	Base	21	0.0084
90	2.10	0.173	0.00	0.173	Base	21	0.0098
88	2.50	0.206	0.00	0.206	Base	21	0.0117
86	3.20	0.264	0.00	0.264	Base	21	0.0149
84	3.90	0.322	0.00	0.322	Base	21	0.0182
82	4.80	0.396	0.00	0.40	Base	21	0.0224
80	5.80	0.478	0.00	0.48	Base	21	0.0271
78	6.90	0.569	0.00	0.57	Base	21	0.0322
76	8.00	0.660	0.00	0.66	Base	21	0.0374
74	9.70	0.800	0.00	0.80	Base	21	0.0453
72	12.0	0.990	0.00	0.99	Base	21	0.0561
70	15.0	1.24	0.00	1.24	Base	21	0.0701
68	18.0	1.48	0.00	1.48	Base	21	0.084
66	24.0	1.98	0.00	1.98	Base	21	0.112
64	31.0	2.56	0.00	2.56	Base	21	0.145
62	39.0	3.22	0.00	3.22	Base	21	0.182
60	48.0	3.96	0.00	3.96	Base	21	0.224
59.9	49.0	4.04	0.00	4.04	Storm	37	0.403
58	61.0	5.03	0.00	5.03	Storm	37	0.502
56	75.0	6.19	0.00	6.19	Storm	37	0.617
54	90.0	7.42	0.00	7.42	Storm	37	0.741
52	107	8.83	0.00	8.83	Storm	37	0.881
50	123	10.1	0.00	10.1	Storm	37	1.01
48	144	11.9	0.00	11.9	Storm	37	1.19
46	166	13.7	0.00	13.7	Storm	37	1.37
44	188	15.5	0.00	15.5	Storm	37	1.55
42	218	18.0	0.00	18.0	Storm	37	1.80
40	250	20.6	0.00	20.6	Storm	37	2.06
38	287	23.6	0.00	23.6	Storm	37	2.36
36	326	26.9	0.00	26.9	Storm	37	2.68
34	369	30.4	0.00	30.4	Storm	37	3.04
32	414	34.1	0.00	34.1	Storm	37	3.40
30	465	38.4	0.00	38.4	Storm	37	3.83
28	522	43.1	0.00	43.1	Storm	37	4.30
26	609	50.2	0.00	50.2	Storm	37	5.01
24	697	57.5	0.00	57.5	Storm	37	5.73

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-025 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Flow Category	Target TSS (mg/L)	Total allowable load (i.e., TMDL) for TSS (tons/day)
22	797	65.7	0.00	65.7	Storm	37	6.56
20	922	76.1	0.00	76.1	Storm	37	7.59
18	1,050	86.6	0.00	86.6	Storm	37	8.64
16	1,210	99.8	0.00	100	Storm	37	10.0
14	1,390	115	0.00	115	Storm	37	11.4
12	1,590	131	0.00	131	Storm	37	13.1
10	1,850	153	0.00	153	Storm	37	15.2
9	1,980	163	0.00	163	Storm	37	16.3
8	2,110	174	0.00	174	Storm	37	17.4
7	2,340	193	0.00	193	Storm	37	19.3
6	2,592	214	0.00	214	Storm	37	21.3
5	2,900	239	0.00	239	Storm	37	23.9
4	3,403	281	0.00	281	Storm	37	28.0
3	4,201	346	0.00	346	Storm	37	34.6
2	5,684	469	0.00	469	Storm	37	46.8
1	8,223	678	0.00	678	Storm	37	67.7
0.5	11,654	961	0.00	961	Storm	37	95.9
0.1	19,254	1,588	0.00	1,588	Storm	37	158
0.01	29,277	2,415	0.00	2,415	Storm	37	241

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TABLE J.3 COMPONENTS OF TMDLS FOR DISSOLVED LEAD AND TSS FOR BEECH CREEK REACH 11140203-025

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 2 facilities × 40 ac each =		80	ac
Tot. drain. area for reach 11140203-025 =	50 sq. mi. =	31,936	ac
Drainage area for regul. stormwater as percent of total drainage area =		0.25%	

--> WLA for regulated stormwater = 0.25% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.75% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of effluent flows for non-storm point sources (for allowable lead loads) =	0.4 MGD =	0.619 cfs
Sum of effluent flows for non-storm point sources (for allowable TSS loads) =	0 MGD =	0.000 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of effluent flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

Ambient flow at downstream end of reach from Table J.1 for minimum flow within each hydrologic range (cfs) =	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
	153	20.6	3.96	0.17	0.049

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (μg/L) =	0.93	0.93	0.93	0.93	0.93
Existing load from diffuse sources (lbs/day) =	0.7654	0.1034	0.01986	0.00087	0.00025
Allowable load from diffuse sources (lbs/day) =	0.567	0.0766	0.01471	0.00064	0.00018
LA for non-regulated diffuse sources (lbs/day) =	0.5655	0.0764	0.01467	0.000638	0.0001795
WLA for regulated stormwater (lbs/day) =	0.0015	0.0002	0.00004	0.000002	0.0000005
Effluent conc. for non-storm point sources (μg/L) =	0.68	0.68	0.68	0.68	0.68
WLA for non-storm point sources (lbs/day) =	0.0023	0.0023	0.0023	0.0023	0.0023
Load reserved for future growth (lbs/day) =	0	0	0	0	0
TMDL from Table J.1 (lbs/day) =	0.5693	0.0789	0.01701	0.00294	0.00248
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

TSS (surrogate for turbidity)

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (mg/L) =	20.0	11.6	10.2	19.5	15.8
Existing load from diffuse sources (tons/day) =	8.23	0.645	0.109	0.0091	0.0021
Allowable load from diffuse sources (tons/day) =	8.23	0.645	0.109	0.0091	0.0021
LA for non-regulated diffuse sources (tons/day) =	8.209	0.6433	0.1087	0.00907	0.002094
WLA for regulated stormwater (tons/day) =	0.021	0.0017	0.0003	0.00003	0.000006
Effluent conc. for non-storm point sources (mg/L) =					
WLA for non-storm point sources (tons/day) =	0	0	0	0	0
Load reserved for future growth (tons/day) =	6.97	1.415	0.115	0.0007	0.0007
TMDL from Table J.2 (tons/day) =	15.2	2.06	0.224	0.0098	0.0028
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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APPENDIX K

TMDL Calculations for Reach 11140203-923

TABLE K.1 ALLOWABLE LOADS OF DISSOLVED LEAD FOR BIG CREEK REACH 11140203-923

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles	
Drainage area at downstream end of reach 11140203-923 =	118	square miles	
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.6	cfs	
Sum of design flows for non-storm point sources for this reach =	3.9151	MGD =	6.06 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-923 (cfs)	Flow from non-storm points sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.049	6.06	6.11	0.018
99	0.500	0.098	6.06	6.16	0.018
98.4	0.600	0.117	6.06	6.17	0.018
96	1.00	0.195	6.06	6.25	0.018
94	1.40	0.273	6.06	6.33	0.018
92	1.80	0.351	6.06	6.41	0.019
90	2.10	0.410	6.06	6.47	0.019
88	2.50	0.488	6.06	6.55	0.019
86	3.20	0.624	6.06	6.68	0.019
84	3.90	0.761	6.06	6.82	0.020
82	4.80	0.936	6.06	6.99	0.020
80	5.80	1.13	6.06	7.19	0.021
78	6.90	1.35	6.06	7.40	0.022
76	8.00	1.56	6.06	7.62	0.022
74	9.70	1.89	6.06	7.95	0.023
72	12.0	2.34	6.06	8.40	0.025
70	15.0	2.93	6.06	8.98	0.026
68	18.0	3.51	6.06	9.57	0.028
66	24.0	4.68	6.06	10.7	0.031
64	31.0	6.05	6.06	12.1	0.035
62	39.0	7.61	6.06	13.7	0.040
60	48.0	9.36	6.06	15.4	0.045
58	61.0	11.9	6.06	18.0	0.052
56	75.0	14.6	6.06	20.7	0.060
54	90.0	17.6	6.06	23.6	0.069
52	107	20.9	6.06	26.9	0.079
50	123	24.0	6.06	30.0	0.088
48	144	28.1	6.06	34.1	0.100
46	166	32.4	6.06	38.4	0.112
44	188	36.7	6.06	42.7	0.125
42	218	42.5	6.06	48.6	0.142
40	250	48.8	6.06	54.8	0.160
38	287	55.9	6.06	62.0	0.181
36	326	63.6	6.06	69.6	0.203
34	369	72.0	6.06	78.0	0.228
32	414	80.7	6.06	86.7	0.253
30	465	90.7	6.06	96.8	0.282
28	522	102	6.06	108	0.315
26	609	119	6.06	125	0.364
24	697	136	6.06	142	0.414
22	797	155	6.06	161	0.471
20	922	180	6.06	186	0.543
18	1,050	205	6.06	211	0.615

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-923 (cfs)	Flow from non-storm points sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
16	1,210	236	6.06	242	0.706
14	1,390	271	6.06	277	0.809
12	1,590	310	6.06	316	0.923
10	1,850	361	6.06	367	1.07
9	1,980	386	6.06	392	1.14
8	2,110	412	6.06	418	1.22
7	2,340	456	6.06	462	1.35
6	2,592	505	6.06	512	1.49
5	2,900	566	6.06	572	1.67
4	3,403	664	6.06	670	1.95
3	4,201	819	6.06	825	2.41
2	5,684	1,109	6.06	1,115	3.25
1	8,223	1,604	6.06	1,610	4.70
0.5	11,654	2,273	6.06	2,279	6.65
0.1	19,254	3,755	6.06	3,761	11.0
0.01	29,277	5,710	6.06	5,716	16.7

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TABLE K.2 COMPONENTS OF TMDL FOR DISSOLVED LEAD FOR BIG CREEK REACH 11140203-923

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 14 facilities × 40 ac each = 560 ac

Tot. drain. area for reach 11140203-923 = 118 sq. mi. = 75,520 ac

Drainage area for regul. stormwater as percent of total drainage area = 0.74%

--> WLA for regulated stormwater = 0.74% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.26% of allowable load from diffuse sources

Note: The no. of facilities with regulated stormwater (14) includes W2 Oil, Inc., which is an individual permit with runoff as the only discharge.

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 3.9151 MGD = 6.06 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for continous point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table K.1 for minimum flow within each hydrologic range (cfs) =	361	48.8	9.36	0.410	0.117

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (μg/L) =	0.752	0.752	0.730	0.835	1.13
Existing load from diffuse sources (lbs/day) =	1.4629	0.1977	0.0369	0.0018	0.0007
Allowable load from diffuse sources (lbs/day) =	1.0528	0.1423	0.0273	0.0012	0.0003
LA for non-regulated diffuse sources (lbs/day) =	1.045	0.1412	0.02709	0.001191	0.000297
WLA for regulated stormwater (lbs/day) =	0.0078	0.0011	0.00021	0.000009	0.000003
Effluent conc. for non-storm point sources (μg/L) =	0.54	0.54	0.54	0.54	0.54
WLA for non-storm point sources (lbs/day) =	0.0177	0.0177	0.0177	0.0177	0.0177
Load reserved for future growth (lbs/day) =	0	0	0	0	0
TMDL from Table K.1 (lbs/day) =	1.0705	0.1600	0.0450	0.0189	0.0180
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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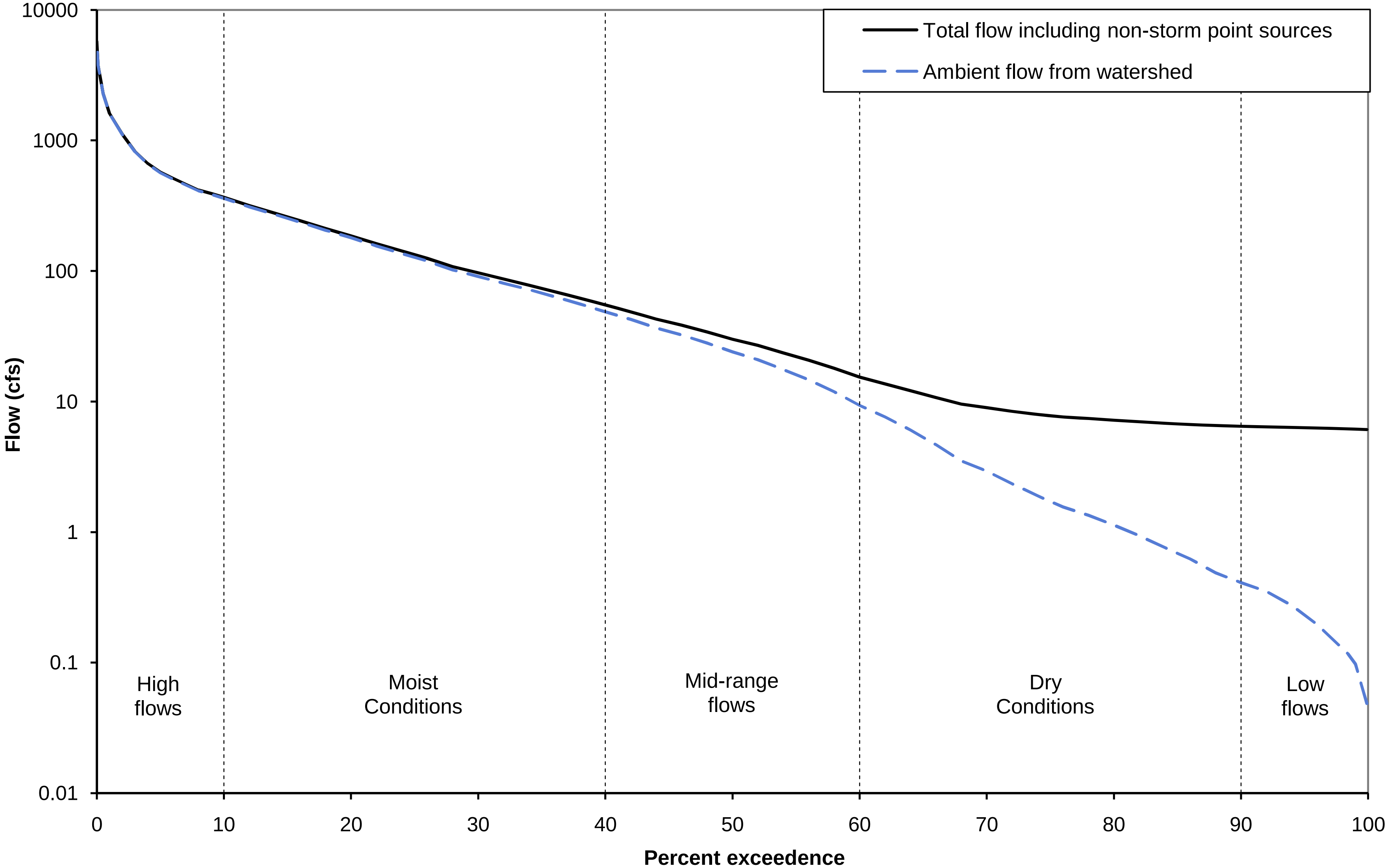
Figure K.1 Flow Duration Curve for Big Creek Reach 11140203-923



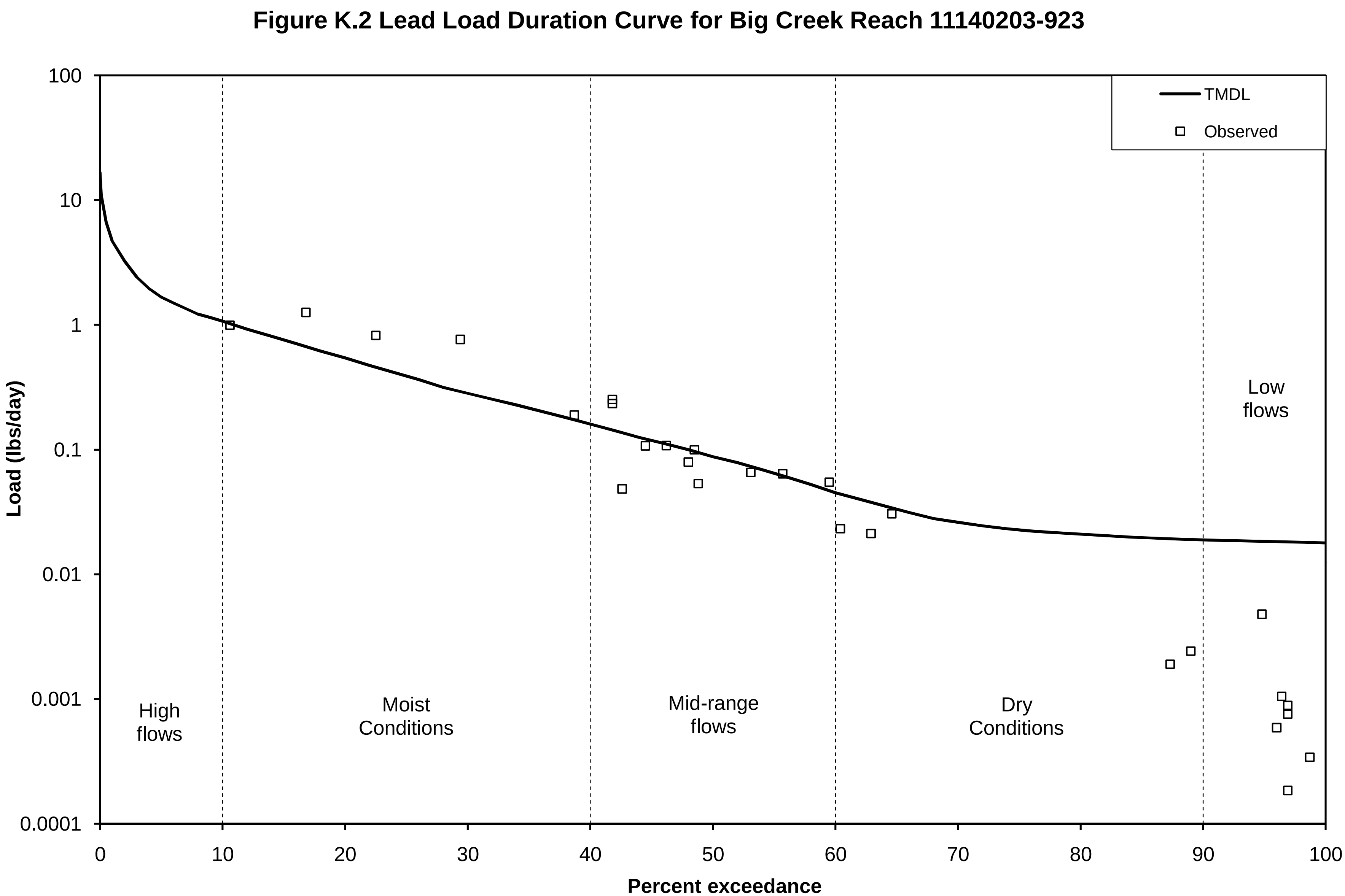


Figure K.2 Lead Load Duration Curve for Big Creek Reach 11140203-923
TMDL
Observed
Load (lbs/day)
100
10
1
0.1
0.01
0.001
0.0001
Percent exceedance
0
10
20
30
40
50
60
70
80
90
100
High flows
Moist Conditions
Mid-range flows
Dry Conditions
Low flows

APPENDIX L

TMDL Calculations for Reach 11140203-023

TABLE L.1 ALLOWABLE LOADS OF CHLORIDE, DISS. LEAD, SULFATE, AND TDS FOR BIG CREEK REACH 11140203-023

Drainage area at Bayou Dorcheat gage near Springhill, LA = 605 square miles
Drainage area at downstream end of reach 11140203-023 = 136 square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA = 0.60 cfs
Sum of design flows for non-storm point sources for this reach = 0.1124 MGD = 0.17 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-023 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for chloride (tons/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)	Total allowable load (i.e., TMDL) for sulfate (tons/day)	Total allowable load (i.e., TMDL) for TDS (tons/day)
99.9	0.25	0.06	0.17	0.23	0.012	0.001	0.026	0.124
99	0.50	0.11	0.17	0.29	0.015	0.001	0.032	0.154
98.4	0.60	0.13	0.17	0.31	0.017	0.001	0.034	0.167
96	1.00	0.22	0.17	0.40	0.022	0.001	0.044	0.215
94	1.40	0.31	0.17	0.49	0.026	0.002	0.054	0.264
92	1.80	0.40	0.17	0.58	0.031	0.002	0.064	0.312
90	2.10	0.47	0.17	0.65	0.035	0.002	0.072	0.348
88	2.50	0.56	0.17	0.74	0.040	0.003	0.082	0.397
86	3.20	0.72	0.17	0.89	0.048	0.003	0.099	0.482
84	3.90	0.88	0.17	1.05	0.057	0.004	0.117	0.567
82	4.80	1.08	0.17	1.25	0.068	0.005	0.140	0.676
80	5.80	1.30	0.17	1.48	0.080	0.005	0.165	0.797
78	6.90	1.55	0.17	1.72	0.093	0.006	0.192	0.930
76	8.00	1.80	0.17	1.97	0.106	0.007	0.220	1.06
74	9.70	2.18	0.17	2.35	0.127	0.009	0.262	1.27
72	12.0	2.70	0.17	2.87	0.155	0.011	0.320	1.55
70	15.0	3.37	0.17	3.55	0.191	0.013	0.395	1.91
68	18.0	4.05	0.17	4.22	0.228	0.016	0.470	2.28
66	24.0	5.40	0.17	5.57	0.300	0.021	0.620	3.00
64	31.0	6.97	0.17	7.14	0.385	0.027	0.796	3.85
62	39.0	8.77	0.17	8.94	0.482	0.033	1.00	4.82
60	48.0	10.8	0.17	11.0	0.591	0.041	1.22	5.91
58	61.0	13.7	0.17	13.9	0.749	0.052	1.55	7.49
56	75.0	16.9	0.17	17.0	0.919	0.063	1.90	9.19
54	90.0	20.2	0.17	20.4	1.10	0.076	2.27	11.0
52	107	24.1	0.17	24.2	1.31	0.090	2.70	13.1
50	123	27.6	0.17	27.8	1.50	0.103	3.10	15.0
48	144	32.4	0.17	32.5	1.76	0.121	3.62	17.6
46	166	37.3	0.17	37.5	2.02	0.139	4.18	20.2
44	188	42.3	0.17	42.4	2.29	0.158	4.73	22.9
42	218	49.0	0.17	49.2	2.65	0.183	5.48	26.5

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-023 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for chloride (tons/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)	Total allowable load (i.e., TMDL) for sulfate (tons/day)	Total allowable load (i.e., TMDL) for TDS (tons/day)
40	250	56.2	0.17	56.4	3.04	0.209	6.28	30.4
38	287	64.4	0.17	64.6	3.49	0.240	7.20	34.9
36	326	73.3	0.17	73.5	3.96	0.273	8.18	39.6
34	369	82.9	0.17	83.1	4.48	0.309	9.26	44.8
32	414	93.0	0.17	93.1	5.02	0.346	10.4	50.2
30	465	105	0.17	105	5.65	0.389	11.7	56.5
28	522	117	0.17	118	6.34	0.437	13.1	63.4
26	609	137	0.17	137	7.39	0.509	15.3	73.9
24	697	157	0.17	157	8.46	0.583	17.5	84.6
22	797	179	0.17	179	9.67	0.666	20.0	96.7
20	922	207	0.17	207	11.2	0.771	23.1	112
18	1,050	236	0.17	236	12.7	0.878	26.3	127
16	1,210	272	0.17	272	14.7	1.01	30.3	147
14	1,390	312	0.17	313	16.9	1.16	34.8	169
12	1,590	357	0.17	358	19.3	1.33	39.8	193
10	1,850	416	0.17	416	22.4	1.55	46.3	224
9	1,980	445	0.17	445	24.0	1.65	49.6	240
8	2,110	474	0.17	474	25.6	1.76	52.8	256
7	2,340	526	0.17	526	28.4	1.96	58.6	284
6	2,592	583	0.17	583	31.4	2.17	64.9	314
5	2,900	652	0.17	652	35.2	2.42	72.6	352
4	3,403	765	0.17	765	41.3	2.84	85.2	413
3	4,201	944	0.17	944	50.9	3.51	105	509
2	5,684	1,278	0.17	1,278	68.9	4.75	142	689
1	8,223	1,849	0.17	1,849	99.7	6.87	206	997
0.5	11,654	2,620	0.17	2,620	141	9.74	292	1,413
0.1	19,254	4,328	0.17	4,328	233	16.1	482	2,335
0.01	29,277	6,581	0.17	6,581	355	24.5	733	3,550

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TABLE L.2 COMPONENTS OF TMDLS FOR CHLORIDE, LEAD, SULFATE, AND TDS FOR BIG CREEK REACH 11140203-023

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)
Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 2 facilities × 40 ac each =			80 ac
Tot. drain. area for reach 11140203-023 =	136 sq. mi. =		87,040 ac
Drainage area for regul. stormwater as percent of total drainage area =			0.09%
--> WLA for regulated stormwater =	0.09% of allowable load from diffuse sources		
--> LA for non-regulated diffuse sources =	99.91% of allowable load from diffuse sources		

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0.1124 MGD = 0.17 cfs
Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL
WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

Ambient flow at downstream end of reach from Table L.1 for minimum flow within each hydrologic range (cfs) =	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
	416	56.2	10.8	0.47	0.13

CHLORIDE

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (mg/L) =	10.9	10.9	23.8	32.8	19.5
Existing load from diffuse sources (tons/day) =	12.225	1.652	0.6926	0.0418	0.0071
Allowable load from diffuse sources (tons/day) =	12.225	1.652	0.5820	0.0255	0.0071
LA for non-regulated diffuse sources (tons/day) =	12.213	1.65	0.5814	0.02547	0.007093
WLA for regulated stormwater (tons/day) =	0.012	0.002	0.0006	0.00003	0.000007
Effluent conc. for non-storm point sources (mg/L) =	20	20	20	20	20
WLA for non-storm point sources (tons/day) =	0.009	0.009	0.009	0.009	0.009
Load reserved for future growth (tons/day) =	10.206	1.38	0.0004	0.0003	0.0006
TMDL from Table L.1 (tons/day) =	22.44	3.041	0.5914	0.0348	0.0167
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

SULFATE

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (mg/L) =	10.8	10.8	27.7	81.1	58.2
Existing load from diffuse sources (tons/day) =	12.11	1.637	0.806	0.1032	0.0212
Allowable load from diffuse sources (tons/day) =	12.11	1.637	0.806	0.0526	0.0150
LA for non-regulated diffuse sources (tons/day) =	12.099	1.6355	0.8052	0.05255	0.01498
WLA for regulated stormwater (tons/day) =	0.011	0.0015	0.0008	0.00005	0.00002
Effluent conc. for non-storm point sources (mg/L) =	41	41	41	41	41
WLA for non-storm point sources (tons/day) =	0.0193	0.0193	0.0193	0.0193	0.0193
Load reserved for future growth (tons/day) =	34.2107	4.6227	0.3957	0	0.0001
TMDL from Table L.1 (tons/day) =	46.34	6.279	1.221	0.0719	0.0344
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

TDS

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (mg/L) =	100	100	156	262	231
Existing load from diffuse sources (tons/day) =	112	15.2	4.54	0.33	0.084
Allowable load from diffuse sources (tons/day) =	112	15.2	4.54	0.25	0.073
LA for non-regulated diffuse sources (tons/day) =	111.89	15.186	4.535	0.2497	0.07293
WLA for regulated stormwater (tons/day) =	0.11	0.014	0.005	0.0003	0.00007
Effluent conc. for non-storm point sources (mg/L) =	200	200	200	200	200
WLA for non-storm point sources (tons/day) =	0.094	0.094	0.094	0.094	0.094
Load reserved for future growth (tons/day) =	111.906	15.106	1.276	0.004	0
TMDL from Table L.1 (tons/day) =	224	30.4	5.91	0.348	0.167
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (µg/L) =	0.43	0.43	0.56	0.41	0.32
Existing load from diffuse sources (lbs/day) =	0.965	0.130	0.0326	0.0010	0.0002
Allowable load from diffuse sources (lbs/day) =	0.965	0.130	0.0326	0.0010	0.0002
LA for non-regulated diffuse sources (lbs/day) =	0.9641	0.1298	0.03257	0.000999	0.0001998
WLA for regulated stormwater (lbs/day) =	0.0009	0.0002	0.00003	0.000001	0.0000002
Effluent conc. for non-storm point sources (µg/L) =	0.95	0.95	0.95	0.95	0.95
WLA for non-storm point sources (lbs/day) =	0.0009	0.0009	0.0009	0.0009	0.0009
Load reserved for future growth (lbs/day) =	0.5801	0.0781	0.0072	0.0005	0
TMDL from Table L.1 (lbs/day) =	1.546	0.209	0.0407	0.0024	0.0011
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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Figure L.1 Flow Duration Curve for Big Creek Reach 11140203-023

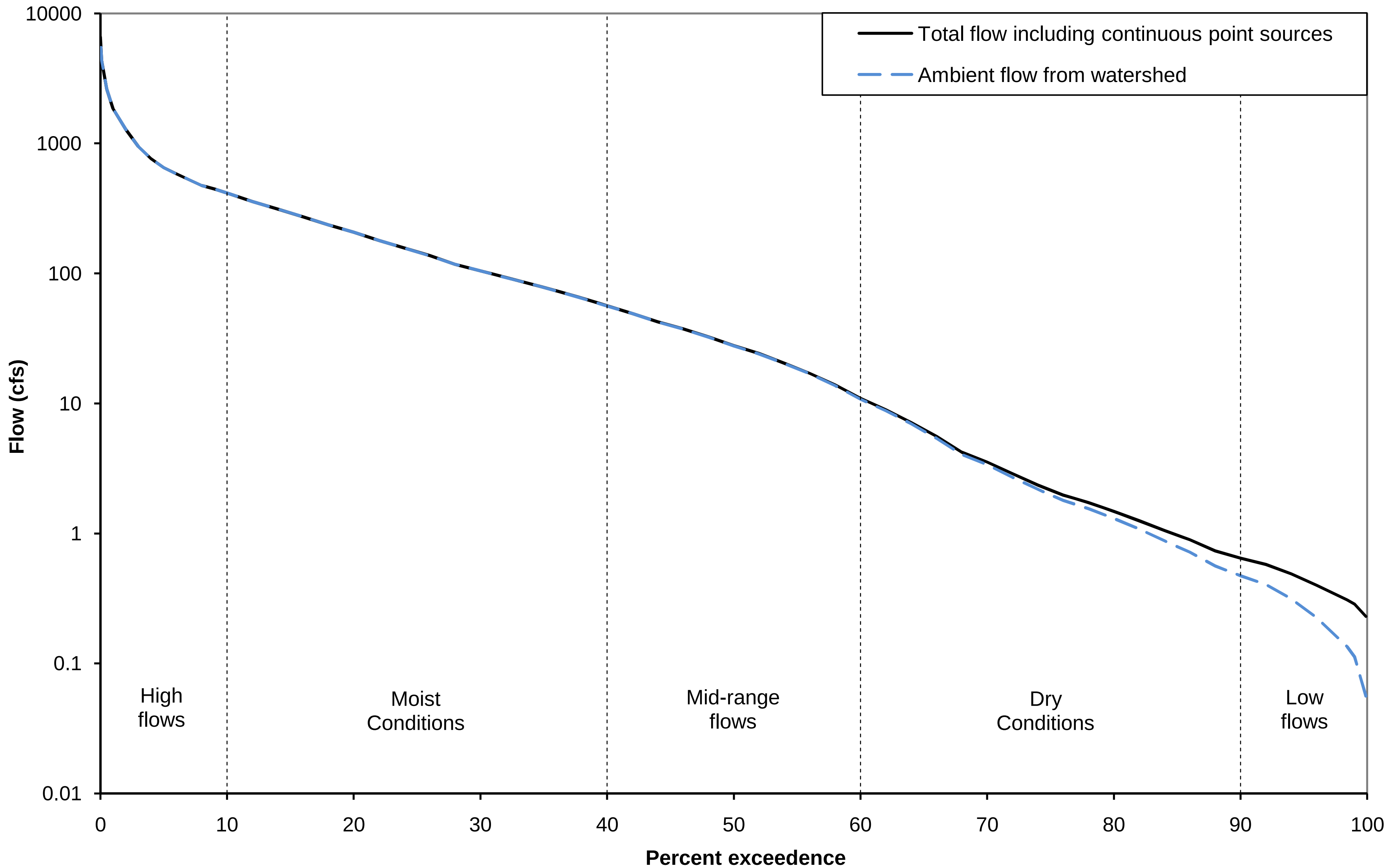


Figure L.2 Chloride Load Duration Curve for Big Creek Reach 11140203-023

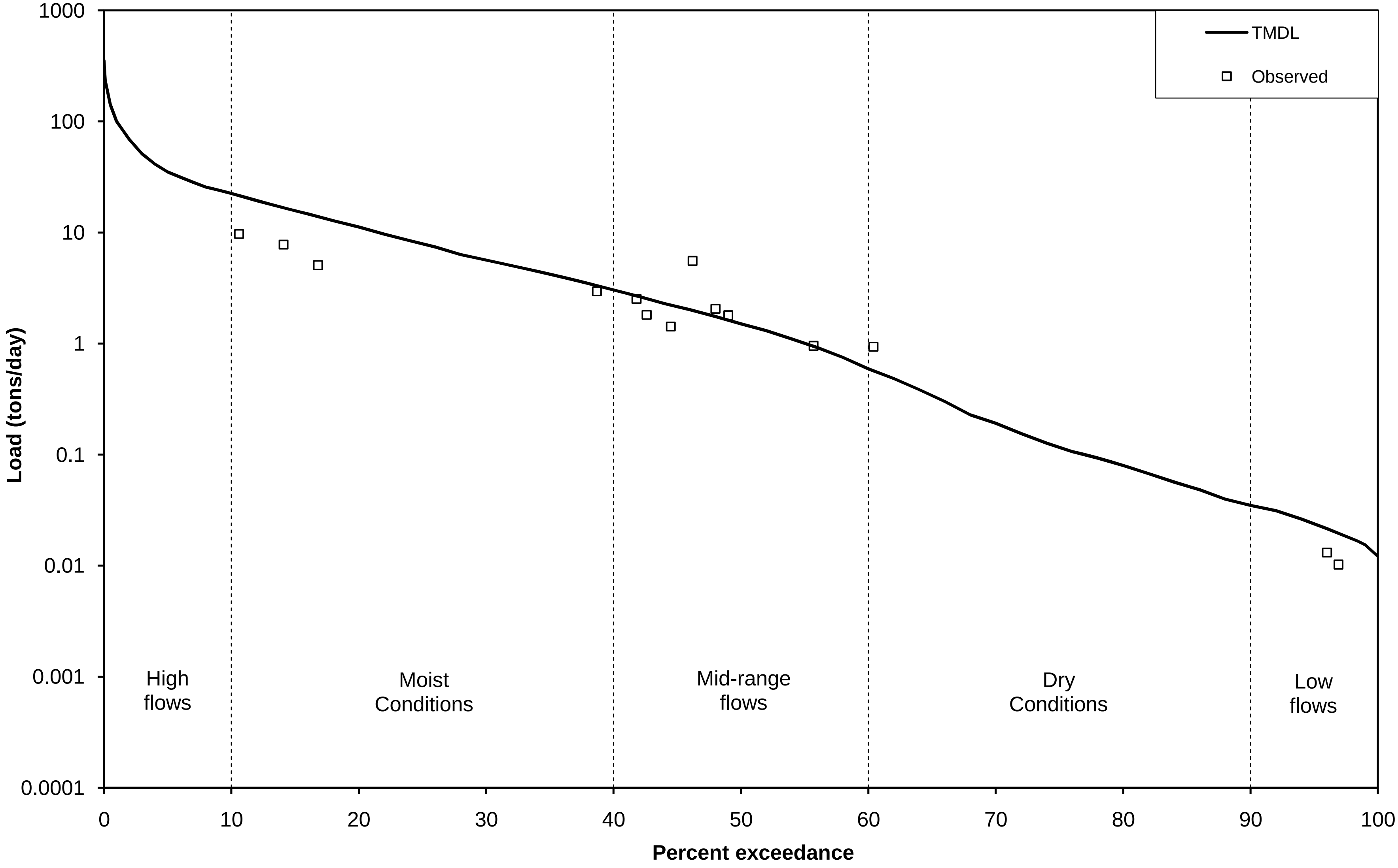


Figure L.3 Dissolved Lead Load Duration Curve for Big Creek Reach 11140203-023

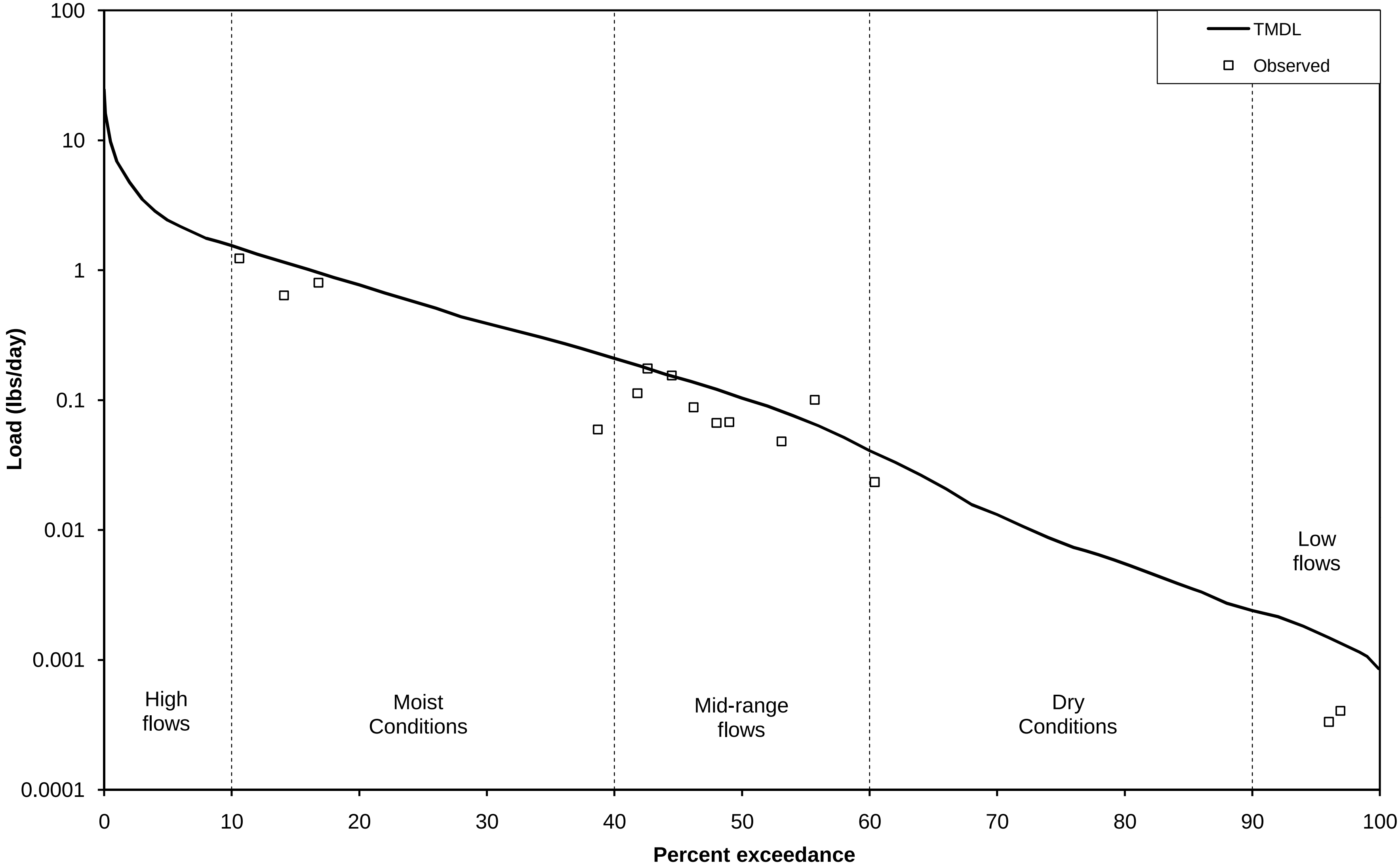


Figure L.4 Sulfate Load Duration Curve for Big Creek Reach 11140203-023

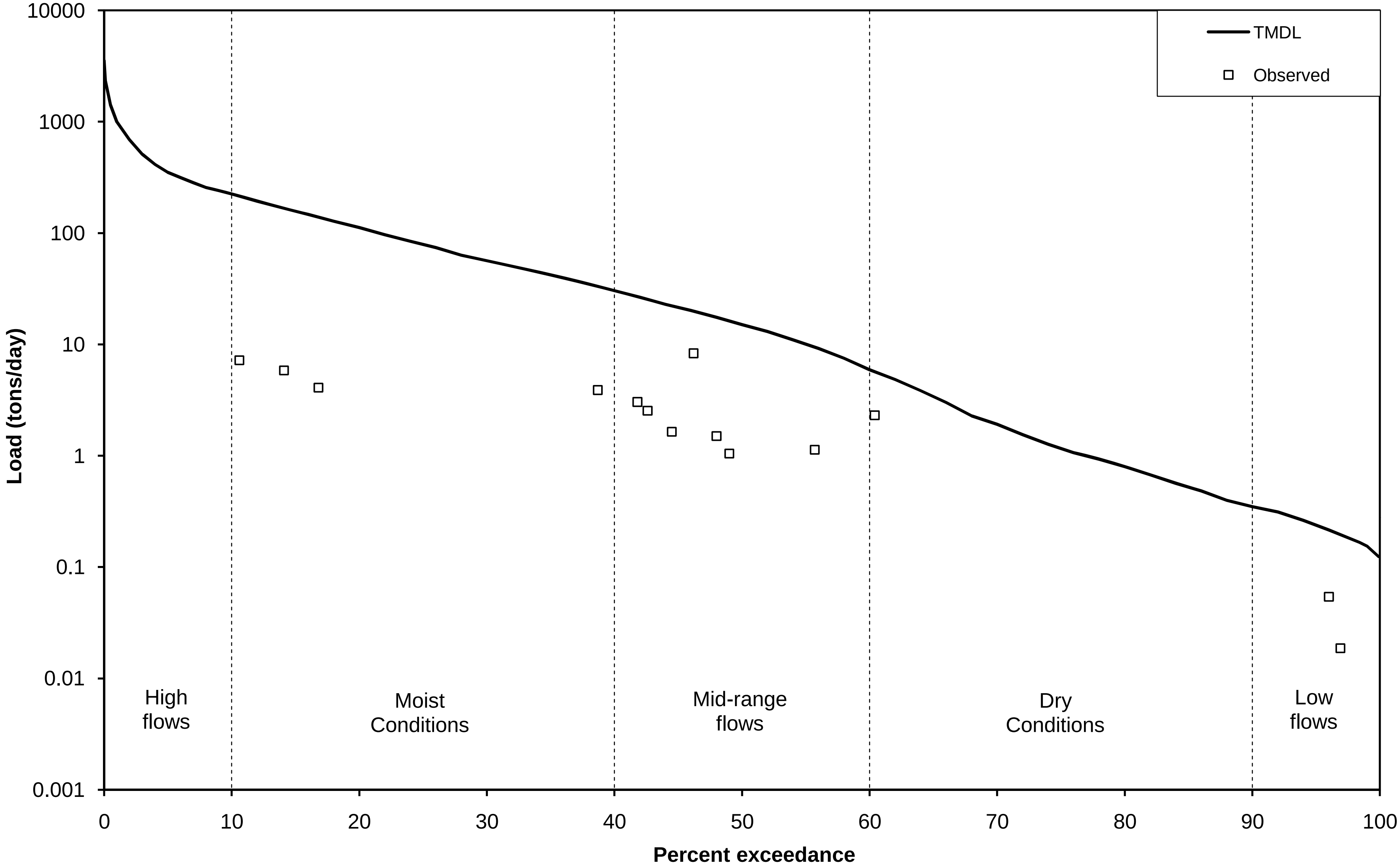
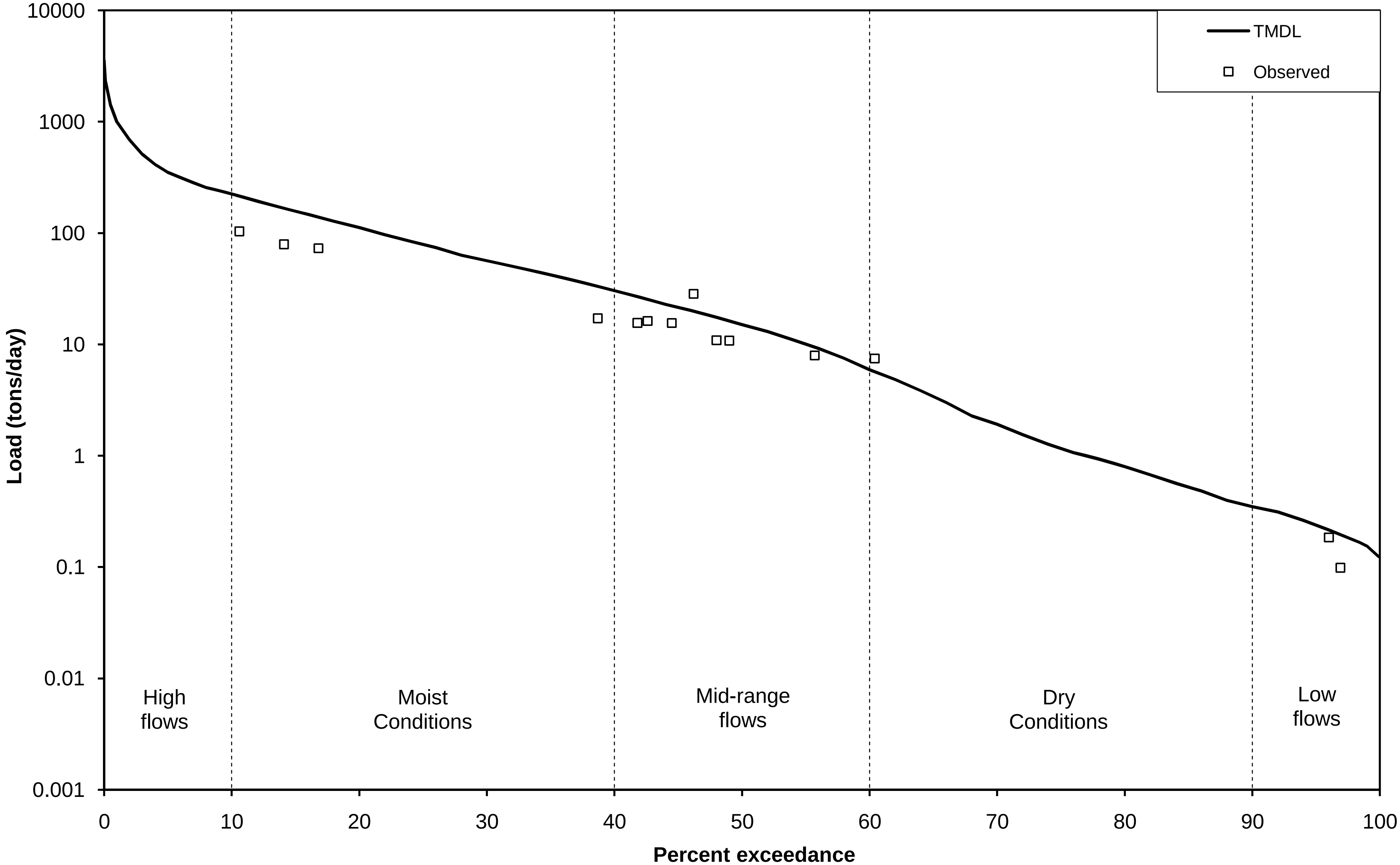


Figure L.5 TDS Load Duration Curve for Big Creek Reach 11140203-023



APPENDIX M

TMDL Calculations for Reaches 11140203-022 and 11140203-020

TABLE M.1 ALLOWABLE LOADS OF LEAD AND SULFATE FOR DORCHEAT BAYOU REACH 11140203-022

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles
Drainage area at downstream end of reach 11140203-022 =	392	square miles
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.60	cfs
Sum of design flows for non-storm point sources for this reach =	0	MGD = 0.00 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-022 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for sulfate (tons/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.162	0	0.162	0.007	4.7E-04
99	0.500	0.324	0	0.324	0.014	9.5E-04
98.4	0.600	0.389	0	0.389	0.017	1.1E-03
96	1.00	0.648	0	0.648	0.028	0.002
94	1.40	0.907	0	0.907	0.039	0.003
92	1.80	1.17	0	1.17	0.050	0.003
90	2.10	1.36	0	1.36	0.059	0.004
88	2.50	1.62	0	1.62	0.070	0.005
86	3.20	2.07	0	2.07	0.089	0.006
84	3.90	2.53	0	2.53	0.109	0.007
82	4.80	3.11	0	3.11	0.134	0.009
79.2	6.17	4.00	0	4.00	0.173	0.012
78	6.90	4.47	0	4.47	0.193	0.013
76	8.00	5.18	0	5.18	0.224	0.015
74	9.70	6.28	0	6.28	0.271	0.018
72	12.0	7.78	0	7.78	0.336	0.023
70	15.0	9.72	0	9.72	0.419	0.028
68	18.0	11.7	0	11.7	0.503	0.034
66	24.0	15.6	0	15.6	0.671	0.045
64	31.0	20.1	0	20.1	0.867	0.059
62	39.0	25.3	0	25.3	1.09	0.074
60	48.0	31.1	0	31.1	1.34	0.091
58	61.0	39.5	0	39.5	1.71	0.115
56	75.0	48.6	0	48.6	2.10	0.142
54	90.0	58.3	0	58.3	2.52	0.170
52	107	69.3	0	69.3	2.99	0.202
50	123	79.7	0	79.7	3.44	0.233
48	144	93.3	0	93.3	4.03	0.272
46	166	108	0	108	4.64	0.314
44	188	122	0	122	5.26	0.355
42	218	141	0	141	6.10	0.412
40	250	162	0	162	6.99	0.473
38	287	186	0	186	8.02	0.542
36	326	211	0	211	9.11	0.616
34	369	239	0	239	10.3	0.698
32	414	268	0	268	11.6	0.782
30	465	301	0	301	13.0	0.879
28	522	338	0	338	14.6	0.987
26	609	395	0	395	17.0	1.15
24	697	451	0	451	19.5	1.32
22	797	516	0	516	22.3	1.51
20	922	598	0	598	25.8	1.74
18	1,050	680	0	680	29.4	1.99
16	1,210	784	0	784	33.8	2.29

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-022 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for sulfate (tons/day)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
14	1,390	901	0	901	38.9	2.63
12	1,590	1,030	0	1,030	44.5	3.01
10	1,850	1,199	0	1,199	51.7	3.50
9	1,980	1,283	0	1,283	55.4	3.74
8	2,110	1,367	0	1,367	59.0	3.99
7	2,340	1,516	0	1,516	65.4	4.42
6	2,592	1,679	0	1,679	72.5	4.90
5	2,900	1,879	0	1,879	81.1	5.48
4	3,403	2,205	0	2,205	95.1	6.43
3	4,201	2,722	0	2,722	117	7.94
2	5,684	3,683	0	3,683	159	10.7
1	8,223	5,328	0	5,328	230	15.5
0.5	11,654	7,551	0	7,551	326	22.0
0.1	19,254	12,476	0	12,476	538	36.4
0.01	29,277	18,970	0	18,970	819	55.4

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TABLE M.2 COMPONENTS OF TMDLS FOR SULFATE AND LEAD FOR DORCHEAT BAYOU REACH 11140203-022

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 0 facilities × 40 ac each = 0 ac

Tot. drain. area for reach 11140203-022 = 392 sq. mi. = 250,880 ac

Drainage area for regul. stormwater as percent of total drainage area = 0.00%

--> WLA for regulated stormwater = 0.00% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 100.00% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0 MGD = 0.00 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table M.1 for minimum flow for diss. minerals within each hydrologic range (cfs) =	1199	162	31.1	4.00	--

SULFATE

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (mg/L) =	7.79	8.68	11.1	36.0	This hydrologic range represents stream flows less than the critical flow
Existing load from diffuse sources (tons/day) =	25.2	3.79	0.931	0.388	
Allowable load from diffuse sources (tons/day) =	25.2	3.79	0.931	0.173	
LA for non-regulated diffuse sources (tons/day) =	25.2	3.79	0.931	0.173	
WLA for regulated stormwater (tons/day) =	0	0	0	0	
Effluent conc. for non-storm point sources (mg/L) =					
WLA for non-storm point sources (tons/day) =	0	0	0	0	
Load reserved for future growth (tons/day) =	26.5	3.20	0.409	0	
TMDL from Table M.1 (tons/day) =	51.7	6.99	1.34	0.173	
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table M.1 for minimum flow for diss. metals within each hydrologic range (cfs) =	1199	162	31.1	1.36	0.39

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (μg/L) =	0.50	0.77	0.786	0.73	0.857
Existing load from diffuse sources (lbs/day) =	3.23	0.67	0.132	0.0054	0.0018
Allowable load from diffuse sources (lbs/day) =	3.23	0.47	0.091	0.0040	0.0011
LA for non-regulated diffuse sources (lbs/day) =	3.23	0.47	0.091	0.0040	0.0011
WLA for regulated stormwater (lbs/day) =	0	0	0	0	0
Effluent conc. for non-storm point sources (μg/L) =					
WLA for non-storm point sources (lbs/day) =	0	0	0	0	0
Load reserved for future growth (lbs/day) =	0.27	0	0	0	0
TMDL from Table M.1 (lbs/day) =	3.50	0.47	0.091	0.0040	0.0011
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

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TABLE M.3 COMPONENTS OF TMDLS FOR SULFATE AND LEAD FOR DORCHEAT BAYOU REACH 11140203-020

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 0 facilities × 40 ac each =			0	ac
Tot. drain. area for reach 11140203-022 =	392	sq. mi. =	250,880	ac
Drainage area for regul. stormwater as percent of total drainage area =			0.00%	
--> WLA for regulated stormwater =	0.00% of allowable load from diffuse sources			
--> LA for non-regulated diffuse sources =	100.00% of allowable load from diffuse sources			

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 0 MGD = 0.00 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach calc. from Table M.1 values for minimum flow for diss. minerals within each hydrologic range (cfs) =	1560	211	40.5	4.00	--

SULFATE

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing conc. from diffuse sources (mg/L) =	7.79	8.68	11.1	36.0	This hydrologic range represents stream flows less than the critical flow
Existing load from diffuse sources (tons/day) =	32.8	4.93	1.21	0.388	
Allowable load from diffuse sources (tons/day) =	32.8	4.93	1.21	0.173	
LA for non-regulated diffuse sources (tons/day) =	32.8	4.93	1.21	0.173	
WLA for regulated stormwater (tons/day) =	0	0	0	0	
Effluent conc. for non-storm point sources (mg/L) =					
WLA for non-storm point sources (tons/day) =	0	0	0	0	
Load reserved for future growth (tons/day) =	34.5	4.16	0.54	0	
TMDL calc. from Table M.1 (tons/day) =	67.3	9.09	1.75	0.173	
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach calc. from Table M.1 values for minimum flow for diss. metals within each hydrologic range (cfs) =	1560	211	40.5	1.77	0.51

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (µg/L) =	0.50	0.77	0.79	0.73	0.86
Existing load from diffuse sources (lbs/day) =	4.21	0.875	0.172	0.007	0.0023
Allowable load from diffuse sources (lbs/day) =	4.21	0.615	0.118	0.0052	0.0015
LA for non-regulated diffuse sources (lbs/day) =	4.21	0.615	0.118	0.0052	0.0015
WLA for regulated stormwater (lbs/day) =	0	0	0	0	0
Effluent conc. for non-storm point sources (µg/L) =					
WLA for non-storm point sources (lbs/day) =	0	0	0	0	0
Load reserved for future growth (lbs/day) =	0.34	0	0	0	0
TMDL calc. from Table M.1 (lbs/day) =	4.55	0.615	0.118	0.0052	0.0015
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

Figure M.1 Flow Duration Curve for Dorcheat Bayou Reach 11140203-22

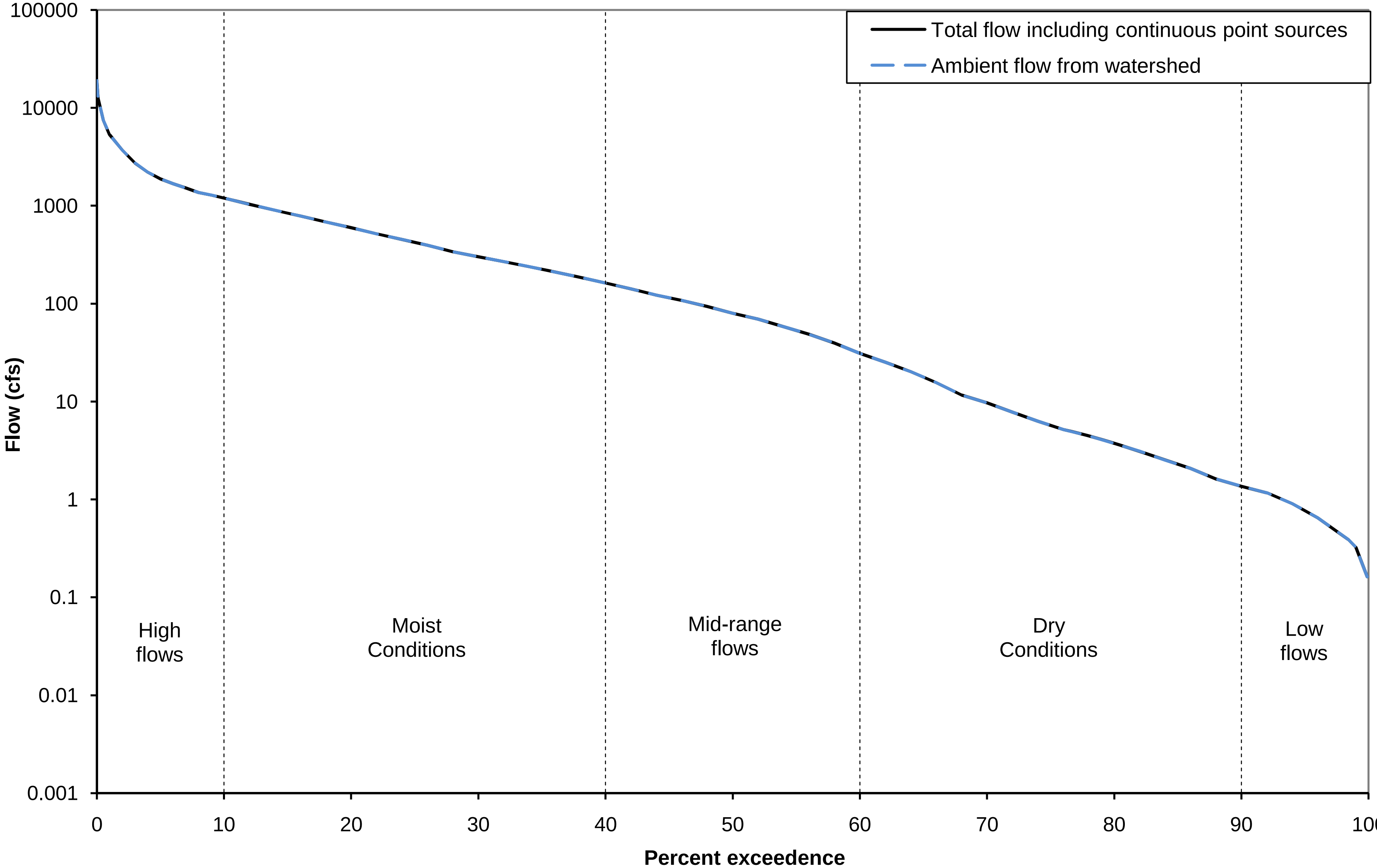


Figure M.2 Lead Load Duration Curve for Dorcheat Bayou Reach 11140203-022

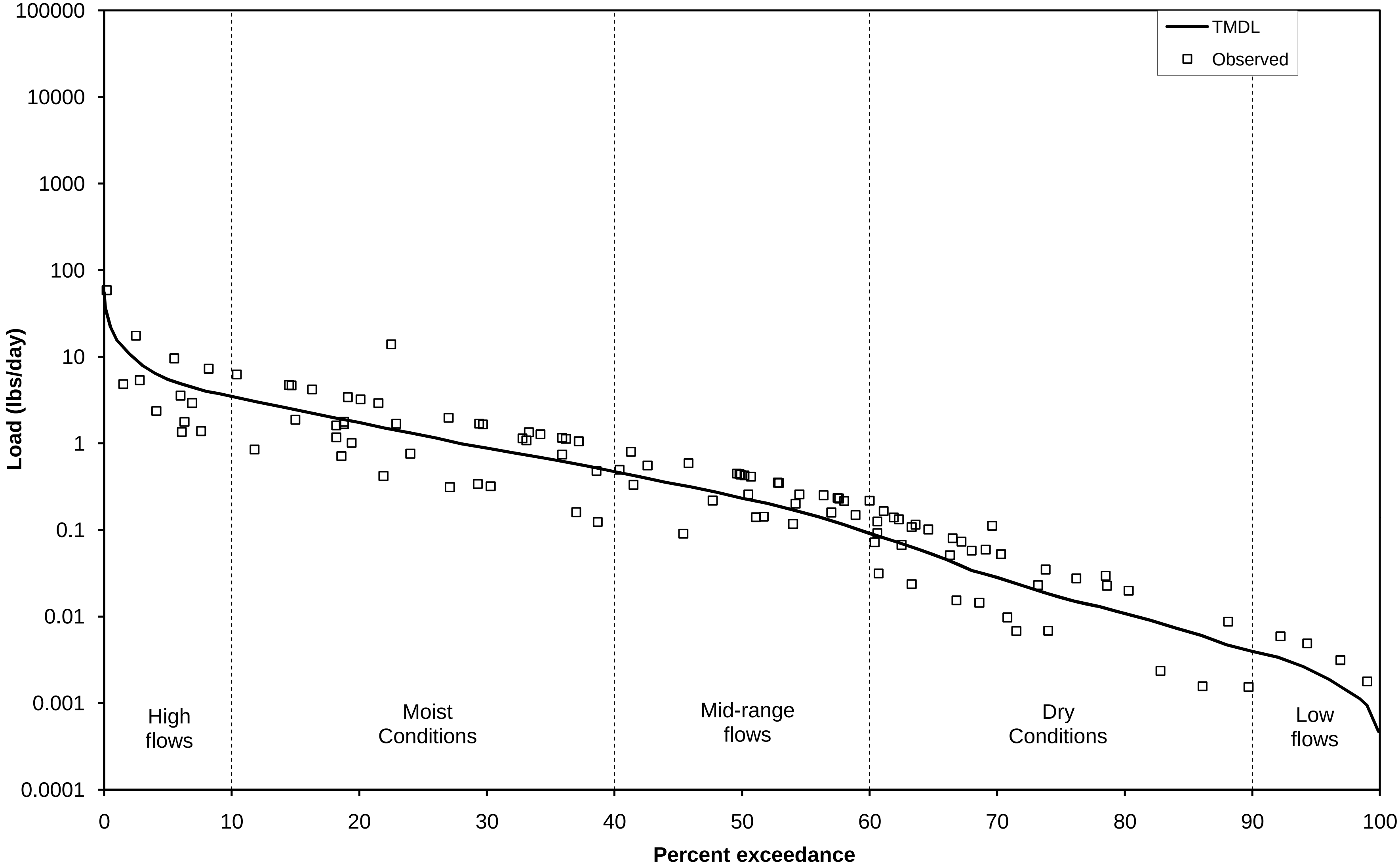
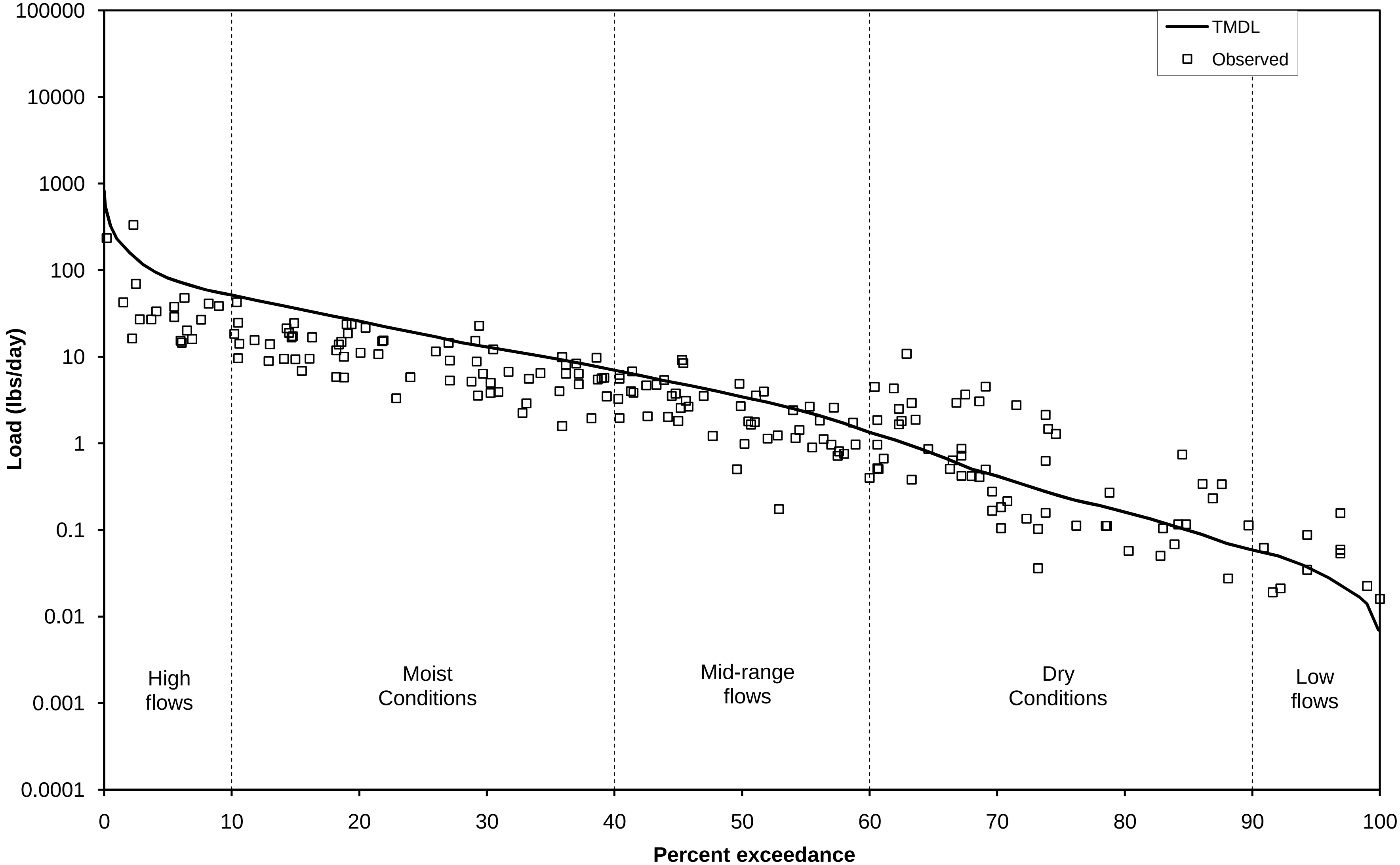


Figure M.3 Sulfate Load Duration Curve for Dorcheat Bayou Reach 11140203-022



APPENDIX N

TMDL Calculations for Reach 11140203-021

TABLE N.1 ALLOWABLE LOAD OF LEAD FOR HORSEHEAD CREEK REACH 11140203-021

Drainage area at Bayou Dorcheat gage near Springhill, LA =	605	square miles	
Drainage area at downstream end of reach 11140203-021 =	100	square miles	
Published 7Q10 flow for Bayou Dorcheat gage near Springhill, LA =	0.60	cfs	
Sum of design flows for non-storm point sources for this reach =	2.3845	MGD =	3.69 cfs

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-021 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
99.9	0.250	0.041	3.69	3.73	0.014
99	0.500	0.082	3.69	3.77	0.014
98.4	0.600	0.099	3.69	3.79	0.014
96	1.00	0.165	3.69	3.85	0.014
94	1.40	0.231	3.69	3.92	0.015
92	1.80	0.297	3.69	3.99	0.015
90	2.10	0.346	3.69	4.04	0.015
88	2.50	0.412	3.69	4.10	0.015
86	3.20	0.527	3.69	4.22	0.016
84	3.90	0.643	3.69	4.33	0.016
82	4.80	0.791	3.69	4.48	0.017
80	5.80	0.956	3.69	4.65	0.017
78	6.90	1.14	3.69	4.83	0.018
76	8.00	1.32	3.69	5.01	0.019
74	9.70	1.60	3.69	5.29	0.020
72	12.0	1.98	3.69	5.67	0.021
70	15.0	2.47	3.69	6.16	0.023
68	18.0	2.97	3.69	6.66	0.025
66	24.0	3.96	3.69	7.64	0.028
64	31.0	5.11	3.69	8.80	0.033
62	39.0	6.43	3.69	10.1	0.038
60	48.0	7.91	3.69	11.6	0.043
58	61.0	10.1	3.69	13.7	0.051
56	75.0	12.4	3.69	16.0	0.060
54	90.0	14.8	3.69	18.5	0.069
52	107	17.6	3.69	21.3	0.079
50	123	20.3	3.69	24.0	0.089
48	144	23.7	3.69	27.4	0.102
46	166	27.4	3.69	31.0	0.115
44	188	31.0	3.69	34.7	0.129
42	218	35.9	3.69	39.6	0.147
40	250	41.2	3.69	44.9	0.167
38	287	47.2	3.69	50.9	0.189
36	326	53.7	3.69	57.4	0.213
34	369	60.8	3.69	64.5	0.240
32	414	68.1	3.69	71.8	0.267
30	465	76.6	3.69	80.3	0.298
28	522	86.0	3.69	89.7	0.333
26	609	100	3.69	104	0.387
24	697	115	3.69	118	0.440
22	797	131	3.69	135	0.502
20	922	152	3.69	156	0.578
18	1,050	173	3.69	177	0.657

Percent exceedance for flow	Flow in Bayou Dorcheat near Springhill, LA (cfs)	Ambient flow at downstream end of reach 11140203-021 (cfs)	Flow from non-storm point sources (cfs)	Total flow (cfs)	Total allowable load (i.e., TMDL) for diss. lead (lbs/day)
16	1,210	199	3.69	203	0.755
14	1,390	229	3.69	233	0.865
12	1,590	262	3.69	266	0.987
10	1,850	305	3.69	309	1.15
9	1,980	326	3.69	330	1.23
8	2,110	348	3.69	351	1.31
7	2,340	386	3.69	389	1.45
6	2,592	427	3.69	431	1.60
5	2,900	478	3.69	482	1.79
4	3,403	561	3.69	565	2.10
3	4,201	692	3.69	696	2.59
2	5,684	937	3.69	940	3.49
1	8,223	1,355	3.69	1,359	5.05
0.5	11,654	1,921	3.69	1,924	7.15
0.1	19,254	3,173	3.69	3,177	11.8
0.01	29,277	4,825	3.69	4,828	17.9

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWHHC01 HORSEHEAD CREEK.XLSX

TABLE N.2 COMPONENTS OF TMDL FOR DISSOLVED LEAD FOR HORSEHEAD CREEK REACH 11140203-021

Calculations for diffuse loads:

Existing diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × (Average existing conc.)

Allowable diffuse load = (Ambient flow at d/s end of reach for min. flow w/in hydrol. zone) × MIN (Average existing conc., Criterion)

Calculations for dividing regulated and non-regulated diffuse loads:

Tot. drain. area for regul. stormwater = 1 facilities × 40 ac each = 40 ac

Tot. drain. area for reach 11140203-021 = 100 sq. mi. = 63,808 ac

Drainage area for regul. stormwater as percent of total drainage area = 0.06%

--> WLA for regulated stormwater = 0.06% of allowable load from diffuse sources

--> LA for non-regulated diffuse sources = 99.94% of allowable load from diffuse sources

Calculations for non-storm point sources:

Sum of design flows for non-storm point sources for this reach = 2.3845 MGD = 3.69 cfs

Effluent concentration is set manually so that allocated loads (Σ WLA + LA) do not exceed TMDL

WLA for non-storm point sources = Sum of design flows × Effluent concentration

Load reserved for future growth = TMDL – LA for non-regulated diffuse sources – WLA for regulated stormwater – WLA for contin. point sources

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Ambient flow at downstream end of reach from Table N.1 for minimum flow within each hydrologic range (cfs) =	305	41.2	7.91	0.35	0.10

DISSOLVED LEAD

	High flows	Moist cond.	Mid-range	Dry cond.	Low flows
Average existing concentration (µg/L) =	0.60	0.60	0.46	0.72	1.25
Existing load from diffuse sources (lbs/day) =	0.987	0.133	0.0196	0.0013	0.00067
Allowable load from diffuse sources (lbs/day) =	0.987	0.133	0.0196	0.00127	0.00037
LA for non-regulated diffuse sources (lbs/day) =	0.9864	0.13292	0.01958	0.001269	0.0003697
WLA for regulated stormwater (lbs/day) =	0.0006	0.00008	0.00002	0.000001	0.0000003
Effluent conc. for non-storm point sources (µg/L) =	0.69	0.69	0.69	0.69	0.69
WLA for non-storm point sources (lbs/day) =	0.01373	0.01373	0.01373	0.01373	0.01373
Load reserved for future growth (lbs/day) =	0.14927	0.02027	0.00977	0	0
TMDL from Table N.1 (lbs/day) =	1.15	0.167	0.0431	0.015	0.0141
Error check: Sum of WLAs + LA + FG ≤ TMDL?	ok	ok	ok	ok	ok

FILE: R:\PROJECTS\3013-380\TECH\ADEQ_WQ_DATA\BODCAU_DORCHEAT\UWHHC01 HORSEHEAD CREEK.XLSX

Figure N.1 Flow Duration Curve for Horsehead Creek Reach 11140203-021

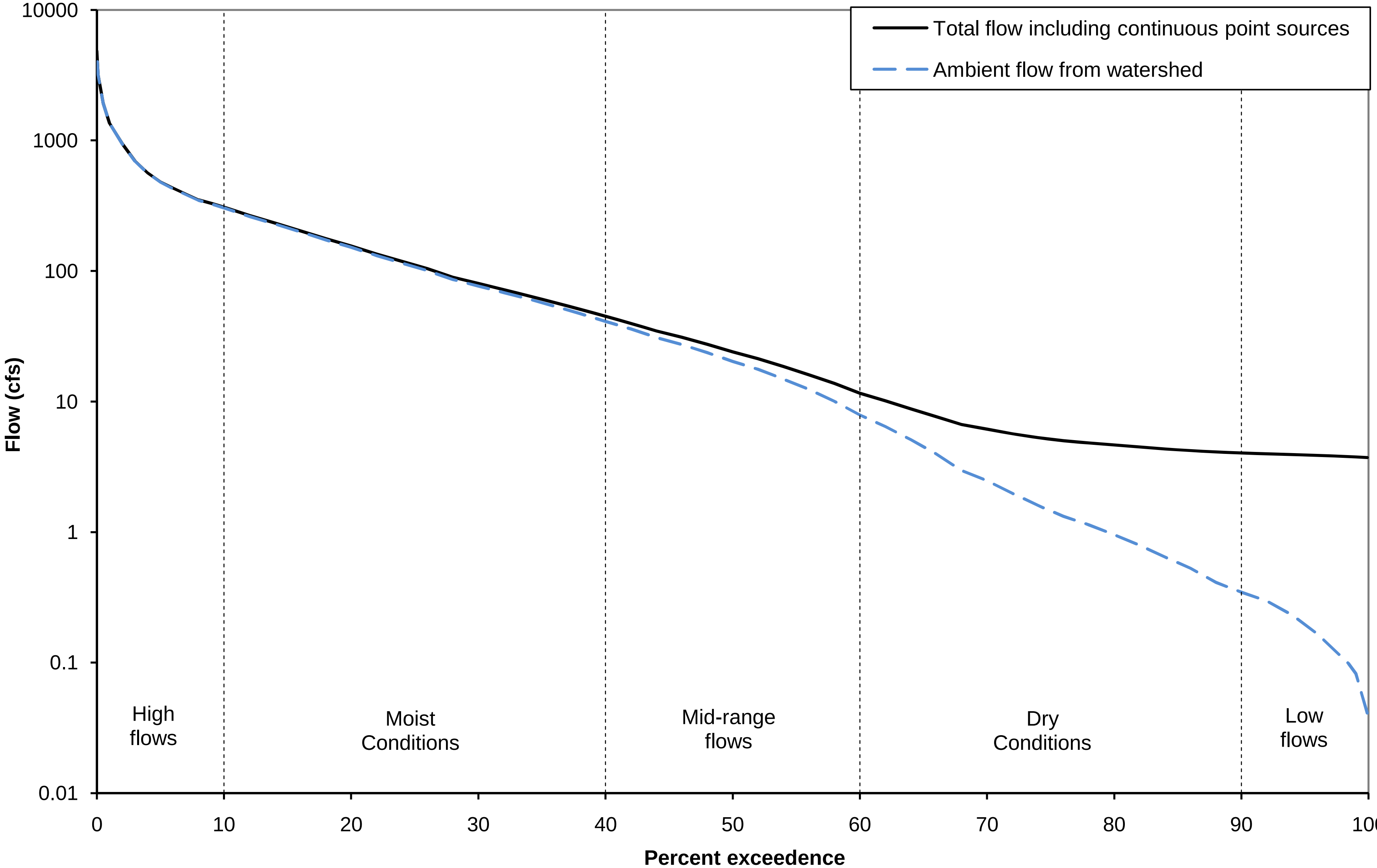
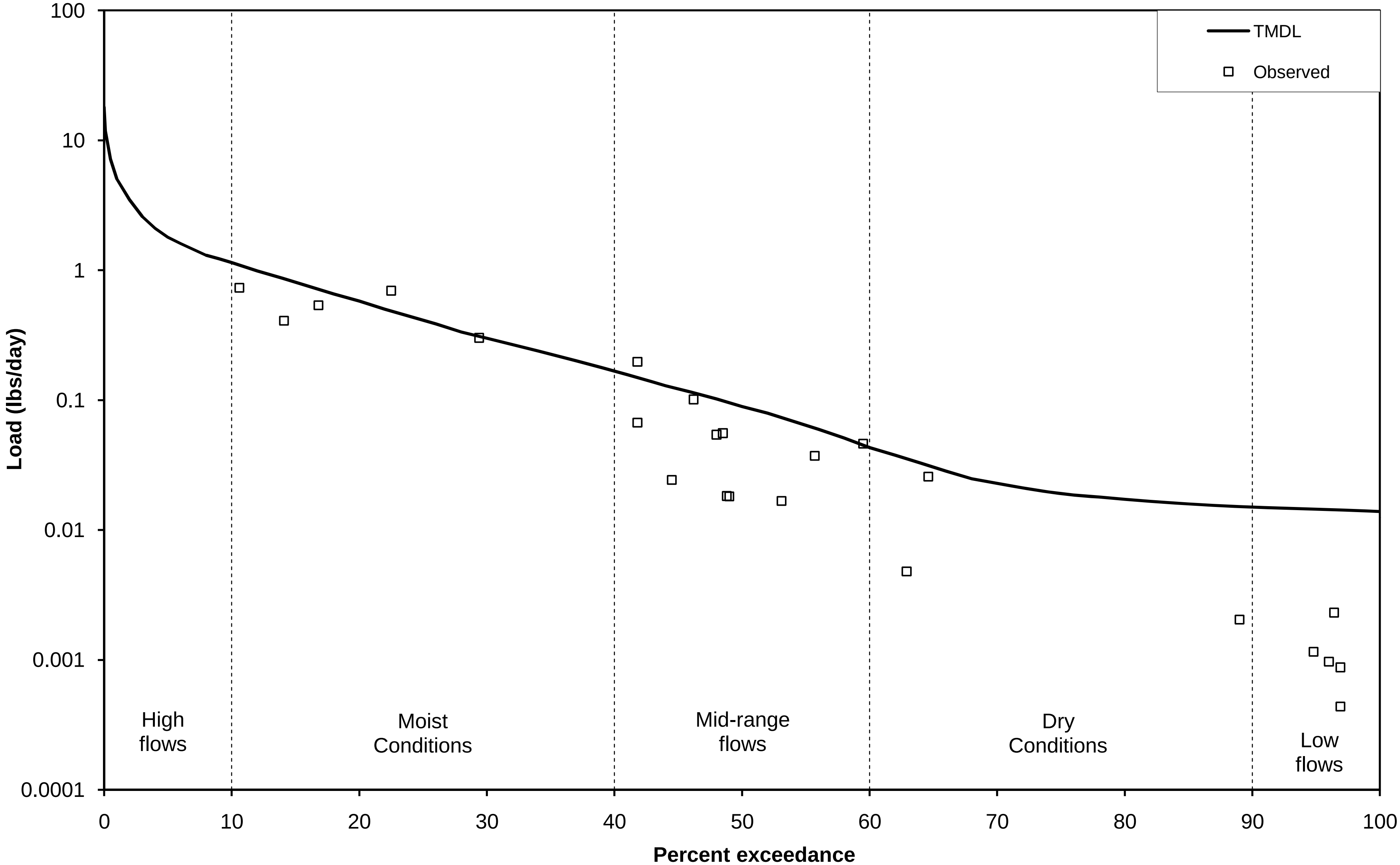


Figure N.2 Dissolved Lead Load Duration Curve for Horsehead Creek Reach 11140203-021



APPENDIX O

DO Model Output for Calibration Simulation

```
LA-QUAL Version 9.08
Louisiana Department of Environmental Quality

Input file is R:\projects\3013-380\tech\laqual\LaQUAL\BeechCr_Calib_rev2.txt
Running in steady-state mode using LA defaults
Output produced at 08:55 on 07/23/2012

$$$ DATA TYPE 1 (TITLES AND CONTROL CARDS) $$$

CARD TYPE       CONTROL TITLES

TITLE01         LA-QUAL Model for Beech Creek upstream of Lake Columbia
TITLE02         Calibration to avg of ADEQ data on 6/20/94 and 9/14/94
CNTROL03  YES   METRIC UNITS
ENDATA01

$$$ DATA TYPE 2 (MODEL OPTIONS) $$$

CARD TYPE       MODEL OPTION

MODOPT01   NO   TEMPERATURE
MODOPT02   NO   SALINITY
MODOPT03   NO   CONSERVATIVE
MODOPT04   NO   CONSERVATIVE
MODOPT05  YES   DISSOLVED OXYGEN
MODOPT06  YES   BOD2 BIOC
MODOPT07  YES   NITROGEN
MODOPT08   NO   PHOSPHORUS
MODOPT09   NO   PHYTOPLANKTON
MODOPT10   NO   PERIPHYTON
MODOPT11   NO   COLIFORM
MODOPT12   NO   NONCONSERVATIVE
ENDATA02

$$$ DATA TYPE 3 (PROGRAM CONSTANTS) $$$

CARD TYPE       DESCRIPTION OF CONSTANT                        VALUE

PROGRAM         HYDRAULIC CALCULATION METHOD      =        2.00000 (widths and depths)
PROGRAM         MAXIMUM ITERATION LIMIT           =      999.00000
PROGRAM         N INHIBITION EQUATION             =        1.00000 (two-step)
ENDATA03

$$$ DATA TYPE 4 (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

 CARD TYPE     RATE CODE     THETA VALUE

ENDATA04
```

$$$ CONSTANTS TYPE 5 (TEMPERATURE DATA) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA05

$$$ DATA TYPE 6 (PHYTOPLANKTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA06

$$$ DATA TYPE 7 (PERIPHYTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA07

$$$ DATA TYPE 8 (REACH IDENTIFICATION DATA) $$$

CARD TYPE	REACH	ID	NAME	BEGIN REACH km		END REACH km	ELEM LENGTH km	REACH LENGTH km	ELEMS PER RCH	BEGIN ELEM NUM	END ELEM NUM
REACH ID	1	B1	Beech Creek	38.80	TO	21.60	0.1000	17.20	172	1	172

ENDATA08

$$$ DATA TYPE 9 (ADVECTIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	WIDTH "A"	WIDTH "B"	WIDTH "C"	DEPTH "D"	DEPTH "E"	DEPTH "F"	SLOPE	MANNINGS "N"
HYDR-1	1	B1	9.068	0.120	0.000	1.412	0.450	0.000	0.00000	0.000

ENDATA09

$$$ DATA TYPE 10 (DISPERSIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	TIDAL RANGE	DISPERSION "A"	DISPERSION "B"	DISPERSION "C"	DISPERSION "D"

ENDATA10

$$$ DATA TYPE 11 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	ID	TEMP deg C	SALIN ppt	DO mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	PERIP g/m²	BOD1 mg/L	BOD2 mg/L	ORG-N mg/L	ORG-P mg/L	COLI #/100mL	NCM	CM-1	CM-2
INITIAL	1	B1	25.75	0.00	1.60	0.29	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00

ENDATA11

$$$ DATA TYPE 12 (REAERATION, SEDIMENT OXYGEN DEMAND, BOD COEFFICIENTS) $$$

CARD TYPE	RCH NUM	RCH ID	K2 OPT	K2 "A"	K2 "B"	K2 "C"	BKGRND SOD g/m²/d	AEROB BOD DECAY per day	BOD SETT m/d	SETTLD SOD AVAIL frac	ANAER BOD DECAY per day	AEROB BOD2 DECAY per day	BOD2 SETT m/d	ANAER BOD2 DECAY per day	BOD2 HYDR TO BOD1 per day
COEFF-1	1	B1	15 LOUISIANA	0.000	0.000	0.000	5.500	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000

ENDATA12

$$$ DATA TYPE 13 (NITROGEN AND PHOSPHORUS COEFFICIENTS) $$$

CARD TYPE	REACH	ID	ORG-N DECA per day	ORG-N SETT m/d	SETTLD ORGN AVAIL frac	NH3 DECA per day	BKGRND NH3 SRCE g/m²/d	BKGRND PO4 SRCE g/m²/d	DENIT RATE per day	ORGP DECA per day	ORGP SETT m/d	SETTLD ORGP AVAIL frac
COEFF-2	1	B1	0.000	0.000	0.000	0.200	0.012	0.000	0.000	0.000	0.000	0.000

ENDATA13

$$$ DATA TYPE 14 (ALGAE PHYTOPLANKTON AND PERIPHYTON COEFFICIENTS) $$$

CARD TYPE	REACH	ID	SECCHI DEPTH m	CHL A: ALGAE frac	PHYTO SETT m/d	PHYTO DEATH per day	MAX PHYTO GROW per day	PHYTO RESP per day	PERIP DEATH per day	MAX PERIP GROW per day	PERIP RESP per day	BANK SHADING frac

ENDATA14

$$$ DATA TYPE 15 (COLIFORM AND NONCONSERVATIVE COEFFICIENTS) $$$

CARD TYPE	REACH	ID	COLIFORM DIE-OFF per day	NCM DECAY per day	NCM SETT m/d

ENDATA15

$$$ DATA TYPE 16 (INCREMENTAL DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

CARD TYPE	REACH	ID	OUTFLOW m³/s	INFLOW m³/s	TEMP deg C	SALIN ppt	CM-1	CM-2	IN/DIST	OUT/DIST
INCR-1	1	B1	0.00000	0.06500	25.75	0.00	0.00	0.00	0.00378	0.00000

ENDATA16

$$$ DATA TYPE 17 (INCREMENTAL DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	REACH	ID	DO mg/L	BOD1 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	BOD2 mg/L
INCR-2	1	B1	1.60	0.00	0.00	0.29	0.00	6.90

ENDATA17

$$$ DATA TYPE 18 (INCREMENTAL DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	REACH	ID	PO4	PHYTO CHL A	COLI	NCM	ORGP
			mg/L	µg/L	#/100mL		mg/L

ENDATA18

$$$ DATA TYPE 19 (NONPOINT SOURCE DATA) $$$

CARD TYPE	REACH	ID	BOD1	ORG-N	COLI	NCM	DO	BOD2	ORG-P
			kg/d	kg/d	#/day		kg/d	kg/d	kg/d
NONPOINT	1	B1	0.00	0.00	0.00	0.00	0.00	60.00	0.00

ENDATA19

$$$ DATA TYPE 20 (HEADWATER FOR FLOW, TEMPERATURE, SALINITY AND CONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	UNIT	FLOW	FLOW	TEMP	SALIN	CM-1	CM-2	HDW DISP EXCHG
				m^3/s	cfs	deg C	ppt			frac
HDWTR-1	1	Beech Creek	0	0.03200	1.12994	25.75	0.00	0.000	0.000	0.000

ENDATA20

$$$ DATA TYPE 21 (HEADWATER DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	ELEMENT	NAME	DO	BOD#1	ORG-N	NH3-N	NO3-N	BOD2
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
HDWTR-2	1	Beech Creek	1.60	0.00	0.00	0.29	0.00	6.90

ENDATA21

$$$ DATA TYPE 22 (HEADWATER DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	PO4-P	PHYTO CHL A	COLI	NCM	ORG-P
			mg/L	µg/L	#/100mL		mg/L

ENDATA22

$$$ DATA TYPE 23 (JUNCTION DATA) $$$

CARD TYPE	JUNCTION ELEMENT	UPSTRM ELEMENT	RIVER KILOM	NAME

ENDATA23

$$$ DATA TYPE 24 (WASTELOAD DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

CARD TYPE	ELEMENT	RKILO	NAME	FLOW	FLOW	FLOW	TEMP	SALIN	CM-1	CM-2
				m^3/s	cfs	MGD	deg C	ppt		

ENDATA24

$$$ DATA TYPE 25 (WASTELOAD DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	ELEMENT	NAME	DO	BOD	% BOD RMVL	ORG-N	NH3-N	% NITRIF	NO3-N	BOD2
			mg/L	mg/L		mg/L	mg/L		mg/L	mg/L

ENDATA25

$$$ DATA TYPE 26 (WASTELOAD DATA FOR PHOSPHORUS, PHYTOPLANTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	PO4-P	PHYTO CHL A	COLI	NCM	ORG-P
			mg/L	µg/L	#/100mL		mg/L

ENDATA26

$$$ DATA TYPE 27 (LOWER BOUNDARY CONDITIONS) $$$

CARD TYPE	CONSTITUENT	CONCENTRATION

ENDATA27

$$$ DATA TYPE 28 (DAM DATA) $$$

CARD TYPE	ELEMENT	NAME	EQN	"A"	"B"	"H"

ENDATA28

$$$ DATA TYPE 29 (SENSITIVITY ANALYSIS DATA) $$$

CARD TYPE	PARAMETER	COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7	COL 8

ENDATA29

$$$ DATA TYPE 30 (PLOT CONTROL CARDS) $$$

NUMBER OF PLOTS = 1
NUMBER OF REACHES IN PLOT 1 = 1
PLOT RCH 1
ENDATA30

$$$ DATA TYPE 31 (OVERLAY PLOT DATA) $$$

ENDATA31

.....NO ERRORS DETECTED IN INPUT DATA
.....HYDRAULIC CALCULATIONS COMPLETED
.....TRIDIAGONAL MATRIX TERMS INITIALIZED
.....OXYGEN DEPENDENT RATES CONVERGENT IN 7 ITERATIONS
.....CONSTITUENT CALCULATIONS COMPLETED
.....GRAPHICS DATA FOR PLOT 1 WRITTEN TO UNIT 11

FINAL REPORT Beech Creek LA-QUAL Model for Beech Creek upstream of Lake Columbia
REACH NO. 1 Beech Creek Calibration to avg of ADEQ data on 6/20/94 and 9/14/94

****************************** REACH INPUTS ******************************

ELEM NO.	TYPE	FLOW	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	COLI #/100mL	NCM
1	HDWTR	0.03200	25.75	0.00	0.00	0.00	1.60	0.00	6.90	0.00	6.90	0.00	0.29	0.00	0.00	0.00	0.00	0.00
EACH	INCR	0.00038	25.75	0.00	0.00	0.00	1.60	0.00	6.90			0.00	0.29	0.00	0.00	0.00	0.00	

****************************** HYDRAULIC PARAMETER VALUES ******************************

ELEM NO.	BEGIN DIST km	ENDING DIST km	FLOW m^3/s	PCT EFF	ADVCTV VELO m/s	TRAVEL TIME days	CUM TIME days	DEPTH m	WIDTH m	VOLUME m^3	SURFACE AREA m^2	X-SECT AREA m^2	TIDAL PRISM m^3	TIDAL VELO m/s	DISPRSN m^2/s	MEAN VELO m/s
1	38.80	38.70	0.03238	0.0	0.01787	0.06	0.06	0.30	6.01	181.21	600.82	1.81	0.00	0.000	0.000	0.018
2	38.70	38.60	0.03276	0.0	0.01796	0.06	0.13	0.30	6.02	182.42	601.65	1.82	0.00	0.000	0.000	0.018
3	38.60	38.50	0.03313	0.0	0.01805	0.06	0.19	0.30	6.02	183.61	602.48	1.84	0.00	0.000	0.000	0.018
4	38.50	38.40	0.03351	0.0	0.01813	0.06	0.26	0.31	6.03	184.80	603.30	1.85	0.00	0.000	0.000	0.018
5	38.40	38.30	0.03389	0.0	0.01822	0.06	0.32	0.31	6.04	185.99	604.11	1.86	0.00	0.000	0.000	0.018
6	38.30	38.20	0.03427	0.0	0.01831	0.06	0.38	0.31	6.05	187.17	604.92	1.87	0.00	0.000	0.000	0.018
7	38.20	38.10	0.03465	0.0	0.01840	0.06	0.45	0.31	6.06	188.34	605.72	1.88	0.00	0.000	0.000	0.018
8	38.10	38.00	0.03502	0.0	0.01848	0.06	0.51	0.31	6.07	189.51	606.50	1.90	0.00	0.000	0.000	0.018
9	38.00	37.90	0.03540	0.0	0.01857	0.06	0.57	0.31	6.07	190.67	607.29	1.91	0.00	0.000	0.000	0.019
10	37.90	37.80	0.03578	0.0	0.01865	0.06	0.63	0.32	6.08	191.83	608.06	1.92	0.00	0.000	0.000	0.019
11	37.80	37.70	0.03616	0.0	0.01874	0.06	0.70	0.32	6.09	192.98	608.83	1.93	0.00	0.000	0.000	0.019
12	37.70	37.60	0.03653	0.0	0.01882	0.06	0.76	0.32	6.10	194.13	609.59	1.94	0.00	0.000	0.000	0.019
13	37.60	37.50	0.03691	0.0	0.01890	0.06	0.82	0.32	6.10	195.27	610.34	1.95	0.00	0.000	0.000	0.019
14	37.50	37.40	0.03729	0.0	0.01899	0.06	0.88	0.32	6.11	196.41	611.09	1.96	0.00	0.000	0.000	0.019
15	37.40	37.30	0.03767	0.0	0.01907	0.06	0.94	0.32	6.12	197.54	611.83	1.98	0.00	0.000	0.000	0.019
16	37.30	37.20	0.03805	0.0	0.01915	0.06	1.00	0.32	6.13	198.67	612.56	1.99	0.00	0.000	0.000	0.019

17	37.20	37.10	0.03842	0.0	0.01923	0.06	1.06	0.33	6.13	199.79	613.29	2.00	0.00	0.000	0.000	0.019
18	37.10	37.00	0.03880	0.0	0.01931	0.06	1.12	0.33	6.14	200.91	614.01	2.01	0.00	0.000	0.000	0.019
19	37.00	36.90	0.03918	0.0	0.01939	0.06	1.18	0.33	6.15	202.02	614.72	2.02	0.00	0.000	0.000	0.019
20	36.90	36.80	0.03956	0.0	0.01947	0.06	1.24	0.33	6.15	203.13	615.43	2.03	0.00	0.000	0.000	0.019
21	36.80	36.70	0.03994	0.0	0.01955	0.06	1.30	0.33	6.16	204.23	616.13	2.04	0.00	0.000	0.000	0.020
22	36.70	36.60	0.04031	0.0	0.01963	0.06	1.36	0.33	6.17	205.33	616.83	2.05	0.00	0.000	0.000	0.020
23	36.60	36.50	0.04069	0.0	0.01971	0.06	1.42	0.33	6.18	206.43	617.52	2.06	0.00	0.000	0.000	0.020
24	36.50	36.40	0.04107	0.0	0.01979	0.06	1.48	0.34	6.18	207.52	618.21	2.08	0.00	0.000	0.000	0.020
25	36.40	36.30	0.04145	0.0	0.01987	0.06	1.53	0.34	6.19	208.60	618.89	2.09	0.00	0.000	0.000	0.020
26	36.30	36.20	0.04183	0.0	0.01995	0.06	1.59	0.34	6.20	209.69	619.56	2.10	0.00	0.000	0.000	0.020
27	36.20	36.10	0.04220	0.0	0.02002	0.06	1.65	0.34	6.20	210.76	620.23	2.11	0.00	0.000	0.000	0.020
28	36.10	36.00	0.04258	0.0	0.02010	0.06	1.71	0.34	6.21	211.84	620.89	2.12	0.00	0.000	0.000	0.020
29	36.00	35.90	0.04296	0.0	0.02018	0.06	1.76	0.34	6.22	212.91	621.55	2.13	0.00	0.000	0.000	0.020
30	35.90	35.80	0.04334	0.0	0.02025	0.06	1.82	0.34	6.22	213.97	622.21	2.14	0.00	0.000	0.000	0.020
31	35.80	35.70	0.04372	0.0	0.02033	0.06	1.88	0.35	6.23	215.03	622.86	2.15	0.00	0.000	0.000	0.020
32	35.70	35.60	0.04409	0.0	0.02040	0.06	1.93	0.35	6.23	216.09	623.50	2.16	0.00	0.000	0.000	0.020
33	35.60	35.50	0.04447	0.0	0.02048	0.06	1.99	0.35	6.24	217.15	624.14	2.17	0.00	0.000	0.000	0.020
34	35.50	35.40	0.04485	0.0	0.02055	0.06	2.05	0.35	6.25	218.19	624.77	2.18	0.00	0.000	0.000	0.021
35	35.40	35.30	0.04523	0.0	0.02063	0.06	2.10	0.35	6.25	219.24	625.40	2.19	0.00	0.000	0.000	0.021
36	35.30	35.20	0.04560	0.0	0.02070	0.06	2.16	0.35	6.26	220.28	626.03	2.20	0.00	0.000	0.000	0.021
37	35.20	35.10	0.04598	0.0	0.02078	0.06	2.22	0.35	6.27	221.32	626.65	2.21	0.00	0.000	0.000	0.021
38	35.10	35.00	0.04636	0.0	0.02085	0.06	2.27	0.35	6.27	222.36	627.26	2.22	0.00	0.000	0.000	0.021
39	35.00	34.90	0.04674	0.0	0.02092	0.06	2.33	0.36	6.28	223.39	627.87	2.23	0.00	0.000	0.000	0.021
40	34.90	34.80	0.04712	0.0	0.02100	0.06	2.38	0.36	6.28	224.42	628.48	2.24	0.00	0.000	0.000	0.021
41	34.80	34.70	0.04749	0.0	0.02107	0.05	2.44	0.36	6.29	225.44	629.08	2.25	0.00	0.000	0.000	0.021
42	34.70	34.60	0.04787	0.0	0.02114	0.05	2.49	0.36	6.30	226.46	629.68	2.26	0.00	0.000	0.000	0.021
43	34.60	34.50	0.04825	0.0	0.02121	0.05	2.55	0.36	6.30	227.48	630.28	2.27	0.00	0.000	0.000	0.021
44	34.50	34.40	0.04863	0.0	0.02128	0.05	2.60	0.36	6.31	228.49	630.87	2.28	0.00	0.000	0.000	0.021
45	34.40	34.30	0.04901	0.0	0.02135	0.05	2.65	0.36	6.31	229.50	631.45	2.30	0.00	0.000	0.000	0.021
46	34.30	34.20	0.04938	0.0	0.02142	0.05	2.71	0.36	6.32	230.51	632.04	2.31	0.00	0.000	0.000	0.021
47	34.20	34.10	0.04976	0.0	0.02149	0.05	2.76	0.37	6.33	231.51	632.61	2.32	0.00	0.000	0.000	0.021
48	34.10	34.00	0.05014	0.0	0.02156	0.05	2.82	0.37	6.33	232.51	633.19	2.33	0.00	0.000	0.000	0.022
49	34.00	33.90	0.05052	0.0	0.02163	0.05	2.87	0.37	6.34	233.51	633.76	2.34	0.00	0.000	0.000	0.022
50	33.90	33.80	0.05090	0.0	0.02170	0.05	2.92	0.37	6.34	234.51	634.33	2.35	0.00	0.000	0.000	0.022
51	33.80	33.70	0.05127	0.0	0.02177	0.05	2.98	0.37	6.35	235.50	634.89	2.35	0.00	0.000	0.000	0.022
52	33.70	33.60	0.05165	0.0	0.02184	0.05	3.03	0.37	6.35	236.48	635.45	2.36	0.00	0.000	0.000	0.022
53	33.60	33.50	0.05203	0.0	0.02191	0.05	3.08	0.37	6.36	237.47	636.01	2.37	0.00	0.000	0.000	0.022
54	33.50	33.40	0.05241	0.0	0.02198	0.05	3.13	0.37	6.37	238.45	636.56	2.38	0.00	0.000	0.000	0.022
55	33.40	33.30	0.05278	0.0	0.02205	0.05	3.19	0.38	6.37	239.43	637.11	2.39	0.00	0.000	0.000	0.022
56	33.30	33.20	0.05316	0.0	0.02211	0.05	3.24	0.38	6.38	240.40	637.65	2.40	0.00	0.000	0.000	0.022
57	33.20	33.10	0.05354	0.0	0.02218	0.05	3.29	0.38	6.38	241.38	638.20	2.41	0.00	0.000	0.000	0.022
58	33.10	33.00	0.05392	0.0	0.02225	0.05	3.34	0.38	6.39	242.35	638.73	2.42	0.00	0.000	0.000	0.022
59	33.00	32.90	0.05430	0.0	0.02232	0.05	3.40	0.38	6.39	243.31	639.27	2.43	0.00	0.000	0.000	0.022
60	32.90	32.80	0.05467	0.0	0.02238	0.05	3.45	0.38	6.40	244.28	639.80	2.44	0.00	0.000	0.000	0.022
61	32.80	32.70	0.05505	0.0	0.02245	0.05	3.50	0.38	6.40	245.24	640.33	2.45	0.00	0.000	0.000	0.022
62	32.70	32.60	0.05543	0.0	0.02251	0.05	3.55	0.38	6.41	246.20	640.86	2.46	0.00	0.000	0.000	0.023
63	32.60	32.50	0.05581	0.0	0.02258	0.05	3.60	0.39	6.41	247.15	641.38	2.47	0.00	0.000	0.000	0.023
64	32.50	32.40	0.05619	0.0	0.02265	0.05	3.65	0.39	6.42	248.10	641.90	2.48	0.00	0.000	0.000	0.023

65	32.40	32.30	0.05656	0.0	0.02271	0.05	3.70	0.39	6.42	249.05	642.42	2.49	0.00	0.000	0.000	0.023
66	32.30	32.20	0.05694	0.0	0.02278	0.05	3.75	0.39	6.43	250.00	642.93	2.50	0.00	0.000	0.000	0.023
67	32.20	32.10	0.05732	0.0	0.02284	0.05	3.80	0.39	6.43	250.95	643.44	2.51	0.00	0.000	0.000	0.023
68	32.10	32.00	0.05770	0.0	0.02291	0.05	3.86	0.39	6.44	251.89	643.95	2.52	0.00	0.000	0.000	0.023
69	32.00	31.90	0.05808	0.0	0.02297	0.05	3.91	0.39	6.44	252.83	644.45	2.53	0.00	0.000	0.000	0.023
70	31.90	31.80	0.05845	0.0	0.02303	0.05	3.96	0.39	6.45	253.76	644.95	2.54	0.00	0.000	0.000	0.023
71	31.80	31.70	0.05883	0.0	0.02310	0.05	4.01	0.39	6.45	254.70	645.45	2.55	0.00	0.000	0.000	0.023
72	31.70	31.60	0.05921	0.0	0.02316	0.05	4.06	0.40	6.46	255.63	645.95	2.56	0.00	0.000	0.000	0.023
73	31.60	31.50	0.05959	0.0	0.02323	0.05	4.11	0.40	6.46	256.56	646.44	2.57	0.00	0.000	0.000	0.023
74	31.50	31.40	0.05997	0.0	0.02329	0.05	4.16	0.40	6.47	257.48	646.93	2.57	0.00	0.000	0.000	0.023
75	31.40	31.30	0.06034	0.0	0.02335	0.05	4.20	0.40	6.47	258.41	647.42	2.58	0.00	0.000	0.000	0.023
76	31.30	31.20	0.06072	0.0	0.02341	0.05	4.25	0.40	6.48	259.33	647.91	2.59	0.00	0.000	0.000	0.023
77	31.20	31.10	0.06110	0.0	0.02348	0.05	4.30	0.40	6.48	260.25	648.39	2.60	0.00	0.000	0.000	0.023
78	31.10	31.00	0.06148	0.0	0.02354	0.05	4.35	0.40	6.49	261.16	648.87	2.61	0.00	0.000	0.000	0.024
79	31.00	30.90	0.06185	0.0	0.02360	0.05	4.40	0.40	6.49	262.08	649.35	2.62	0.00	0.000	0.000	0.024
80	30.90	30.80	0.06223	0.0	0.02366	0.05	4.45	0.40	6.50	262.99	649.82	2.63	0.00	0.000	0.000	0.024
81	30.80	30.70	0.06261	0.0	0.02373	0.05	4.50	0.41	6.50	263.90	650.29	2.64	0.00	0.000	0.000	0.024
82	30.70	30.60	0.06299	0.0	0.02379	0.05	4.55	0.41	6.51	264.80	650.76	2.65	0.00	0.000	0.000	0.024
83	30.60	30.50	0.06337	0.0	0.02385	0.05	4.60	0.41	6.51	265.71	651.23	2.66	0.00	0.000	0.000	0.024
84	30.50	30.40	0.06374	0.0	0.02391	0.05	4.65	0.41	6.52	266.61	651.70	2.67	0.00	0.000	0.000	0.024
85	30.40	30.30	0.06412	0.0	0.02397	0.05	4.69	0.41	6.52	267.51	652.16	2.68	0.00	0.000	0.000	0.024
86	30.30	30.20	0.06450	0.0	0.02403	0.05	4.74	0.41	6.53	268.41	652.62	2.68	0.00	0.000	0.000	0.024
87	30.20	30.10	0.06488	0.0	0.02409	0.05	4.79	0.41	6.53	269.30	653.08	2.69	0.00	0.000	0.000	0.024
88	30.10	30.00	0.06526	0.0	0.02415	0.05	4.84	0.41	6.54	270.20	653.53	2.70	0.00	0.000	0.000	0.024
89	30.00	29.90	0.06563	0.0	0.02421	0.05	4.89	0.41	6.54	271.09	653.98	2.71	0.00	0.000	0.000	0.024
90	29.90	29.80	0.06601	0.0	0.02427	0.05	4.93	0.42	6.54	271.98	654.43	2.72	0.00	0.000	0.000	0.024
91	29.80	29.70	0.06639	0.0	0.02433	0.05	4.98	0.42	6.55	272.86	654.88	2.73	0.00	0.000	0.000	0.024
92	29.70	29.60	0.06677	0.0	0.02439	0.05	5.03	0.42	6.55	273.75	655.33	2.74	0.00	0.000	0.000	0.024
93	29.60	29.50	0.06715	0.0	0.02445	0.05	5.08	0.42	6.56	274.63	655.77	2.75	0.00	0.000	0.000	0.024
94	29.50	29.40	0.06752	0.0	0.02451	0.05	5.12	0.42	6.56	275.51	656.21	2.76	0.00	0.000	0.000	0.025
95	29.40	29.30	0.06790	0.0	0.02457	0.05	5.17	0.42	6.57	276.39	656.65	2.76	0.00	0.000	0.000	0.025
96	29.30	29.20	0.06828	0.0	0.02463	0.05	5.22	0.42	6.57	277.26	657.09	2.77	0.00	0.000	0.000	0.025
97	29.20	29.10	0.06866	0.0	0.02468	0.05	5.26	0.42	6.58	278.14	657.53	2.78	0.00	0.000	0.000	0.025
98	29.10	29.00	0.06904	0.0	0.02474	0.05	5.31	0.42	6.58	279.01	657.96	2.79	0.00	0.000	0.000	0.025
99	29.00	28.90	0.06941	0.0	0.02480	0.05	5.36	0.43	6.58	279.88	658.39	2.80	0.00	0.000	0.000	0.025
100	28.90	28.80	0.06979	0.0	0.02486	0.05	5.40	0.43	6.59	280.74	658.82	2.81	0.00	0.000	0.000	0.025
101	28.80	28.70	0.07017	0.0	0.02492	0.05	5.45	0.43	6.59	281.61	659.25	2.82	0.00	0.000	0.000	0.025
102	28.70	28.60	0.07055	0.0	0.02497	0.05	5.50	0.43	6.60	282.47	659.67	2.82	0.00	0.000	0.000	0.025
103	28.60	28.50	0.07092	0.0	0.02503	0.05	5.54	0.43	6.60	283.34	660.10	2.83	0.00	0.000	0.000	0.025
104	28.50	28.40	0.07130	0.0	0.02509	0.05	5.59	0.43	6.61	284.19	660.52	2.84	0.00	0.000	0.000	0.025
105	28.40	28.30	0.07168	0.0	0.02515	0.05	5.63	0.43	6.61	285.05	660.94	2.85	0.00	0.000	0.000	0.025
106	28.30	28.20	0.07206	0.0	0.02520	0.05	5.68	0.43	6.61	285.91	661.35	2.86	0.00	0.000	0.000	0.025
107	28.20	28.10	0.07244	0.0	0.02526	0.05	5.73	0.43	6.62	286.76	661.77	2.87	0.00	0.000	0.000	0.025
108	28.10	28.00	0.07281	0.0	0.02532	0.05	5.77	0.43	6.62	287.61	662.18	2.88	0.00	0.000	0.000	0.025
109	28.00	27.90	0.07319	0.0	0.02537	0.05	5.82	0.44	6.63	288.46	662.59	2.88	0.00	0.000	0.000	0.025
110	27.90	27.80	0.07357	0.0	0.02543	0.05	5.86	0.44	6.63	289.31	663.00	2.89	0.00	0.000	0.000	0.025
111	27.80	27.70	0.07395	0.0	0.02549	0.05	5.91	0.44	6.63	290.16	663.41	2.90	0.00	0.000	0.000	0.025
112	27.70	27.60	0.07433	0.0	0.02554	0.05	5.95	0.44	6.64	291.00	663.82	2.91	0.00	0.000	0.000	0.026

113	27.60	27.50	0.07470	0.0	0.02560	0.05	6.00	0.44	6.64	291.84	664.22	2.92	0.00	0.000	0.000	0.026
114	27.50	27.40	0.07508	0.0	0.02565	0.05	6.04	0.44	6.65	292.68	664.62	2.93	0.00	0.000	0.000	0.026
115	27.40	27.30	0.07546	0.0	0.02571	0.05	6.09	0.44	6.65	293.52	665.02	2.94	0.00	0.000	0.000	0.026
116	27.30	27.20	0.07584	0.0	0.02576	0.04	6.13	0.44	6.65	294.36	665.42	2.94	0.00	0.000	0.000	0.026
117	27.20	27.10	0.07622	0.0	0.02582	0.04	6.18	0.44	6.66	295.20	665.82	2.95	0.00	0.000	0.000	0.026
118	27.10	27.00	0.07659	0.0	0.02587	0.04	6.22	0.44	6.66	296.03	666.21	2.96	0.00	0.000	0.000	0.026
119	27.00	26.90	0.07697	0.0	0.02593	0.04	6.27	0.45	6.67	296.86	666.61	2.97	0.00	0.000	0.000	0.026
120	26.90	26.80	0.07735	0.0	0.02598	0.04	6.31	0.45	6.67	297.69	667.00	2.98	0.00	0.000	0.000	0.026
121	26.80	26.70	0.07773	0.0	0.02604	0.04	6.36	0.45	6.67	298.52	667.39	2.99	0.00	0.000	0.000	0.026
122	26.70	26.60	0.07810	0.0	0.02609	0.04	6.40	0.45	6.68	299.35	667.78	2.99	0.00	0.000	0.000	0.026
123	26.60	26.50	0.07848	0.0	0.02615	0.04	6.45	0.45	6.68	300.17	668.17	3.00	0.00	0.000	0.000	0.026
124	26.50	26.40	0.07886	0.0	0.02620	0.04	6.49	0.45	6.69	300.99	668.55	3.01	0.00	0.000	0.000	0.026
125	26.40	26.30	0.07924	0.0	0.02625	0.04	6.53	0.45	6.69	301.81	668.93	3.02	0.00	0.000	0.000	0.026
126	26.30	26.20	0.07962	0.0	0.02631	0.04	6.58	0.45	6.69	302.63	669.32	3.03	0.00	0.000	0.000	0.026
127	26.20	26.10	0.07999	0.0	0.02636	0.04	6.62	0.45	6.70	303.45	669.70	3.03	0.00	0.000	0.000	0.026
128	26.10	26.00	0.08037	0.0	0.02641	0.04	6.67	0.45	6.70	304.27	670.08	3.04	0.00	0.000	0.000	0.026
129	26.00	25.90	0.08075	0.0	0.02647	0.04	6.71	0.46	6.70	305.08	670.45	3.05	0.00	0.000	0.000	0.026
130	25.90	25.80	0.08113	0.0	0.02652	0.04	6.75	0.46	6.71	305.90	670.83	3.06	0.00	0.000	0.000	0.027
131	25.80	25.70	0.08151	0.0	0.02657	0.04	6.80	0.46	6.71	306.71	671.20	3.07	0.00	0.000	0.000	0.027
132	25.70	25.60	0.08188	0.0	0.02663	0.04	6.84	0.46	6.72	307.52	671.58	3.08	0.00	0.000	0.000	0.027
133	25.60	25.50	0.08226	0.0	0.02668	0.04	6.88	0.46	6.72	308.33	671.95	3.08	0.00	0.000	0.000	0.027
134	25.50	25.40	0.08264	0.0	0.02673	0.04	6.93	0.46	6.72	309.13	672.32	3.09	0.00	0.000	0.000	0.027
135	25.40	25.30	0.08302	0.0	0.02679	0.04	6.97	0.46	6.73	309.94	672.69	3.10	0.00	0.000	0.000	0.027
136	25.30	25.20	0.08340	0.0	0.02684	0.04	7.01	0.46	6.73	310.74	673.05	3.11	0.00	0.000	0.000	0.027
137	25.20	25.10	0.08377	0.0	0.02689	0.04	7.06	0.46	6.73	311.54	673.42	3.12	0.00	0.000	0.000	0.027
138	25.10	25.00	0.08415	0.0	0.02694	0.04	7.10	0.46	6.74	312.34	673.78	3.12	0.00	0.000	0.000	0.027
139	25.00	24.90	0.08453	0.0	0.02699	0.04	7.14	0.46	6.74	313.14	674.14	3.13	0.00	0.000	0.000	0.027
140	24.90	24.80	0.08491	0.0	0.02705	0.04	7.19	0.47	6.75	313.94	674.50	3.14	0.00	0.000	0.000	0.027
141	24.80	24.70	0.08529	0.0	0.02710	0.04	7.23	0.47	6.75	314.73	674.86	3.15	0.00	0.000	0.000	0.027
142	24.70	24.60	0.08566	0.0	0.02715	0.04	7.27	0.47	6.75	315.53	675.22	3.16	0.00	0.000	0.000	0.027
143	24.60	24.50	0.08604	0.0	0.02720	0.04	7.31	0.47	6.76	316.32	675.58	3.16	0.00	0.000	0.000	0.027
144	24.50	24.40	0.08642	0.0	0.02725	0.04	7.36	0.47	6.76	317.11	675.93	3.17	0.00	0.000	0.000	0.027
145	24.40	24.30	0.08680	0.0	0.02730	0.04	7.40	0.47	6.76	317.90	676.29	3.18	0.00	0.000	0.000	0.027
146	24.30	24.20	0.08717	0.0	0.02735	0.04	7.44	0.47	6.77	318.69	676.64	3.19	0.00	0.000	0.000	0.027
147	24.20	24.10	0.08755	0.0	0.02740	0.04	7.48	0.47	6.77	319.48	676.99	3.19	0.00	0.000	0.000	0.027
148	24.10	24.00	0.08793	0.0	0.02746	0.04	7.52	0.47	6.77	320.26	677.34	3.20	0.00	0.000	0.000	0.027
149	24.00	23.90	0.08831	0.0	0.02751	0.04	7.57	0.47	6.78	321.05	677.69	3.21	0.00	0.000	0.000	0.028
150	23.90	23.80	0.08869	0.0	0.02756	0.04	7.61	0.47	6.78	321.83	678.04	3.22	0.00	0.000	0.000	0.028
151	23.80	23.70	0.08906	0.0	0.02761	0.04	7.65	0.48	6.78	322.61	678.38	3.23	0.00	0.000	0.000	0.028
152	23.70	23.60	0.08944	0.0	0.02766	0.04	7.69	0.48	6.79	323.39	678.73	3.23	0.00	0.000	0.000	0.028
153	23.60	23.50	0.08982	0.0	0.02771	0.04	7.73	0.48	6.79	324.17	679.07	3.24	0.00	0.000	0.000	0.028
154	23.50	23.40	0.09020	0.0	0.02776	0.04	7.78	0.48	6.79	324.94	679.41	3.25	0.00	0.000	0.000	0.028
155	23.40	23.30	0.09058	0.0	0.02781	0.04	7.82	0.48	6.80	325.72	679.76	3.26	0.00	0.000	0.000	0.028
156	23.30	23.20	0.09095	0.0	0.02786	0.04	7.86	0.48	6.80	326.49	680.10	3.26	0.00	0.000	0.000	0.028
157	23.20	23.10	0.09133	0.0	0.02791	0.04	7.90	0.48	6.80	327.27	680.43	3.27	0.00	0.000	0.000	0.028
158	23.10	23.00	0.09171	0.0	0.02796	0.04	7.94	0.48	6.81	328.04	680.77	3.28	0.00	0.000	0.000	0.028
159	23.00	22.90	0.09209	0.0	0.02801	0.04	7.98	0.48	6.81	328.81	681.11	3.29	0.00	0.000	0.000	0.028
160	22.90	22.80	0.09247	0.0	0.02806	0.04	8.02	0.48	6.81	329.57	681.44	3.30	0.00	0.000	0.000	0.028

161	22.80	22.70	0.09284	0.0	0.02811	0.04	8.07	0.48	6.82	330.34	681.78	3.30	0.00	0.000	0.000	0.028
162	22.70	22.60	0.09322	0.0	0.02815	0.04	8.11	0.49	6.82	331.11	682.11	3.31	0.00	0.000	0.000	0.028
163	22.60	22.50	0.09360	0.0	0.02820	0.04	8.15	0.49	6.82	331.87	682.44	3.32	0.00	0.000	0.000	0.028
164	22.50	22.40	0.09398	0.0	0.02825	0.04	8.19	0.49	6.83	332.64	682.77	3.33	0.00	0.000	0.000	0.028
165	22.40	22.30	0.09435	0.0	0.02830	0.04	8.23	0.49	6.83	333.40	683.10	3.33	0.00	0.000	0.000	0.028
166	22.30	22.20	0.09473	0.0	0.02835	0.04	8.27	0.49	6.83	334.16	683.43	3.34	0.00	0.000	0.000	0.028
167	22.20	22.10	0.09511	0.0	0.02840	0.04	8.31	0.49	6.84	334.92	683.75	3.35	0.00	0.000	0.000	0.028
168	22.10	22.00	0.09549	0.0	0.02845	0.04	8.35	0.49	6.84	335.67	684.08	3.36	0.00	0.000	0.000	0.028
169	22.00	21.90	0.09587	0.0	0.02850	0.04	8.39	0.49	6.84	336.43	684.40	3.36	0.00	0.000	0.000	0.028
170	21.90	21.80	0.09624	0.0	0.02854	0.04	8.43	0.49	6.85	337.19	684.73	3.37	0.00	0.000	0.000	0.029
171	21.80	21.70	0.09662	0.0	0.02859	0.04	8.47	0.49	6.85	337.94	685.05	3.38	0.00	0.000	0.000	0.029
172	21.70	21.60	0.09700	0.0	0.02864	0.04	8.51	0.49	6.85	338.69	685.37	3.39	0.00	0.000	0.000	0.029
TOT						8.51				45743.36	111752.21					
AVG					0.0234			0.41	6.50			2.66				

*** BIOLOGICAL AND PHYSICAL COEFFICIENTS ***

ELEM NO.	ENDING DIST	SAT D.O. mg/L	REAER RATE 1/da	BOD1 DECAY 1/da	BOD1 SETT 1/da	ABOD1 DECAY 1/da	BOD1 HYDR 1/da	BOD2 DECAY 1/da	BOD2 SETT 1/da	ABOD2 DECAY 1/da	BKGD SOD *	FULL SOD *	CORR SOD *	ORG-N HYDR 1/da	ORG-N SETT 1/da	NH3-N DECAY 1/da	NH3-N SRCE *	DENIT RATE 1/da	ORG-P HYDR 1/da	ORG-P SETT 1/da	PO4 SRCE *	PHYTO PROD **	PERIP PROD **	COLI DECAY 1/da	NCM DECAY 1/da	NCM SETT 1/da
1	38.700	8.15	3.40	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.28	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	38.600	8.15	3.39	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.26	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	38.500	8.15	3.37	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.25	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	38.400	8.15	3.36	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.25	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	38.300	8.15	3.35	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.25	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	38.200	8.15	3.34	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.25	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	38.100	8.15	3.33	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.26	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	38.000	8.15	3.31	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.26	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	37.900	8.15	3.30	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.26	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	37.800	8.15	3.29	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.27	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	37.700	8.15	3.28	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.27	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	37.600	8.15	3.27	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.27	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	37.500	8.15	3.26	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.28	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	37.400	8.15	3.25	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.28	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	37.300	8.15	3.24	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.29	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	37.200	8.15	3.23	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.29	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	37.100	8.15	3.21	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.29	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	37.000	8.15	3.20	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.30	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	36.900	8.15	3.19	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.30	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	36.800	8.15	3.18	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.31	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	36.700	8.15	3.17	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.31	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	36.600	8.15	3.17	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.31	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	36.500	8.15	3.16	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.32	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	36.400	8.15	3.15	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.32	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	36.300	8.15	3.14	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.33	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

26	36.200	8.15	3.13	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.33	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	36.100	8.15	3.12	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.33	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	36.000	8.15	3.11	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.34	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	35.900	8.15	3.10	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.34	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	35.800	8.15	3.09	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.34	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	35.700	8.15	3.08	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.35	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	35.600	8.15	3.08	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.35	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	35.500	8.15	3.07	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.36	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	35.400	8.15	3.06	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.36	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	35.300	8.15	3.05	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.36	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	35.200	8.15	3.04	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.37	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	35.100	8.15	3.03	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.37	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	35.000	8.15	3.03	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.38	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	34.900	8.15	3.02	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.38	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	34.800	8.15	3.01	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.38	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	34.700	8.15	3.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.39	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	34.600	8.15	3.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.39	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	34.500	8.15	2.99	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.40	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	34.400	8.15	2.98	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.40	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	34.300	8.15	2.97	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.40	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	34.200	8.15	2.97	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.41	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	34.100	8.15	2.96	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.41	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	34.000	8.15	2.95	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.42	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	33.900	8.15	2.95	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.42	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	33.800	8.15	2.94	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.42	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	33.700	8.15	2.93	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.43	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	33.600	8.15	2.93	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.43	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	33.500	8.15	2.92	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.44	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	33.400	8.15	2.91	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.44	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	33.300	8.15	2.91	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.44	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	33.200	8.15	2.90	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.45	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	33.100	8.15	2.89	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.45	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	33.000	8.15	2.89	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.46	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	32.900	8.15	2.88	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.46	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	32.800	8.15	2.87	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.46	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	32.700	8.15	2.87	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.47	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	32.600	8.15	2.86	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.47	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	32.500	8.15	2.86	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.48	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	32.400	8.15	2.85	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.48	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	32.300	8.15	2.84	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.48	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	32.200	8.15	2.84	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.49	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	32.100	8.15	2.83	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.49	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	32.000	8.15	2.83	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.50	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	31.900	8.15	2.82	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.50	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	31.800	8.15	2.82	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.50	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	31.700	8.15	2.81	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.51	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	31.600	8.15	2.80	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.51	0.00	0.00	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	31.500	8.15	2.80	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.52	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

74	31.400	8.15	2.79	0.00	0.00	0.00	0.00	0.21	0.00	0.00	7.90	7.90	6.52	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	31.300	8.15	2.79	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.52	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	31.200	8.15	2.78	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.53	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	31.100	8.15	2.78	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.53	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	31.000	8.15	2.77	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.54	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	30.900	8.15	2.77	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.54	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	30.800	8.15	2.76	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.54	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	30.700	8.15	2.76	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.55	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	30.600	8.15	2.75	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.55	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	30.500	8.15	2.75	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.55	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	30.400	8.15	2.74	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.56	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	30.300	8.15	2.74	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.56	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	30.200	8.15	2.73	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.57	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	30.100	8.15	2.73	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.57	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	30.000	8.15	2.72	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.57	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	29.900	8.15	2.72	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.58	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	29.800	8.15	2.71	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.58	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	29.700	8.15	2.71	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.59	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	29.600	8.15	2.70	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.59	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	29.500	8.15	2.70	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.59	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	29.400	8.15	2.69	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.60	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	29.300	8.15	2.69	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.60	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	29.200	8.15	2.69	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.60	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	29.100	8.15	2.68	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.61	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	29.000	8.15	2.68	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.61	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	28.900	8.15	2.67	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.62	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	28.800	8.15	2.67	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.62	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	28.700	8.15	2.66	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.62	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	28.600	8.15	2.66	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.63	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	28.500	8.15	2.66	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.63	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	28.400	8.15	2.65	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.64	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	28.300	8.15	2.65	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.64	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	28.200	8.15	2.64	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.64	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	28.100	8.15	2.64	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.65	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	28.000	8.15	2.63	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.65	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	27.900	8.15	2.63	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.65	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	27.800	8.15	2.63	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.66	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	27.700	8.15	2.62	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.66	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	27.600	8.15	2.62	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.67	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	27.500	8.15	2.61	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.67	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	27.400	8.15	2.61	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.67	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	27.300	8.15	2.61	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.68	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	27.200	8.15	2.60	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.68	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	27.100	8.15	2.60	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.68	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118	27.000	8.15	2.60	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.69	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	26.900	8.15	2.59	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.69	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	26.800	8.15	2.59	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.69	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	26.700	8.15	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.70	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

122	26.600	8.15	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.70	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
123	26.500	8.15	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.71	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
124	26.400	8.15	2.57	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.71	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	26.300	8.15	2.57	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.71	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126	26.200	8.15	2.57	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.72	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	26.100	8.15	2.56	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.72	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	26.000	8.15	2.56	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.72	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	25.900	8.15	2.56	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.73	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	25.800	8.15	2.55	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.73	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	25.700	8.15	2.55	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.74	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	25.600	8.15	2.54	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.74	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	25.500	8.15	2.54	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.74	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
134	25.400	8.15	2.54	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.75	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	25.300	8.15	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.75	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
136	25.200	8.15	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.75	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	25.100	8.15	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.76	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
138	25.000	8.15	2.52	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.76	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
139	24.900	8.15	2.52	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.76	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	24.800	8.15	2.52	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.77	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	24.700	8.15	2.51	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.77	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	24.600	8.15	2.51	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.77	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	24.500	8.15	2.51	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.78	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
144	24.400	8.15	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.78	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	24.300	8.15	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.78	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146	24.200	8.15	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.79	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	24.100	8.15	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.79	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148	24.000	8.15	2.49	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.79	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	23.900	8.15	2.49	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.80	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	23.800	8.15	2.49	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.80	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151	23.700	8.15	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.81	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
152	23.600	8.15	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.81	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	23.500	8.15	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.81	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
154	23.400	8.15	2.47	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.82	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	23.300	8.15	2.47	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.82	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156	23.200	8.15	2.47	0.00	0.00	0.00	0.00	0.22	0.00	0.00	7.90	7.90	6.82	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	23.100	8.15	2.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.83	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	23.000	8.15	2.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.83	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	22.900	8.15	2.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.83	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	22.800	8.15	2.46	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.84	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	22.700	8.15	2.45	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.84	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
162	22.600	8.15	2.45	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.84	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
163	22.500	8.15	2.45	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.85	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
164	22.400	8.15	2.44	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.85	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	22.300	8.15	2.44	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.85	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166	22.200	8.15	2.44	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.86	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	22.100	8.15	2.44	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.86	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
168	22.000	8.15	2.43	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.86	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169	21.900	8.15	2.43	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.87	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

170	21.800	8.15	2.43	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.87	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
171	21.700	8.15	2.43	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.87	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	21.600	8.15	2.42	0.00	0.00	0.00	0.00	0.23	0.00	0.00	7.90	7.90	6.88	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG 20 DEG C RATE			2.50	0.00	0.00	0.00	0.00	0.20	0.00	0.00	5.50			0.00	0.00	0.20	0.01	0.00	0.00	0.00	0.00			0.00	0.00	0.00

* g/m²/d ** mg/L/day

** WATER QUALITY CONSTITUENT VALUES **

ELEM NO.	ENDING DIST	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	TOT-N mg/L	EORG-N mg/L	ETOT-N mg/L	ORG-P mg/L	PO4-P mg/L	TOT-P mg/L	EORG-P mg/L	ETOT-P mg/L	CHL A µg/L
1	38.700	25.75	0.00	1.00	0.00	1.59	0.00	6.93	0.00	6.93	0.00	0.29	0.00	0.29	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.0
2	38.600	25.75	0.00	1.00	0.00	1.58	0.00	6.96	0.00	6.96	0.00	0.29	0.01	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.0
3	38.500	25.75	0.00	1.00	0.00	1.58	0.00	6.99	0.00	6.99	0.00	0.29	0.01	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.0
4	38.400	25.75	0.00	1.00	0.00	1.58	0.00	7.02	0.00	7.02	0.00	0.29	0.01	0.30	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.0
5	38.300	25.75	0.00	1.00	0.00	1.58	0.00	7.04	0.00	7.04	0.00	0.29	0.02	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.0
6	38.200	25.75	0.00	1.00	0.00	1.58	0.00	7.07	0.00	7.07	0.00	0.29	0.02	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.0
7	38.100	25.75	0.00	1.00	0.00	1.58	0.00	7.09	0.00	7.09	0.00	0.29	0.02	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.0
8	38.000	25.75	0.00	1.00	0.00	1.58	0.00	7.11	0.00	7.11	0.00	0.29	0.03	0.32	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.0
9	37.900	25.75	0.00	1.00	0.00	1.59	0.00	7.13	0.00	7.13	0.00	0.29	0.03	0.32	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.0
10	37.800	25.75	0.00	1.00	0.00	1.59	0.00	7.15	0.00	7.15	0.00	0.29	0.03	0.32	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.0
11	37.700	25.75	0.00	1.00	0.00	1.59	0.00	7.17	0.00	7.17	0.00	0.29	0.04	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.0
12	37.600	25.75	0.00	1.00	0.00	1.59	0.00	7.18	0.00	7.18	0.00	0.29	0.04	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.0
13	37.500	25.75	0.00	1.00	0.00	1.59	0.00	7.20	0.00	7.20	0.00	0.29	0.04	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.0
14	37.400	25.75	0.00	1.00	0.00	1.59	0.00	7.21	0.00	7.21	0.00	0.29	0.05	0.34	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.0
15	37.300	25.75	0.00	1.00	0.00	1.59	0.00	7.23	0.00	7.23	0.00	0.29	0.05	0.34	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.0
16	37.200	25.75	0.00	1.00	0.00	1.59	0.00	7.24	0.00	7.24	0.00	0.29	0.05	0.34	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.0
17	37.100	25.75	0.00	1.00	0.00	1.59	0.00	7.25	0.00	7.25	0.00	0.29	0.05	0.34	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.0
18	37.000	25.75	0.00	1.00	0.00	1.59	0.00	7.26	0.00	7.26	0.00	0.29	0.06	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.0
19	36.900	25.75	0.00	1.00	0.00	1.60	0.00	7.27	0.00	7.27	0.00	0.29	0.06	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.0
20	36.800	25.75	0.00	1.00	0.00	1.60	0.00	7.28	0.00	7.28	0.00	0.29	0.06	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.0
21	36.700	25.75	0.00	1.00	0.00	1.60	0.00	7.29	0.00	7.29	0.00	0.29	0.07	0.35	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.0
22	36.600	25.75	0.00	1.00	0.00	1.60	0.00	7.29	0.00	7.29	0.00	0.29	0.07	0.36	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.0
23	36.500	25.75	0.00	1.00	0.00	1.60	0.00	7.30	0.00	7.30	0.00	0.29	0.07	0.36	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.0
24	36.400	25.75	0.00	1.00	0.00	1.60	0.00	7.31	0.00	7.31	0.00	0.29	0.07	0.36	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.0
25	36.300	25.75	0.00	1.00	0.00	1.60	0.00	7.31	0.00	7.31	0.00	0.29	0.08	0.36	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.0
26	36.200	25.75	0.00	1.00	0.00	1.60	0.00	7.31	0.00	7.31	0.00	0.29	0.08	0.37	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.0
27	36.100	25.75	0.00	1.00	0.00	1.60	0.00	7.32	0.00	7.32	0.00	0.29	0.08	0.37	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.0
28	36.000	25.75	0.00	1.00	0.00	1.60	0.00	7.32	0.00	7.32	0.00	0.29	0.08	0.37	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.0
29	35.900	25.75	0.00	1.00	0.00	1.60	0.00	7.32	0.00	7.32	0.00	0.29	0.09	0.37	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.0
30	35.800	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.09	0.37	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.0
31	35.700	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.09	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.0
32	35.600	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.09	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.0
33	35.500	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.09	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.0
34	35.400	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.10	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.0

35	35.300	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.29	0.10	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.0
36	35.200	25.75	0.00	1.00	0.00	1.61	0.00	7.33	0.00	7.33	0.00	0.28	0.10	0.39	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.0
37	35.100	25.75	0.00	1.00	0.00	1.61	0.00	7.32	0.00	7.32	0.00	0.28	0.10	0.39	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.0
38	35.000	25.75	0.00	1.00	0.00	1.61	0.00	7.32	0.00	7.32	0.00	0.28	0.11	0.39	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.0
39	34.900	25.75	0.00	1.00	0.00	1.61	0.00	7.32	0.00	7.32	0.00	0.28	0.11	0.39	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.0
40	34.800	25.75	0.00	1.00	0.00	1.62	0.00	7.32	0.00	7.32	0.00	0.28	0.11	0.39	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.0
41	34.700	25.75	0.00	1.00	0.00	1.62	0.00	7.32	0.00	7.32	0.00	0.28	0.11	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
42	34.600	25.75	0.00	1.00	0.00	1.62	0.00	7.31	0.00	7.31	0.00	0.28	0.11	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
43	34.500	25.75	0.00	1.00	0.00	1.62	0.00	7.31	0.00	7.31	0.00	0.28	0.12	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
44	34.400	25.75	0.00	1.00	0.00	1.62	0.00	7.30	0.00	7.30	0.00	0.28	0.12	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
45	34.300	25.75	0.00	1.00	0.00	1.62	0.00	7.30	0.00	7.30	0.00	0.28	0.12	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
46	34.200	25.75	0.00	1.00	0.00	1.62	0.00	7.30	0.00	7.30	0.00	0.28	0.12	0.40	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.0
47	34.100	25.75	0.00	1.00	0.00	1.62	0.00	7.29	0.00	7.29	0.00	0.28	0.12	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
48	34.000	25.75	0.00	1.00	0.00	1.62	0.00	7.29	0.00	7.29	0.00	0.28	0.13	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
49	33.900	25.75	0.00	1.00	0.00	1.63	0.00	7.28	0.00	7.28	0.00	0.28	0.13	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
50	33.800	25.75	0.00	1.00	0.00	1.63	0.00	7.27	0.00	7.27	0.00	0.28	0.13	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
51	33.700	25.75	0.00	1.00	0.00	1.63	0.00	7.27	0.00	7.27	0.00	0.28	0.13	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
52	33.600	25.75	0.00	1.00	0.00	1.63	0.00	7.26	0.00	7.26	0.00	0.28	0.13	0.41	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.0
53	33.500	25.75	0.00	1.00	0.00	1.63	0.00	7.26	0.00	7.26	0.00	0.28	0.14	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
54	33.400	25.75	0.00	1.00	0.00	1.63	0.00	7.25	0.00	7.25	0.00	0.28	0.14	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
55	33.300	25.75	0.00	1.00	0.00	1.63	0.00	7.24	0.00	7.24	0.00	0.28	0.14	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
56	33.200	25.75	0.00	1.00	0.00	1.63	0.00	7.24	0.00	7.24	0.00	0.28	0.14	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
57	33.100	25.75	0.00	1.00	0.00	1.63	0.00	7.23	0.00	7.23	0.00	0.28	0.14	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
58	33.000	25.75	0.00	1.00	0.00	1.63	0.00	7.22	0.00	7.22	0.00	0.28	0.15	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
59	32.900	25.75	0.00	1.00	0.00	1.64	0.00	7.21	0.00	7.21	0.00	0.28	0.15	0.42	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.0
60	32.800	25.75	0.00	1.00	0.00	1.64	0.00	7.21	0.00	7.21	0.00	0.28	0.15	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
61	32.700	25.75	0.00	1.00	0.00	1.64	0.00	7.20	0.00	7.20	0.00	0.28	0.15	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
62	32.600	25.75	0.00	1.00	0.00	1.64	0.00	7.19	0.00	7.19	0.00	0.28	0.15	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
63	32.500	25.75	0.00	1.00	0.00	1.64	0.00	7.18	0.00	7.18	0.00	0.28	0.15	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
64	32.400	25.75	0.00	1.00	0.00	1.64	0.00	7.17	0.00	7.17	0.00	0.28	0.16	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
65	32.300	25.75	0.00	1.00	0.00	1.64	0.00	7.16	0.00	7.16	0.00	0.28	0.16	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
66	32.200	25.75	0.00	1.00	0.00	1.64	0.00	7.16	0.00	7.16	0.00	0.27	0.16	0.43	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.0
67	32.100	25.75	0.00	1.00	0.00	1.64	0.00	7.15	0.00	7.15	0.00	0.27	0.16	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
68	32.000	25.75	0.00	1.00	0.00	1.64	0.00	7.14	0.00	7.14	0.00	0.27	0.16	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
69	31.900	25.75	0.00	1.00	0.00	1.65	0.00	7.13	0.00	7.13	0.00	0.27	0.16	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
70	31.800	25.75	0.00	1.00	0.00	1.65	0.00	7.12	0.00	7.12	0.00	0.27	0.17	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
71	31.700	25.75	0.00	1.00	0.00	1.65	0.00	7.11	0.00	7.11	0.00	0.27	0.17	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
72	31.600	25.75	0.00	1.00	0.00	1.65	0.00	7.10	0.00	7.10	0.00	0.27	0.17	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
73	31.500	25.75	0.00	1.00	0.00	1.65	0.00	7.09	0.00	7.09	0.00	0.27	0.17	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
74	31.400	25.75	0.00	1.00	0.00	1.65	0.00	7.08	0.00	7.08	0.00	0.27	0.17	0.44	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.0
75	31.300	25.75	0.00	1.00	0.00	1.65	0.00	7.07	0.00	7.07	0.00	0.27	0.17	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
76	31.200	25.75	0.00	1.00	0.00	1.65	0.00	7.06	0.00	7.06	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
77	31.100	25.75	0.00	1.00	0.00	1.65	0.00	7.05	0.00	7.05	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
78	31.000	25.75	0.00	1.00	0.00	1.65	0.00	7.04	0.00	7.04	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
79	30.900	25.75	0.00	1.00	0.00	1.66	0.00	7.03	0.00	7.03	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
80	30.800	25.75	0.00	1.00	0.00	1.66	0.00	7.02	0.00	7.02	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
81	30.700	25.75	0.00	1.00	0.00	1.66	0.00	7.01	0.00	7.01	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
82	30.600	25.75	0.00	1.00	0.00	1.66	0.00	7.00	0.00	7.00	0.00	0.27	0.18	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0

83	30.500	25.75	0.00	1.00	0.00	1.66	0.00	6.99	0.00	6.99	0.00	0.27	0.19	0.45	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.0
84	30.400	25.75	0.00	1.00	0.00	1.66	0.00	6.98	0.00	6.98	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
85	30.300	25.75	0.00	1.00	0.00	1.66	0.00	6.97	0.00	6.97	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
86	30.200	25.75	0.00	1.00	0.00	1.66	0.00	6.96	0.00	6.96	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
87	30.100	25.75	0.00	1.00	0.00	1.66	0.00	6.95	0.00	6.95	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
88	30.000	25.75	0.00	1.00	0.00	1.66	0.00	6.94	0.00	6.94	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
89	29.900	25.75	0.00	1.00	0.00	1.67	0.00	6.93	0.00	6.93	0.00	0.27	0.19	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
90	29.800	25.75	0.00	1.00	0.00	1.67	0.00	6.92	0.00	6.92	0.00	0.27	0.20	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
91	29.700	25.75	0.00	1.00	0.00	1.67	0.00	6.91	0.00	6.91	0.00	0.27	0.20	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
92	29.600	25.75	0.00	1.00	0.00	1.67	0.00	6.90	0.00	6.90	0.00	0.27	0.20	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
93	29.500	25.75	0.00	1.00	0.00	1.67	0.00	6.89	0.00	6.89	0.00	0.26	0.20	0.46	0.00	0.46	0.00	0.00	0.00	0.00	0.00	0.0
94	29.400	25.75	0.00	1.00	0.00	1.67	0.00	6.88	0.00	6.88	0.00	0.26	0.20	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
95	29.300	25.75	0.00	1.00	0.00	1.67	0.00	6.87	0.00	6.87	0.00	0.26	0.20	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
96	29.200	25.75	0.00	1.00	0.00	1.67	0.00	6.86	0.00	6.86	0.00	0.26	0.20	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
97	29.100	25.75	0.00	1.00	0.00	1.67	0.00	6.84	0.00	6.84	0.00	0.26	0.20	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
98	29.000	25.75	0.00	1.00	0.00	1.67	0.00	6.83	0.00	6.83	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
99	28.900	25.75	0.00	1.00	0.00	1.67	0.00	6.82	0.00	6.82	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
100	28.800	25.75	0.00	1.00	0.00	1.68	0.00	6.81	0.00	6.81	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
101	28.700	25.75	0.00	1.00	0.00	1.68	0.00	6.80	0.00	6.80	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
102	28.600	25.75	0.00	1.00	0.00	1.68	0.00	6.79	0.00	6.79	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
103	28.500	25.75	0.00	1.00	0.00	1.68	0.00	6.78	0.00	6.78	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
104	28.400	25.75	0.00	1.00	0.00	1.68	0.00	6.77	0.00	6.77	0.00	0.26	0.21	0.47	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.0
105	28.300	25.75	0.00	1.00	0.00	1.68	0.00	6.76	0.00	6.76	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
106	28.200	25.75	0.00	1.00	0.00	1.68	0.00	6.75	0.00	6.75	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
107	28.100	25.75	0.00	1.00	0.00	1.68	0.00	6.73	0.00	6.73	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
108	28.000	25.75	0.00	1.00	0.00	1.68	0.00	6.72	0.00	6.72	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
109	27.900	25.75	0.00	1.00	0.00	1.68	0.00	6.71	0.00	6.71	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
110	27.800	25.75	0.00	1.00	0.00	1.69	0.00	6.70	0.00	6.70	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
111	27.700	25.75	0.00	1.00	0.00	1.69	0.00	6.69	0.00	6.69	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
112	27.600	25.75	0.00	1.00	0.00	1.69	0.00	6.68	0.00	6.68	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
113	27.500	25.75	0.00	1.00	0.00	1.69	0.00	6.67	0.00	6.67	0.00	0.26	0.22	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
114	27.400	25.75	0.00	1.00	0.00	1.69	0.00	6.66	0.00	6.66	0.00	0.26	0.23	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
115	27.300	25.75	0.00	1.00	0.00	1.69	0.00	6.65	0.00	6.65	0.00	0.26	0.23	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
116	27.200	25.75	0.00	1.00	0.00	1.69	0.00	6.63	0.00	6.63	0.00	0.26	0.23	0.48	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.0
117	27.100	25.75	0.00	1.00	0.00	1.69	0.00	6.62	0.00	6.62	0.00	0.26	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
118	27.000	25.75	0.00	1.00	0.00	1.69	0.00	6.61	0.00	6.61	0.00	0.26	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
119	26.900	25.75	0.00	1.00	0.00	1.69	0.00	6.60	0.00	6.60	0.00	0.26	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
120	26.800	25.75	0.00	1.00	0.00	1.69	0.00	6.59	0.00	6.59	0.00	0.25	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
121	26.700	25.75	0.00	1.00	0.00	1.70	0.00	6.58	0.00	6.58	0.00	0.25	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
122	26.600	25.75	0.00	1.00	0.00	1.70	0.00	6.57	0.00	6.57	0.00	0.25	0.23	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
123	26.500	25.75	0.00	1.00	0.00	1.70	0.00	6.56	0.00	6.56	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
124	26.400	25.75	0.00	1.00	0.00	1.70	0.00	6.55	0.00	6.55	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
125	26.300	25.75	0.00	1.00	0.00	1.70	0.00	6.53	0.00	6.53	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
126	26.200	25.75	0.00	1.00	0.00	1.70	0.00	6.52	0.00	6.52	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
127	26.100	25.75	0.00	1.00	0.00	1.70	0.00	6.51	0.00	6.51	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
128	26.000	25.75	0.00	1.00	0.00	1.70	0.00	6.50	0.00	6.50	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
129	25.900	25.75	0.00	1.00	0.00	1.70	0.00	6.49	0.00	6.49	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0
130	25.800	25.75	0.00	1.00	0.00	1.70	0.00	6.48	0.00	6.48	0.00	0.25	0.24	0.49	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.0

131	25.700	25.75	0.00	1.00	0.00	1.70	0.00	6.47	0.00	6.47	0.00	0.25	0.24	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
132	25.600	25.75	0.00	1.00	0.00	1.71	0.00	6.46	0.00	6.46	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
133	25.500	25.75	0.00	1.00	0.00	1.71	0.00	6.45	0.00	6.45	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
134	25.400	25.75	0.00	1.00	0.00	1.71	0.00	6.43	0.00	6.43	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
135	25.300	25.75	0.00	1.00	0.00	1.71	0.00	6.42	0.00	6.42	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
136	25.200	25.75	0.00	1.00	0.00	1.71	0.00	6.41	0.00	6.41	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
137	25.100	25.75	0.00	1.00	0.00	1.71	0.00	6.40	0.00	6.40	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
138	25.000	25.75	0.00	1.00	0.00	1.71	0.00	6.39	0.00	6.39	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
139	24.900	25.75	0.00	1.00	0.00	1.71	0.00	6.38	0.00	6.38	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
140	24.800	25.75	0.00	1.00	0.00	1.71	0.00	6.37	0.00	6.37	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
141	24.700	25.75	0.00	1.00	0.00	1.71	0.00	6.36	0.00	6.36	0.00	0.25	0.25	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
142	24.600	25.75	0.00	1.00	0.00	1.71	0.00	6.35	0.00	6.35	0.00	0.25	0.26	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
143	24.500	25.75	0.00	1.00	0.00	1.72	0.00	6.34	0.00	6.34	0.00	0.25	0.26	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
144	24.400	25.75	0.00	1.00	0.00	1.72	0.00	6.33	0.00	6.33	0.00	0.25	0.26	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
145	24.300	25.75	0.00	1.00	0.00	1.72	0.00	6.31	0.00	6.31	0.00	0.25	0.26	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.0
146	24.200	25.75	0.00	1.00	0.00	1.72	0.00	6.30	0.00	6.30	0.00	0.25	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
147	24.100	25.75	0.00	1.00	0.00	1.72	0.00	6.29	0.00	6.29	0.00	0.25	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
148	24.000	25.75	0.00	1.00	0.00	1.72	0.00	6.28	0.00	6.28	0.00	0.25	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
149	23.900	25.75	0.00	1.00	0.00	1.72	0.00	6.27	0.00	6.27	0.00	0.25	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
150	23.800	25.75	0.00	1.00	0.00	1.72	0.00	6.26	0.00	6.26	0.00	0.24	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
151	23.700	25.75	0.00	1.00	0.00	1.72	0.00	6.25	0.00	6.25	0.00	0.24	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
152	23.600	25.75	0.00	1.00	0.00	1.72	0.00	6.24	0.00	6.24	0.00	0.24	0.26	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
153	23.500	25.75	0.00	1.00	0.00	1.73	0.00	6.23	0.00	6.23	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
154	23.400	25.75	0.00	1.00	0.00	1.73	0.00	6.22	0.00	6.22	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
155	23.300	25.75	0.00	1.00	0.00	1.73	0.00	6.21	0.00	6.21	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
156	23.200	25.75	0.00	1.00	0.00	1.73	0.00	6.20	0.00	6.20	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
157	23.100	25.75	0.00	1.00	0.00	1.73	0.00	6.19	0.00	6.19	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
158	23.000	25.75	0.00	1.00	0.00	1.73	0.00	6.18	0.00	6.18	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
159	22.900	25.75	0.00	1.00	0.00	1.73	0.00	6.16	0.00	6.16	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
160	22.800	25.75	0.00	1.00	0.00	1.73	0.00	6.15	0.00	6.15	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
161	22.700	25.75	0.00	1.00	0.00	1.73	0.00	6.14	0.00	6.14	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
162	22.600	25.75	0.00	1.00	0.00	1.73	0.00	6.13	0.00	6.13	0.00	0.24	0.27	0.51	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.0
163	22.500	25.75	0.00	1.00	0.00	1.73	0.00	6.12	0.00	6.12	0.00	0.24	0.27	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
164	22.400	25.75	0.00	1.00	0.00	1.73	0.00	6.11	0.00	6.11	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
165	22.300	25.75	0.00	1.00	0.00	1.74	0.00	6.10	0.00	6.10	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
166	22.200	25.75	0.00	1.00	0.00	1.74	0.00	6.09	0.00	6.09	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
167	22.100	25.75	0.00	1.00	0.00	1.74	0.00	6.08	0.00	6.08	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
168	22.000	25.75	0.00	1.00	0.00	1.74	0.00	6.07	0.00	6.07	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
169	21.900	25.75	0.00	1.00	0.00	1.74	0.00	6.06	0.00	6.06	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
170	21.800	25.75	0.00	1.00	0.00	1.74	0.00	6.05	0.00	6.05	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
171	21.700	25.75	0.00	1.00	0.00	1.74	0.00	6.04	0.00	6.04	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0
172	21.600	25.75	0.00	1.00	0.00	1.74	0.00	6.03	0.00	6.03	0.00	0.24	0.28	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.0

LA-QUAL Model for Beech Creek upstream of Lake Columbia
Calibration to avg of ADEQ data on 6/20/94 and 9/14/94

STREAM SUMMARY REPORT: Beech Creek

TRAVEL TIME	=		8.51 DAYS		
MAXIMUM EFFLUENT	=		0.00 PERCENT		
FLOW	=	0.03238	TO	0.09700	m^3/s
DISPERSION	=	0.0000	TO	0.0000	m^2/s
VELOCITY	=	0.01787	TO	0.02864	m/s
DEPTH	=	0.30	TO	0.49	m
WIDTH	=	6.01	TO	6.85	m
BOD DECAY	=	0.00	TO	0.00	per day
NH3 DECAY	=	0.19	TO	0.20	per day
SOD	=	6.25	TO	6.88	$g/m^2/d$
NH3 SED SOURCE	=	0.02	TO	0.02	$g/m^2/d$
PO4 SED SOURCE	=	0.00	TO	0.00	$g/m^2/d$
REAERATION	=	2.42	TO	3.40	per day
BOD SETTLING	=	0.00	TO	0.00	per day
ORG-N DECAY	=	0.00	TO	0.00	per day
ORG-N SETTLING	=	0.00	TO	0.00	per day
TEMPERATURE	=	25.75	TO	25.75	deg C
DISSOLVED OXYGEN	=	1.58	TO	1.74	mg/L

LA-QUAL Model for Beech Creek upstream of Lake Columbia
Calibration to avg of ADEQ data on 6/20/94 and 9/14/94

INPUT/OUTPUT LOADING SUMMARY

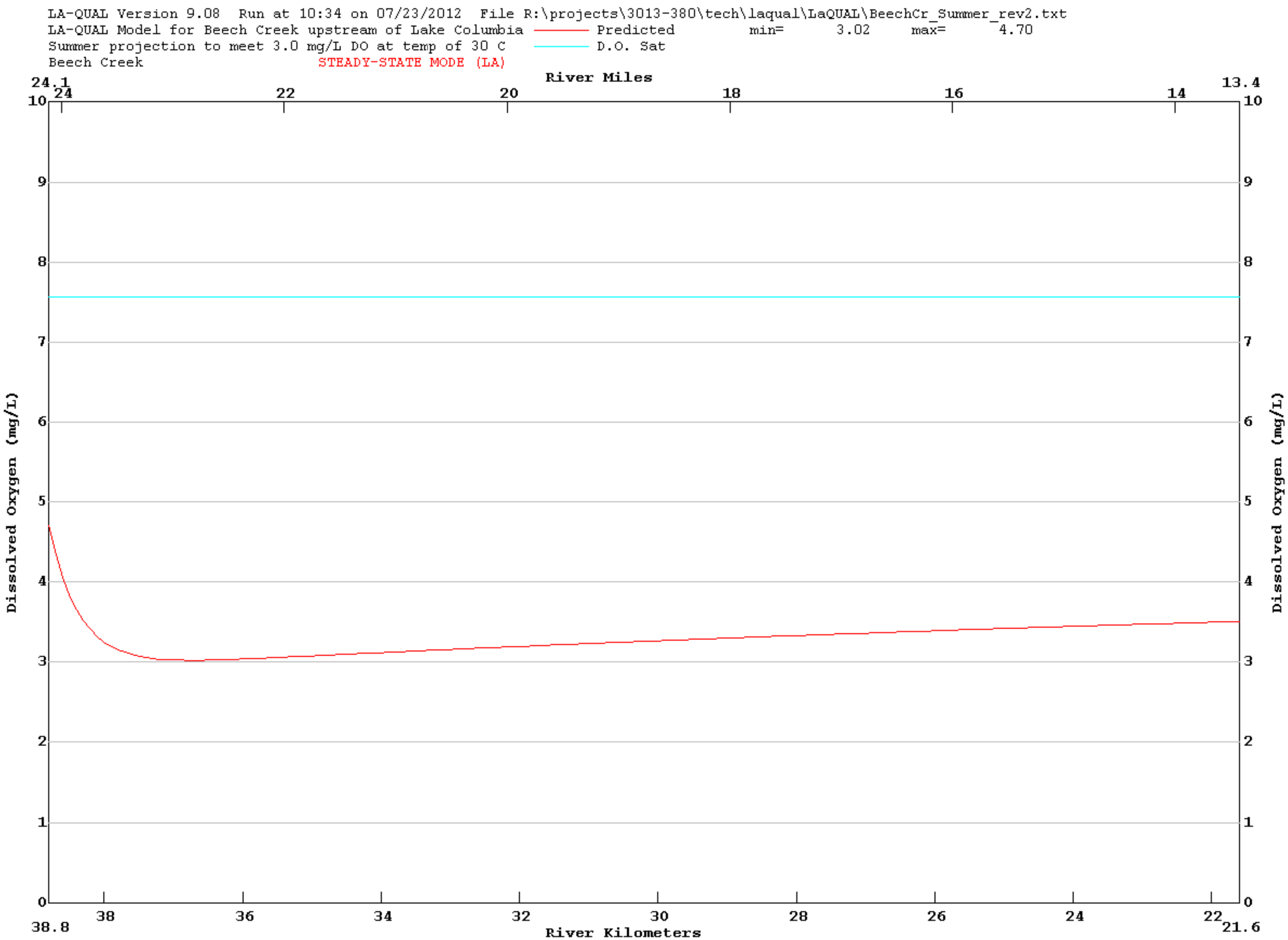
	FLOW m^3/s	DO kg/d	BOD1 kg/d	BOD2 kg/d	ORG-N kg/d	NH3-N kg/d	NO3-N kg/d	ORG-P kg/d	PO4-P kg/d	CHL A	PERIP	NCM
HEADWATER FLOW	0.03200	4.42	0.00	19.08	0.00	0.80	0.00	0.00	0.00	0.00		0.00
INCREMENTAL INFLOW	0.06500	8.99	0.00	38.75	0.00	1.63	0.00	0.00	0.00	0.00		0.00
INCREMENTAL OUTFLOW	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WASTELOADS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WITHDRAWLS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
FLOW THRU LOWER BNDRY	-0.09700	-14.60	0.00	-50.53	0.00	-1.99	-2.37	0.00	0.00	0.00		0.00
DISPERSION THRU LOWER BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
DISPERSION THRU HDWTR BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
NON-POINT INPUT		0.00	0.00	60.00	0.00			0.00				0.00
NATURAL REAERATION		813.01										
DAM REAERATION		0.00										
SOD BACKGROUND		-734.29										
BOD1 DECAY		0.00	0.00									
BOD1 SETTLING		0.00	0.00									
ANAEROBIC BOD1 DECAY			0.00									
BOD2 DECAY		-67.30		-67.30								
BOD2 SETTLING		0.00		0.00								
ANAEROBIC BOD2 DECAY				0.00								
BOD2 HYDROLYSIS			0.00	0.00								
ORG-N DECAY		0.00			0.00	0.00						
ORG-N SETTLING					0.00	0.00						
NH3-N DECAY (NITRIFICATION)		-10.24				-2.37	2.37					
NH3-N BACKGROUND SEDIMENT SOURCE						1.93						
DENITRIFICATION			0.00				0.00					
ORG-P HYDROLYSIS								0.00	0.00			
ORG-P SETTLING								0.00	0.00			
PO4-P BACKGROUND SEDIMENT SOURCE									0.00			
PHYTOPLANKTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00	0.00		
PHYTOPLANKTON RESPIRATION/EXCRETION		0.00				0.00			0.00	0.00		
PHYTOPLANKTON SETTLING		0.00				0.00			0.00	0.00		
PHYTOPLANKTON DEATH			0.00	0.00	0.00			0.00		0.00		
PERIPHYTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00		0.00	
PERIPHYTON RESPIRATION/EXCRETION		0.00				0.00			0.00		0.00	
PERIPHYTON DEATH			0.00	0.00	0.00			0.00			0.00	
NCM DECAY		0.00										0.00
NCM SETTLING		0.00										0.00

TOTAL INPUTS	0.09700	826.42	0.00	117.83	0.00	4.36	2.37	0.00	0.00	0.00	0.00	0.00
TOTAL OUTPUTS	-0.09700	-826.43	0.00	-117.83	0.00	-4.36	-2.37	0.00	0.00	0.00	0.00	0.00
NET CONVERGENCE ERROR	0.00000	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

.....EXECUTION COMPLETED

APPENDIX P

DO Model Output for Projection Simulations



Graph of predicted DO for Beech Creek for summer projection

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LA-QUAL Version 9.08
Louisiana Department of Environmental Quality

Input file is R:\projects\3013-380\tech\laqual\LaQUAL\BeechCr_Summer_rev2.txt
Running in steady-state mode using LA defaults
Output produced at 10:34 on 07/23/2012

$$$ DATA TYPE 1 (TITLES AND CONTROL CARDS) $$$

CARD TYPE       CONTROL TITLES

TITLE01         LA-QUAL Model for Beech Creek upstream of Lake Columbia
TITLE02         Summer projection to meet 3.0 mg/L DO at temp of 30 C
CNTROL03  YES   METRIC UNITS
ENDATA01

$$$ DATA TYPE 2 (MODEL OPTIONS) $$$

CARD TYPE       MODEL OPTION

MODOPT01   NO   TEMPERATURE
MODOPT02   NO   SALINITY
MODOPT03   NO   CONSERVATIVE
MODOPT04   NO   CONSERVATIVE
MODOPT05  YES   DISSOLVED OXYGEN
MODOPT06  YES   BOD2 BIOC
MODOPT07  YES   NITROGEN
MODOPT08   NO   PHOSPHORUS
MODOPT09   NO   PHYTOPLANKTON
MODOPT10   NO   PERIPHYTON
MODOPT11   NO   COLIFORM
MODOPT12   NO   NONCONSERVATIVE
ENDATA02

$$$ DATA TYPE 3 (PROGRAM CONSTANTS) $$$

CARD TYPE       DESCRIPTION OF CONSTANT                       VALUE

PROGRAM         HYDRAULIC CALCULATION METHOD      =        2.00000 (widths and depths)
PROGRAM         MAXIMUM ITERATION LIMIT           =      999.00000
PROGRAM         N INHIBITION EQUATION             =        1.00000 (two-step)
ENDATA03

$$$ DATA TYPE 4 (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

 CARD TYPE     RATE CODE     THETA VALUE

ENDATA04
```

$$$ CONSTANTS TYPE 5 (TEMPERATURE DATA) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA05

$$$ DATA TYPE 6 (PHYTOPLANKTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA06

$$$ DATA TYPE 7 (PERIPHYTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA07

$$$ DATA TYPE 8 (REACH IDENTIFICATION DATA) $$$

CARD TYPE	REACH	ID	NAME	BEGIN REACH km		END REACH km	ELEM LENGTH km	REACH LENGTH km	ELEMS PER RCH	BEGIN ELEM NUM	END ELEM NUM
REACH ID	1	B1	Beech Creek	38.80	TO	21.60	0.1000	17.20	172	1	172

ENDATA08

$$$ DATA TYPE 9 (ADVECTIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	WIDTH "A"	WIDTH "B"	WIDTH "C"	DEPTH "D"	DEPTH "E"	DEPTH "F"	SLOPE	MANNINGS "N"
HYDR-1	1	B1	9.068	0.120	0.000	1.412	0.450	0.000	0.00000	0.000

ENDATA09

$$$ DATA TYPE 10 (DISPERSIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	TIDAL RANGE	DISPERSION "A"	DISPERSION "B"	DISPERSION "C"	DISPERSION "D"

ENDATA10

$$$ DATA TYPE 11 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	ID	TEMP deg C	SALIN ppt	DO mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	PERIP g/m²	BOD1 mg/L	BOD2 mg/L	ORG-N mg/L	ORG-P mg/L	COLI #/100mL	NCM	CM-1	CM-2
INITIAL	1	B1	30.00	0.00	3.00	0.20	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00

ENDATA11

$$$ DATA TYPE 12 (REAERATION, SEDIMENT OXYGEN DEMAND, BOD COEFFICIENTS) $$$

CARD TYPE	RCH NUM	RCH ID	K2 OPT	K2 "A"	K2 "B"	K2 "C"	BKGRND SOD g/m^2/d	AEROB BOD DECAY per day	BOD SETT m/d	SETTLD SOD AVAIL frac	ANAER BOD DECAY per day	AEROB BOD2 DECAY per day	BOD2 SETT m/d	ANAER BOD2 DECAY per day	BOD2 HYDR TO BOD1 per day
COEFF-1	1	B1	15 LOUISIANA	0.000	0.000	0.000	2.585	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000

ENDATA12

$$$ DATA TYPE 13 (NITROGEN AND PHOSPHORUS COEFFICIENTS) $$$

CARD TYPE	REACH	ID	ORG-N DECA per day	ORG-N SETT m/d	SETTLD ORGN AVAIL frac	NH3 DECA per day	BKGRND NH3 SRCE g/m^2/d	BKGRND PO4 SRCE g/m^2/d	DENIT RATE per day	ORGP DECA per day	ORGP SETT m/d	SETTLD ORGP AVAIL frac
COEFF-2	1	B1	0.000	0.000	0.000	0.200	0.006	0.000	0.000	0.000	0.000	0.000

ENDATA13

$$$ DATA TYPE 14 (ALGAE PHYTOPLANKTON AND PERIPHYTON COEFFICIENTS) $$$

CARD TYPE	REACH	ID	SECCHI DEPTH m	CHL A: ALGAE frac	PHYTO SETT m/d	PHYTO DEATH per day	MAX PHYTO GROW per day	PHYTO RESP per day	PERIP DEATH per day	MAX PERIP GROW per day	PERIP RESP per day	BANK SHADING frac

ENDATA14

$$$ DATA TYPE 15 (COLIFORM AND NONCONSERVATIVE COEFFICIENTS) $$$

CARD TYPE	REACH	ID	COLIFORM DIE-OFF per day	NCM DECAY per day	NCM SETT m/d

ENDATA15

$$$ DATA TYPE 16 (INCREMENTAL DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

CARD TYPE	REACH	ID	OUTFLOW m^3/s	INFLOW m^3/s	TEMP deg C	SALIN ppt	CM-1	CM-2	IN/DIST	OUT/DIST
INCR-1	1	B1	0.00000	0.06500	30.00	0.00	0.00	0.00	0.00378	0.00000

ENDATA16

$$$ DATA TYPE 17 (INCREMENTAL DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	REACH	ID	DO mg/L	BOD1 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	BOD2 mg/L
INCR-2	1	B1	4.70	0.00	0.00	0.14	0.00	3.24

ENDATA17

$$$ DATA TYPE 18 (INCREMENTAL DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	REACH	ID	PO4	PHYTO CHL A	COLI	NCM	ORGP
			mg/L	µg/L	#/100mL		mg/L

ENDATA18

$$$ DATA TYPE 19 (NONPOINT SOURCE DATA) $$$

CARD TYPE	REACH	ID	BOD1	ORG-N	COLI	NCM	DO	BOD2	ORG-P
			kg/d	kg/d	#/day		kg/d	kg/d	kg/d
NONPOINT	1	B1	0.00	0.00	0.00	0.00	0.00	28.20	0.00

ENDATA19

$$$ DATA TYPE 20 (HEADWATER FOR FLOW, TEMPERATURE, SALINITY AND CONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	UNIT	FLOW	FLOW	TEMP	SALIN	CM-1	CM-2	HDW DISP EXCHG
				m^3/s	cfs	deg C	ppt			frac
HDWTR-1	1	Beech Creek	0	0.03200	1.12994	30.00	0.00	0.000	0.000	0.000

ENDATA20

$$$ DATA TYPE 21 (HEADWATER DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	ELEMENT	NAME	DO	BOD#1	ORG-N	NH3-N	NO3-N	BOD2
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
HDWTR-2	1	Beech Creek	4.70	0.00	0.00	0.14	0.00	3.24

ENDATA21

$$$ DATA TYPE 22 (HEADWATER DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	PO4-P	PHYTO CHL A	COLI	NCM	ORG-P
			mg/L	µg/L	#/100mL		mg/L

ENDATA22

$$$ DATA TYPE 23 (JUNCTION DATA) $$$

CARD TYPE	JUNCTION ELEMENT	UPSTRM ELEMENT	RIVER KILOM	NAME

ENDATA23

$$$ DATA TYPE 24 (WASTELOAD DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

CARD TYPE	ELEMENT	RKILO	NAME	FLOW	FLOW	FLOW	TEMP	SALIN	CM-1	CM-2
				m^3/s	cfs	MGD	deg C	ppt		

ENDATA24

$$$ DATA TYPE 25 (WASTELOAD DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	ELEMENT	NAME	DO	BOD	% BOD RMVL	ORG-N	NH3-N	% NITRIF	NO3-N	BOD2
			mg/L	mg/L		mg/L	mg/L		mg/L	mg/L

ENDATA25

$$$ DATA TYPE 26 (WASTELOAD DATA FOR PHOSPHORUS, PHYTOPLANTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	PO4-P	PHYTO CHL A	COLI	NCM	ORG-P
			mg/L	µg/L	#/100mL		mg/L

ENDATA26

$$$ DATA TYPE 27 (LOWER BOUNDARY CONDITIONS) $$$

CARD TYPE	CONSTITUENT	CONCENTRATION

ENDATA27

$$$ DATA TYPE 28 (DAM DATA) $$$

CARD TYPE	ELEMENT	NAME	EQN	"A"	"B"	"H"

ENDATA28

$$$ DATA TYPE 29 (SENSITIVITY ANALYSIS DATA) $$$

CARD TYPE	PARAMETER	COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7	COL 8

ENDATA29

$$$ DATA TYPE 30 (PLOT CONTROL CARDS) $$$

NUMBER OF PLOTS = 1
NUMBER OF REACHES IN PLOT 1 = 1
PLOT RCH 1
ENDATA30

$$$ DATA TYPE 31 (OVERLAY PLOT DATA) $$$

.....NO ERRORS DETECTED IN INPUT DATA
.....HYDRAULIC CALCULATIONS COMPLETED
.....TRIDIAGONAL MATRIX TERMS INITIALIZED
.....OXYGEN DEPENDENT RATES CONVERGENT IN 7 ITERATIONS
.....CONSTITUENT CALCULATIONS COMPLETED
.....GRAPHICS DATA FOR PLOT 1 WRITTEN TO UNIT 11

FINAL REPORT Beech Creek — LA-QUAL Model for Beech Creek upstream of Lake Columbia
REACH NO. 1 Beech Creek — Summer projection to meet 3.0 mg/L DO at temp of 30 C

*************** REACH INPUTS ***************

ELEM NO.	TYPE	FLOW	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	COLI #/100mL	NCM
1	HDWTR	0.03200	30.00	0.00	0.00	0.00	4.70	0.00	3.24	0.00	3.24	0.00	0.14	0.00	0.00	0.00	0.00	0.00
EACH	INCR	0.00038	30.00	0.00	0.00	0.00	4.70	0.00	3.24			0.00	0.14	0.00	0.00	0.00	0.00	

*************** HYDRAULIC PARAMETER VALUES ***************

ELEM NO.	BEGIN DIST km	ENDING DIST km	FLOW m³/s	PCT EFF	ADVCTV VELO m/s	TRAVEL TIME days	CUM TIME days	DEPTH m	WIDTH m	VOLUME m³	SURFACE AREA m²	X-SECT AREA m²	TIDAL PRISM m³	TIDAL VELO m/s	DISPRSN m²/s	MEAN VELO m/s
1	38.80	38.70	0.03238	0.0	0.01787	0.06	0.06	0.30	6.01	181.21	600.82	1.81	0.00	0.000	0.000	0.018
2	38.70	38.60	0.03276	0.0	0.01796	0.06	0.13	0.30	6.02	182.42	601.65	1.82	0.00	0.000	0.000	0.018
3	38.60	38.50	0.03313	0.0	0.01805	0.06	0.19	0.30	6.02	183.61	602.48	1.84	0.00	0.000	0.000	0.018
4	38.50	38.40	0.03351	0.0	0.01813	0.06	0.26	0.31	6.03	184.80	603.30	1.85	0.00	0.000	0.000	0.018
5	38.40	38.30	0.03389	0.0	0.01822	0.06	0.32	0.31	6.04	185.99	604.11	1.86	0.00	0.000	0.000	0.018
6	38.30	38.20	0.03427	0.0	0.01831	0.06	0.38	0.31	6.05	187.17	604.92	1.87	0.00	0.000	0.000	0.018
7	38.20	38.10	0.03465	0.0	0.01840	0.06	0.45	0.31	6.06	188.34	605.72	1.88	0.00	0.000	0.000	0.018
8	38.10	38.00	0.03502	0.0	0.01848	0.06	0.51	0.31	6.07	189.51	606.50	1.90	0.00	0.000	0.000	0.018
9	38.00	37.90	0.03540	0.0	0.01857	0.06	0.57	0.31	6.07	190.67	607.29	1.91	0.00	0.000	0.000	0.019
10	37.90	37.80	0.03578	0.0	0.01865	0.06	0.63	0.32	6.08	191.83	608.06	1.92	0.00	0.000	0.000	0.019
11	37.80	37.70	0.03616	0.0	0.01874	0.06	0.70	0.32	6.09	192.98	608.83	1.93	0.00	0.000	0.000	0.019
12	37.70	37.60	0.03653	0.0	0.01882	0.06	0.76	0.32	6.10	194.13	609.59	1.94	0.00	0.000	0.000	0.019
13	37.60	37.50	0.03691	0.0	0.01890	0.06	0.82	0.32	6.10	195.27	610.34	1.95	0.00	0.000	0.000	0.019
14	37.50	37.40	0.03729	0.0	0.01899	0.06	0.88	0.32	6.11	196.41	611.09	1.96	0.00	0.000	0.000	0.019
15	37.40	37.30	0.03767	0.0	0.01907	0.06	0.94	0.32	6.12	197.54	611.83	1.98	0.00	0.000	0.000	0.019
16	37.30	37.20	0.03805	0.0	0.01915	0.06	1.00	0.32	6.13	198.67	612.56	1.99	0.00	0.000	0.000	0.019

17	37.20	37.10	0.03842	0.0	0.01923	0.06	1.06	0.33	6.13	199.79	613.29	2.00	0.00	0.000	0.000	0.019
18	37.10	37.00	0.03880	0.0	0.01931	0.06	1.12	0.33	6.14	200.91	614.01	2.01	0.00	0.000	0.000	0.019
19	37.00	36.90	0.03918	0.0	0.01939	0.06	1.18	0.33	6.15	202.02	614.72	2.02	0.00	0.000	0.000	0.019
20	36.90	36.80	0.03956	0.0	0.01947	0.06	1.24	0.33	6.15	203.13	615.43	2.03	0.00	0.000	0.000	0.019
21	36.80	36.70	0.03994	0.0	0.01955	0.06	1.30	0.33	6.16	204.23	616.13	2.04	0.00	0.000	0.000	0.020
22	36.70	36.60	0.04031	0.0	0.01963	0.06	1.36	0.33	6.17	205.33	616.83	2.05	0.00	0.000	0.000	0.020
23	36.60	36.50	0.04069	0.0	0.01971	0.06	1.42	0.33	6.18	206.43	617.52	2.06	0.00	0.000	0.000	0.020
24	36.50	36.40	0.04107	0.0	0.01979	0.06	1.48	0.34	6.18	207.52	618.21	2.08	0.00	0.000	0.000	0.020
25	36.40	36.30	0.04145	0.0	0.01987	0.06	1.53	0.34	6.19	208.60	618.89	2.09	0.00	0.000	0.000	0.020
26	36.30	36.20	0.04183	0.0	0.01995	0.06	1.59	0.34	6.20	209.69	619.56	2.10	0.00	0.000	0.000	0.020
27	36.20	36.10	0.04220	0.0	0.02002	0.06	1.65	0.34	6.20	210.76	620.23	2.11	0.00	0.000	0.000	0.020
28	36.10	36.00	0.04258	0.0	0.02010	0.06	1.71	0.34	6.21	211.84	620.89	2.12	0.00	0.000	0.000	0.020
29	36.00	35.90	0.04296	0.0	0.02018	0.06	1.76	0.34	6.22	212.91	621.55	2.13	0.00	0.000	0.000	0.020
30	35.90	35.80	0.04334	0.0	0.02025	0.06	1.82	0.34	6.22	213.97	622.21	2.14	0.00	0.000	0.000	0.020
31	35.80	35.70	0.04372	0.0	0.02033	0.06	1.88	0.35	6.23	215.03	622.86	2.15	0.00	0.000	0.000	0.020
32	35.70	35.60	0.04409	0.0	0.02040	0.06	1.93	0.35	6.23	216.09	623.50	2.16	0.00	0.000	0.000	0.020
33	35.60	35.50	0.04447	0.0	0.02048	0.06	1.99	0.35	6.24	217.15	624.14	2.17	0.00	0.000	0.000	0.020
34	35.50	35.40	0.04485	0.0	0.02055	0.06	2.05	0.35	6.25	218.19	624.77	2.18	0.00	0.000	0.000	0.021
35	35.40	35.30	0.04523	0.0	0.02063	0.06	2.10	0.35	6.25	219.24	625.40	2.19	0.00	0.000	0.000	0.021
36	35.30	35.20	0.04560	0.0	0.02070	0.06	2.16	0.35	6.26	220.28	626.03	2.20	0.00	0.000	0.000	0.021
37	35.20	35.10	0.04598	0.0	0.02078	0.06	2.22	0.35	6.27	221.32	626.65	2.21	0.00	0.000	0.000	0.021
38	35.10	35.00	0.04636	0.0	0.02085	0.06	2.27	0.35	6.27	222.36	627.26	2.22	0.00	0.000	0.000	0.021
39	35.00	34.90	0.04674	0.0	0.02092	0.06	2.33	0.36	6.28	223.39	627.87	2.23	0.00	0.000	0.000	0.021
40	34.90	34.80	0.04712	0.0	0.02100	0.06	2.38	0.36	6.28	224.42	628.48	2.24	0.00	0.000	0.000	0.021
41	34.80	34.70	0.04749	0.0	0.02107	0.05	2.44	0.36	6.29	225.44	629.08	2.25	0.00	0.000	0.000	0.021
42	34.70	34.60	0.04787	0.0	0.02114	0.05	2.49	0.36	6.30	226.46	629.68	2.26	0.00	0.000	0.000	0.021
43	34.60	34.50	0.04825	0.0	0.02121	0.05	2.55	0.36	6.30	227.48	630.28	2.27	0.00	0.000	0.000	0.021
44	34.50	34.40	0.04863	0.0	0.02128	0.05	2.60	0.36	6.31	228.49	630.87	2.28	0.00	0.000	0.000	0.021
45	34.40	34.30	0.04901	0.0	0.02135	0.05	2.65	0.36	6.31	229.50	631.45	2.30	0.00	0.000	0.000	0.021
46	34.30	34.20	0.04938	0.0	0.02142	0.05	2.71	0.36	6.32	230.51	632.04	2.31	0.00	0.000	0.000	0.021
47	34.20	34.10	0.04976	0.0	0.02149	0.05	2.76	0.37	6.33	231.51	632.61	2.32	0.00	0.000	0.000	0.021
48	34.10	34.00	0.05014	0.0	0.02156	0.05	2.82	0.37	6.33	232.51	633.19	2.33	0.00	0.000	0.000	0.022
49	34.00	33.90	0.05052	0.0	0.02163	0.05	2.87	0.37	6.34	233.51	633.76	2.34	0.00	0.000	0.000	0.022
50	33.90	33.80	0.05090	0.0	0.02170	0.05	2.92	0.37	6.34	234.51	634.33	2.35	0.00	0.000	0.000	0.022
51	33.80	33.70	0.05127	0.0	0.02177	0.05	2.98	0.37	6.35	235.50	634.89	2.35	0.00	0.000	0.000	0.022
52	33.70	33.60	0.05165	0.0	0.02184	0.05	3.03	0.37	6.35	236.48	635.45	2.36	0.00	0.000	0.000	0.022
53	33.60	33.50	0.05203	0.0	0.02191	0.05	3.08	0.37	6.36	237.47	636.01	2.37	0.00	0.000	0.000	0.022
54	33.50	33.40	0.05241	0.0	0.02198	0.05	3.13	0.37	6.37	238.45	636.56	2.38	0.00	0.000	0.000	0.022
55	33.40	33.30	0.05278	0.0	0.02205	0.05	3.19	0.38	6.37	239.43	637.11	2.39	0.00	0.000	0.000	0.022
56	33.30	33.20	0.05316	0.0	0.02211	0.05	3.24	0.38	6.38	240.40	637.65	2.40	0.00	0.000	0.000	0.022
57	33.20	33.10	0.05354	0.0	0.02218	0.05	3.29	0.38	6.38	241.38	638.20	2.41	0.00	0.000	0.000	0.022
58	33.10	33.00	0.05392	0.0	0.02225	0.05	3.34	0.38	6.39	242.35	638.73	2.42	0.00	0.000	0.000	0.022
59	33.00	32.90	0.05430	0.0	0.02232	0.05	3.40	0.38	6.39	243.31	639.27	2.43	0.00	0.000	0.000	0.022
60	32.90	32.80	0.05467	0.0	0.02238	0.05	3.45	0.38	6.40	244.28	639.80	2.44	0.00	0.000	0.000	0.022
61	32.80	32.70	0.05505	0.0	0.02245	0.05	3.50	0.38	6.40	245.24	640.33	2.45	0.00	0.000	0.000	0.022
62	32.70	32.60	0.05543	0.0	0.02251	0.05	3.55	0.38	6.41	246.20	640.86	2.46	0.00	0.000	0.000	0.023
63	32.60	32.50	0.05581	0.0	0.02258	0.05	3.60	0.39	6.41	247.15	641.38	2.47	0.00	0.000	0.000	0.023
64	32.50	32.40	0.05619	0.0	0.02265	0.05	3.65	0.39	6.42	248.10	641.90	2.48	0.00	0.000	0.000	0.023

65	32.40	32.30	0.05656	0.0	0.02271	0.05	3.70	0.39	6.42	249.05	642.42	2.49	0.00	0.000	0.000	0.023
66	32.30	32.20	0.05694	0.0	0.02278	0.05	3.75	0.39	6.43	250.00	642.93	2.50	0.00	0.000	0.000	0.023
67	32.20	32.10	0.05732	0.0	0.02284	0.05	3.80	0.39	6.43	250.95	643.44	2.51	0.00	0.000	0.000	0.023
68	32.10	32.00	0.05770	0.0	0.02291	0.05	3.86	0.39	6.44	251.89	643.95	2.52	0.00	0.000	0.000	0.023
69	32.00	31.90	0.05808	0.0	0.02297	0.05	3.91	0.39	6.44	252.83	644.45	2.53	0.00	0.000	0.000	0.023
70	31.90	31.80	0.05845	0.0	0.02303	0.05	3.96	0.39	6.45	253.76	644.95	2.54	0.00	0.000	0.000	0.023
71	31.80	31.70	0.05883	0.0	0.02310	0.05	4.01	0.39	6.45	254.70	645.45	2.55	0.00	0.000	0.000	0.023
72	31.70	31.60	0.05921	0.0	0.02316	0.05	4.06	0.40	6.46	255.63	645.95	2.56	0.00	0.000	0.000	0.023
73	31.60	31.50	0.05959	0.0	0.02323	0.05	4.11	0.40	6.46	256.56	646.44	2.57	0.00	0.000	0.000	0.023
74	31.50	31.40	0.05997	0.0	0.02329	0.05	4.16	0.40	6.47	257.48	646.93	2.57	0.00	0.000	0.000	0.023
75	31.40	31.30	0.06034	0.0	0.02335	0.05	4.20	0.40	6.47	258.41	647.42	2.58	0.00	0.000	0.000	0.023
76	31.30	31.20	0.06072	0.0	0.02341	0.05	4.25	0.40	6.48	259.33	647.91	2.59	0.00	0.000	0.000	0.023
77	31.20	31.10	0.06110	0.0	0.02348	0.05	4.30	0.40	6.48	260.25	648.39	2.60	0.00	0.000	0.000	0.023
78	31.10	31.00	0.06148	0.0	0.02354	0.05	4.35	0.40	6.49	261.16	648.87	2.61	0.00	0.000	0.000	0.024
79	31.00	30.90	0.06185	0.0	0.02360	0.05	4.40	0.40	6.49	262.08	649.35	2.62	0.00	0.000	0.000	0.024
80	30.90	30.80	0.06223	0.0	0.02366	0.05	4.45	0.40	6.50	262.99	649.82	2.63	0.00	0.000	0.000	0.024
81	30.80	30.70	0.06261	0.0	0.02373	0.05	4.50	0.41	6.50	263.90	650.29	2.64	0.00	0.000	0.000	0.024
82	30.70	30.60	0.06299	0.0	0.02379	0.05	4.55	0.41	6.51	264.80	650.76	2.65	0.00	0.000	0.000	0.024
83	30.60	30.50	0.06337	0.0	0.02385	0.05	4.60	0.41	6.51	265.71	651.23	2.66	0.00	0.000	0.000	0.024
84	30.50	30.40	0.06374	0.0	0.02391	0.05	4.65	0.41	6.52	266.61	651.70	2.67	0.00	0.000	0.000	0.024
85	30.40	30.30	0.06412	0.0	0.02397	0.05	4.69	0.41	6.52	267.51	652.16	2.68	0.00	0.000	0.000	0.024
86	30.30	30.20	0.06450	0.0	0.02403	0.05	4.74	0.41	6.53	268.41	652.62	2.68	0.00	0.000	0.000	0.024
87	30.20	30.10	0.06488	0.0	0.02409	0.05	4.79	0.41	6.53	269.30	653.08	2.69	0.00	0.000	0.000	0.024
88	30.10	30.00	0.06526	0.0	0.02415	0.05	4.84	0.41	6.54	270.20	653.53	2.70	0.00	0.000	0.000	0.024
89	30.00	29.90	0.06563	0.0	0.02421	0.05	4.89	0.41	6.54	271.09	653.98	2.71	0.00	0.000	0.000	0.024
90	29.90	29.80	0.06601	0.0	0.02427	0.05	4.93	0.42	6.54	271.98	654.43	2.72	0.00	0.000	0.000	0.024
91	29.80	29.70	0.06639	0.0	0.02433	0.05	4.98	0.42	6.55	272.86	654.88	2.73	0.00	0.000	0.000	0.024
92	29.70	29.60	0.06677	0.0	0.02439	0.05	5.03	0.42	6.55	273.75	655.33	2.74	0.00	0.000	0.000	0.024
93	29.60	29.50	0.06715	0.0	0.02445	0.05	5.08	0.42	6.56	274.63	655.77	2.75	0.00	0.000	0.000	0.024
94	29.50	29.40	0.06752	0.0	0.02451	0.05	5.12	0.42	6.56	275.51	656.21	2.76	0.00	0.000	0.000	0.025
95	29.40	29.30	0.06790	0.0	0.02457	0.05	5.17	0.42	6.57	276.39	656.65	2.76	0.00	0.000	0.000	0.025
96	29.30	29.20	0.06828	0.0	0.02463	0.05	5.22	0.42	6.57	277.26	657.09	2.77	0.00	0.000	0.000	0.025
97	29.20	29.10	0.06866	0.0	0.02468	0.05	5.26	0.42	6.58	278.14	657.53	2.78	0.00	0.000	0.000	0.025
98	29.10	29.00	0.06904	0.0	0.02474	0.05	5.31	0.42	6.58	279.01	657.96	2.79	0.00	0.000	0.000	0.025
99	29.00	28.90	0.06941	0.0	0.02480	0.05	5.36	0.43	6.58	279.88	658.39	2.80	0.00	0.000	0.000	0.025
100	28.90	28.80	0.06979	0.0	0.02486	0.05	5.40	0.43	6.59	280.74	658.82	2.81	0.00	0.000	0.000	0.025
101	28.80	28.70	0.07017	0.0	0.02492	0.05	5.45	0.43	6.59	281.61	659.25	2.82	0.00	0.000	0.000	0.025
102	28.70	28.60	0.07055	0.0	0.02497	0.05	5.50	0.43	6.60	282.47	659.67	2.82	0.00	0.000	0.000	0.025
103	28.60	28.50	0.07092	0.0	0.02503	0.05	5.54	0.43	6.60	283.34	660.10	2.83	0.00	0.000	0.000	0.025
104	28.50	28.40	0.07130	0.0	0.02509	0.05	5.59	0.43	6.61	284.19	660.52	2.84	0.00	0.000	0.000	0.025
105	28.40	28.30	0.07168	0.0	0.02515	0.05	5.63	0.43	6.61	285.05	660.94	2.85	0.00	0.000	0.000	0.025
106	28.30	28.20	0.07206	0.0	0.02520	0.05	5.68	0.43	6.61	285.91	661.35	2.86	0.00	0.000	0.000	0.025
107	28.20	28.10	0.07244	0.0	0.02526	0.05	5.73	0.43	6.62	286.76	661.77	2.87	0.00	0.000	0.000	0.025
108	28.10	28.00	0.07281	0.0	0.02532	0.05	5.77	0.43	6.62	287.61	662.18	2.88	0.00	0.000	0.000	0.025
109	28.00	27.90	0.07319	0.0	0.02537	0.05	5.82	0.44	6.63	288.46	662.59	2.88	0.00	0.000	0.000	0.025
110	27.90	27.80	0.07357	0.0	0.02543	0.05	5.86	0.44	6.63	289.31	663.00	2.89	0.00	0.000	0.000	0.025
111	27.80	27.70	0.07395	0.0	0.02549	0.05	5.91	0.44	6.63	290.16	663.41	2.90	0.00	0.000	0.000	0.025
112	27.70	27.60	0.07433	0.0	0.02554	0.05	5.95	0.44	6.64	291.00	663.82	2.91	0.00	0.000	0.000	0.026

113	27.60	27.50	0.07470	0.0	0.02560	0.05	6.00	0.44	6.64	291.84	664.22	2.92	0.00	0.000	0.000	0.026
114	27.50	27.40	0.07508	0.0	0.02565	0.05	6.04	0.44	6.65	292.68	664.62	2.93	0.00	0.000	0.000	0.026
115	27.40	27.30	0.07546	0.0	0.02571	0.05	6.09	0.44	6.65	293.52	665.02	2.94	0.00	0.000	0.000	0.026
116	27.30	27.20	0.07584	0.0	0.02576	0.04	6.13	0.44	6.65	294.36	665.42	2.94	0.00	0.000	0.000	0.026
117	27.20	27.10	0.07622	0.0	0.02582	0.04	6.18	0.44	6.66	295.20	665.82	2.95	0.00	0.000	0.000	0.026
118	27.10	27.00	0.07659	0.0	0.02587	0.04	6.22	0.44	6.66	296.03	666.21	2.96	0.00	0.000	0.000	0.026
119	27.00	26.90	0.07697	0.0	0.02593	0.04	6.27	0.45	6.67	296.86	666.61	2.97	0.00	0.000	0.000	0.026
120	26.90	26.80	0.07735	0.0	0.02598	0.04	6.31	0.45	6.67	297.69	667.00	2.98	0.00	0.000	0.000	0.026
121	26.80	26.70	0.07773	0.0	0.02604	0.04	6.36	0.45	6.67	298.52	667.39	2.99	0.00	0.000	0.000	0.026
122	26.70	26.60	0.07810	0.0	0.02609	0.04	6.40	0.45	6.68	299.35	667.78	2.99	0.00	0.000	0.000	0.026
123	26.60	26.50	0.07848	0.0	0.02615	0.04	6.45	0.45	6.68	300.17	668.17	3.00	0.00	0.000	0.000	0.026
124	26.50	26.40	0.07886	0.0	0.02620	0.04	6.49	0.45	6.69	300.99	668.55	3.01	0.00	0.000	0.000	0.026
125	26.40	26.30	0.07924	0.0	0.02625	0.04	6.53	0.45	6.69	301.81	668.93	3.02	0.00	0.000	0.000	0.026
126	26.30	26.20	0.07962	0.0	0.02631	0.04	6.58	0.45	6.69	302.63	669.32	3.03	0.00	0.000	0.000	0.026
127	26.20	26.10	0.07999	0.0	0.02636	0.04	6.62	0.45	6.70	303.45	669.70	3.03	0.00	0.000	0.000	0.026
128	26.10	26.00	0.08037	0.0	0.02641	0.04	6.67	0.45	6.70	304.27	670.08	3.04	0.00	0.000	0.000	0.026
129	26.00	25.90	0.08075	0.0	0.02647	0.04	6.71	0.46	6.70	305.08	670.45	3.05	0.00	0.000	0.000	0.026
130	25.90	25.80	0.08113	0.0	0.02652	0.04	6.75	0.46	6.71	305.90	670.83	3.06	0.00	0.000	0.000	0.027
131	25.80	25.70	0.08151	0.0	0.02657	0.04	6.80	0.46	6.71	306.71	671.20	3.07	0.00	0.000	0.000	0.027
132	25.70	25.60	0.08188	0.0	0.02663	0.04	6.84	0.46	6.72	307.52	671.58	3.08	0.00	0.000	0.000	0.027
133	25.60	25.50	0.08226	0.0	0.02668	0.04	6.88	0.46	6.72	308.33	671.95	3.08	0.00	0.000	0.000	0.027
134	25.50	25.40	0.08264	0.0	0.02673	0.04	6.93	0.46	6.72	309.13	672.32	3.09	0.00	0.000	0.000	0.027
135	25.40	25.30	0.08302	0.0	0.02679	0.04	6.97	0.46	6.73	309.94	672.69	3.10	0.00	0.000	0.000	0.027
136	25.30	25.20	0.08340	0.0	0.02684	0.04	7.01	0.46	6.73	310.74	673.05	3.11	0.00	0.000	0.000	0.027
137	25.20	25.10	0.08377	0.0	0.02689	0.04	7.06	0.46	6.73	311.54	673.42	3.12	0.00	0.000	0.000	0.027
138	25.10	25.00	0.08415	0.0	0.02694	0.04	7.10	0.46	6.74	312.34	673.78	3.12	0.00	0.000	0.000	0.027
139	25.00	24.90	0.08453	0.0	0.02699	0.04	7.14	0.46	6.74	313.14	674.14	3.13	0.00	0.000	0.000	0.027
140	24.90	24.80	0.08491	0.0	0.02705	0.04	7.19	0.47	6.75	313.94	674.50	3.14	0.00	0.000	0.000	0.027
141	24.80	24.70	0.08529	0.0	0.02710	0.04	7.23	0.47	6.75	314.73	674.86	3.15	0.00	0.000	0.000	0.027
142	24.70	24.60	0.08566	0.0	0.02715	0.04	7.27	0.47	6.75	315.53	675.22	3.16	0.00	0.000	0.000	0.027
143	24.60	24.50	0.08604	0.0	0.02720	0.04	7.31	0.47	6.76	316.32	675.58	3.16	0.00	0.000	0.000	0.027
144	24.50	24.40	0.08642	0.0	0.02725	0.04	7.36	0.47	6.76	317.11	675.93	3.17	0.00	0.000	0.000	0.027
145	24.40	24.30	0.08680	0.0	0.02730	0.04	7.40	0.47	6.76	317.90	676.29	3.18	0.00	0.000	0.000	0.027
146	24.30	24.20	0.08717	0.0	0.02735	0.04	7.44	0.47	6.77	318.69	676.64	3.19	0.00	0.000	0.000	0.027
147	24.20	24.10	0.08755	0.0	0.02740	0.04	7.48	0.47	6.77	319.48	676.99	3.19	0.00	0.000	0.000	0.027
148	24.10	24.00	0.08793	0.0	0.02746	0.04	7.52	0.47	6.77	320.26	677.34	3.20	0.00	0.000	0.000	0.027
149	24.00	23.90	0.08831	0.0	0.02751	0.04	7.57	0.47	6.78	321.05	677.69	3.21	0.00	0.000	0.000	0.028
150	23.90	23.80	0.08869	0.0	0.02756	0.04	7.61	0.47	6.78	321.83	678.04	3.22	0.00	0.000	0.000	0.028
151	23.80	23.70	0.08906	0.0	0.02761	0.04	7.65	0.48	6.78	322.61	678.38	3.23	0.00	0.000	0.000	0.028
152	23.70	23.60	0.08944	0.0	0.02766	0.04	7.69	0.48	6.79	323.39	678.73	3.23	0.00	0.000	0.000	0.028
153	23.60	23.50	0.08982	0.0	0.02771	0.04	7.73	0.48	6.79	324.17	679.07	3.24	0.00	0.000	0.000	0.028
154	23.50	23.40	0.09020	0.0	0.02776	0.04	7.78	0.48	6.79	324.94	679.41	3.25	0.00	0.000	0.000	0.028
155	23.40	23.30	0.09058	0.0	0.02781	0.04	7.82	0.48	6.80	325.72	679.76	3.26	0.00	0.000	0.000	0.028
156	23.30	23.20	0.09095	0.0	0.02786	0.04	7.86	0.48	6.80	326.49	680.10	3.26	0.00	0.000	0.000	0.028
157	23.20	23.10	0.09133	0.0	0.02791	0.04	7.90	0.48	6.80	327.27	680.43	3.27	0.00	0.000	0.000	0.028
158	23.10	23.00	0.09171	0.0	0.02796	0.04	7.94	0.48	6.81	328.04	680.77	3.28	0.00	0.000	0.000	0.028
159	23.00	22.90	0.09209	0.0	0.02801	0.04	7.98	0.48	6.81	328.81	681.11	3.29	0.00	0.000	0.000	0.028
160	22.90	22.80	0.09247	0.0	0.02806	0.04	8.02	0.48	6.81	329.57	681.44	3.30	0.00	0.000	0.000	0.028

161	22.80	22.70	0.09284	0.0	0.02811	0.04	8.07	0.48	6.82	330.34	681.78	3.30	0.00	0.000	0.000	0.028
162	22.70	22.60	0.09322	0.0	0.02815	0.04	8.11	0.49	6.82	331.11	682.11	3.31	0.00	0.000	0.000	0.028
163	22.60	22.50	0.09360	0.0	0.02820	0.04	8.15	0.49	6.82	331.87	682.44	3.32	0.00	0.000	0.000	0.028
164	22.50	22.40	0.09398	0.0	0.02825	0.04	8.19	0.49	6.83	332.64	682.77	3.33	0.00	0.000	0.000	0.028
165	22.40	22.30	0.09435	0.0	0.02830	0.04	8.23	0.49	6.83	333.40	683.10	3.33	0.00	0.000	0.000	0.028
166	22.30	22.20	0.09473	0.0	0.02835	0.04	8.27	0.49	6.83	334.16	683.43	3.34	0.00	0.000	0.000	0.028
167	22.20	22.10	0.09511	0.0	0.02840	0.04	8.31	0.49	6.84	334.92	683.75	3.35	0.00	0.000	0.000	0.028
168	22.10	22.00	0.09549	0.0	0.02845	0.04	8.35	0.49	6.84	335.67	684.08	3.36	0.00	0.000	0.000	0.028
169	22.00	21.90	0.09587	0.0	0.02850	0.04	8.39	0.49	6.84	336.43	684.40	3.36	0.00	0.000	0.000	0.028
170	21.90	21.80	0.09624	0.0	0.02854	0.04	8.43	0.49	6.85	337.19	684.73	3.37	0.00	0.000	0.000	0.029
171	21.80	21.70	0.09662	0.0	0.02859	0.04	8.47	0.49	6.85	337.94	685.05	3.38	0.00	0.000	0.000	0.029
172	21.70	21.60	0.09700	0.0	0.02864	0.04	8.51	0.49	6.85	338.69	685.37	3.39	0.00	0.000	0.000	0.029
TOT						8.51				45743.36	111752.21					
AVG					0.0234			0.41	6.50			2.66				

** BIOLOGICAL AND PHYSICAL COEFFICIENTS **

ELEM NO.	ENDING DIST	SAT D.O. mg/L	REAER RATE 1/da	BOD1 DECAY 1/da	BOD1 SETT 1/da	ABOD1 DECAY 1/da	BOD1 HYDR 1/da	BOD2 DECAY 1/da	BOD2 SETT 1/da	ABOD2 DECAY 1/da	BKGD SOD *	FULL SOD *	CORR SOD *	ORG-N HYDR 1/da	ORG-N SETT 1/da	NH3-N DECAY 1/da	NH3-N SRCE *	DENIT RATE 1/da	ORG-P HYDR 1/da	ORG-P SETT 1/da	PO4 SRCE *	PHYTO PROD **	PERIP PROD **	COLI DECAY 1/da	NCM DECAY 1/da	NCM SETT 1/da
1	38.700	7.56	3.67	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.39	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	38.600	7.56	3.65	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.38	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	38.500	7.56	3.64	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.38	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	38.400	7.56	3.62	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	38.300	7.56	3.61	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	38.200	7.56	3.60	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	38.100	7.56	3.59	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	38.000	7.56	3.57	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	37.900	7.56	3.56	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	37.800	7.56	3.55	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	37.700	7.56	3.54	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	37.600	7.56	3.52	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	37.500	7.56	3.51	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	37.400	7.56	3.50	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	37.300	7.56	3.49	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	37.200	7.56	3.48	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	37.100	7.56	3.47	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	37.000	7.56	3.46	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	36.900	7.56	3.44	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	36.800	7.56	3.43	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	36.700	7.56	3.42	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	36.600	7.56	3.41	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	36.500	7.56	3.40	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	36.400	7.56	3.39	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	36.300	7.56	3.38	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

26	36.200	7.56	3.37	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	36.100	7.56	3.36	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	36.000	7.56	3.35	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	35.900	7.56	3.34	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	35.800	7.56	3.33	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	35.700	7.56	3.33	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	35.600	7.56	3.32	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	35.500	7.56	3.31	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	35.400	7.56	3.30	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	35.300	7.56	3.29	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	35.200	7.56	3.28	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	35.100	7.56	3.27	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	35.000	7.56	3.26	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	34.900	7.56	3.26	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	34.800	7.56	3.25	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	34.700	7.56	3.24	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	34.600	7.56	3.23	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	34.500	7.56	3.22	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	34.400	7.56	3.22	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	34.300	7.56	3.21	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	34.200	7.56	3.20	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	34.100	7.56	3.19	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	34.000	7.56	3.18	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	33.900	7.56	3.18	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	33.800	7.56	3.17	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.35	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	33.700	7.56	3.16	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	33.600	7.56	3.15	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	33.500	7.56	3.15	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	33.400	7.56	3.14	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	33.300	7.56	3.13	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	33.200	7.56	3.13	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	33.100	7.56	3.12	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	33.000	7.56	3.11	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	32.900	7.56	3.11	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	32.800	7.56	3.10	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	32.700	7.56	3.09	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	32.600	7.56	3.09	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	32.500	7.56	3.08	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	32.400	7.56	3.07	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	32.300	7.56	3.07	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	32.200	7.56	3.06	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	32.100	7.56	3.05	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	32.000	7.56	3.05	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	31.900	7.56	3.04	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	31.800	7.56	3.04	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	31.700	7.56	3.03	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	31.600	7.56	3.02	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	31.500	7.56	3.02	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

74	31.400	7.56	3.01	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	31.300	7.56	3.01	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	31.200	7.56	3.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	31.100	7.56	3.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	31.000	7.56	2.99	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	30.900	7.56	2.98	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	30.800	7.56	2.98	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	30.700	7.56	2.97	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	30.600	7.56	2.97	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	30.500	7.56	2.96	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	30.400	7.56	2.96	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	30.300	7.56	2.95	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	30.200	7.56	2.95	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	30.100	7.56	2.94	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	30.000	7.56	2.94	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	29.900	7.56	2.93	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	29.800	7.56	2.93	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	29.700	7.56	2.92	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	29.600	7.56	2.92	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	29.500	7.56	2.91	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	29.400	7.56	2.91	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	29.300	7.56	2.90	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	29.200	7.56	2.90	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	29.100	7.56	2.89	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	29.000	7.56	2.89	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	28.900	7.56	2.88	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	28.800	7.56	2.88	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	28.700	7.56	2.87	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	28.600	7.56	2.87	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	28.500	7.56	2.86	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	28.400	7.56	2.86	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	28.300	7.56	2.85	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	28.200	7.56	2.85	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	28.100	7.56	2.85	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	28.000	7.56	2.84	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	27.900	7.56	2.84	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	27.800	7.56	2.83	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	27.700	7.56	2.83	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	27.600	7.56	2.82	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	27.500	7.56	2.82	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	27.400	7.56	2.81	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	27.300	7.56	2.81	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	27.200	7.56	2.81	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	27.100	7.56	2.80	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118	27.000	7.56	2.80	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	26.900	7.56	2.79	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	26.800	7.56	2.79	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	26.700	7.56	2.79	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

122	26.600	7.56	2.78	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
123	26.500	7.56	2.78	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
124	26.400	7.56	2.77	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	26.300	7.56	2.77	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126	26.200	7.56	2.77	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	26.100	7.56	2.76	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	26.000	7.56	2.76	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	25.900	7.56	2.75	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	25.800	7.56	2.75	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	25.700	7.56	2.75	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	25.600	7.56	2.74	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	25.500	7.56	2.74	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
134	25.400	7.56	2.74	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	25.300	7.56	2.73	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
136	25.200	7.56	2.73	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	25.100	7.56	2.73	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
138	25.000	7.56	2.72	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
139	24.900	7.56	2.72	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	24.800	7.56	2.71	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	24.700	7.56	2.71	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	24.600	7.56	2.71	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	24.500	7.56	2.70	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
144	24.400	7.56	2.70	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	24.300	7.56	2.70	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146	24.200	7.56	2.69	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	24.100	7.56	2.69	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148	24.000	7.56	2.69	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	23.900	7.56	2.68	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	23.800	7.56	2.68	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151	23.700	7.56	2.68	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
152	23.600	7.56	2.67	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	23.500	7.56	2.67	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
154	23.400	7.56	2.67	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	23.300	7.56	2.66	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156	23.200	7.56	2.66	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	23.100	7.56	2.66	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	23.000	7.56	2.65	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	22.900	7.56	2.65	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	22.800	7.56	2.65	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	22.700	7.56	2.65	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
162	22.600	7.56	2.64	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
163	22.500	7.56	2.64	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
164	22.400	7.56	2.64	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	22.300	7.56	2.63	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166	22.200	7.56	2.63	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	22.100	7.56	2.63	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
168	22.000	7.56	2.62	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169	21.900	7.56	2.62	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

170	21.800	7.56	2.62	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
171	21.700	7.56	2.62	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	21.600	7.56	2.61	0.00	0.00	0.00	0.00	0.32	0.00	0.00	4.85	4.85	4.85	0.00	0.00	0.37	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG 20 DEG C RATE			2.50	0.00	0.00	0.00	0.00	0.20	0.00	0.00	2.59			0.00	0.00	0.20	0.01	0.00	0.00	0.00	0.00			0.00	0.00	0.00

* g/m²/d ** mg/L/day

** WATER QUALITY CONSTITUENT VALUES **

ELEM NO.	ENDING DIST	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	TOT-N mg/L	EORG-N mg/L	ETOT-N mg/L	ORG-P mg/L	PO4-P mg/L	TOT-P mg/L	EORG-P mg/L	ETOT-P mg/L	CHL A µg/L
1	38.700	30.00	0.00	1.00	0.00	4.34	0.00	3.24	0.00	3.24	0.00	0.13	0.00	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.0
2	38.600	30.00	0.00	1.00	0.00	4.06	0.00	3.23	0.00	3.23	0.00	0.13	0.01	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.0
3	38.500	30.00	0.00	1.00	0.00	3.84	0.00	3.22	0.00	3.22	0.00	0.13	0.01	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.0
4	38.400	30.00	0.00	1.00	0.00	3.66	0.00	3.21	0.00	3.21	0.00	0.13	0.01	0.14	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.0
5	38.300	30.00	0.00	1.00	0.00	3.52	0.00	3.20	0.00	3.20	0.00	0.13	0.02	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.0
6	38.200	30.00	0.00	1.00	0.00	3.41	0.00	3.20	0.00	3.20	0.00	0.13	0.02	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.0
7	38.100	30.00	0.00	1.00	0.00	3.32	0.00	3.19	0.00	3.19	0.00	0.13	0.02	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.0
8	38.000	30.00	0.00	1.00	0.00	3.25	0.00	3.18	0.00	3.18	0.00	0.13	0.02	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.0
9	37.900	30.00	0.00	1.00	0.00	3.20	0.00	3.17	0.00	3.17	0.00	0.13	0.03	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.0
10	37.800	30.00	0.00	1.00	0.00	3.15	0.00	3.16	0.00	3.16	0.00	0.13	0.03	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
11	37.700	30.00	0.00	1.00	0.00	3.12	0.00	3.15	0.00	3.15	0.00	0.13	0.03	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
12	37.600	30.00	0.00	1.00	0.00	3.09	0.00	3.15	0.00	3.15	0.00	0.13	0.03	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
13	37.500	30.00	0.00	1.00	0.00	3.07	0.00	3.14	0.00	3.14	0.00	0.13	0.04	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
14	37.400	30.00	0.00	1.00	0.00	3.06	0.00	3.13	0.00	3.13	0.00	0.13	0.04	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
15	37.300	30.00	0.00	1.00	0.00	3.05	0.00	3.12	0.00	3.12	0.00	0.12	0.04	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
16	37.200	30.00	0.00	1.00	0.00	3.04	0.00	3.11	0.00	3.11	0.00	0.12	0.04	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
17	37.100	30.00	0.00	1.00	0.00	3.03	0.00	3.10	0.00	3.10	0.00	0.12	0.05	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
18	37.000	30.00	0.00	1.00	0.00	3.03	0.00	3.09	0.00	3.09	0.00	0.12	0.05	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
19	36.900	30.00	0.00	1.00	0.00	3.03	0.00	3.09	0.00	3.09	0.00	0.12	0.05	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
20	36.800	30.00	0.00	1.00	0.00	3.02	0.00	3.08	0.00	3.08	0.00	0.12	0.05	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
21	36.700	30.00	0.00	1.00	0.00	3.02	0.00	3.07	0.00	3.07	0.00	0.12	0.05	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
22	36.600	30.00	0.00	1.00	0.00	3.02	0.00	3.06	0.00	3.06	0.00	0.12	0.06	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
23	36.500	30.00	0.00	1.00	0.00	3.03	0.00	3.05	0.00	3.05	0.00	0.12	0.06	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
24	36.400	30.00	0.00	1.00	0.00	3.03	0.00	3.04	0.00	3.04	0.00	0.12	0.06	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
25	36.300	30.00	0.00	1.00	0.00	3.03	0.00	3.04	0.00	3.04	0.00	0.12	0.06	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
26	36.200	30.00	0.00	1.00	0.00	3.03	0.00	3.03	0.00	3.03	0.00	0.12	0.06	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
27	36.100	30.00	0.00	1.00	0.00	3.04	0.00	3.02	0.00	3.02	0.00	0.12	0.07	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
28	36.000	30.00	0.00	1.00	0.00	3.04	0.00	3.01	0.00	3.01	0.00	0.12	0.07	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
29	35.900	30.00	0.00	1.00	0.00	3.04	0.00	3.00	0.00	3.00	0.00	0.12	0.07	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
30	35.800	30.00	0.00	1.00	0.00	3.05	0.00	2.99	0.00	2.99	0.00	0.12	0.07	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
31	35.700	30.00	0.00	1.00	0.00	3.05	0.00	2.99	0.00	2.99	0.00	0.12	0.07	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
32	35.600	30.00	0.00	1.00	0.00	3.05	0.00	2.98	0.00	2.98	0.00	0.12	0.07	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
33	35.500	30.00	0.00	1.00	0.00	3.06	0.00	2.97	0.00	2.97	0.00	0.12	0.08	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
34	35.400	30.00	0.00	1.00	0.00	3.06	0.00	2.96	0.00	2.96	0.00	0.12	0.08	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0

35	35.300	30.00	0.00	1.00	0.00	3.07	0.00	2.95	0.00	2.95	0.00	0.11	0.08	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
36	35.200	30.00	0.00	1.00	0.00	3.07	0.00	2.95	0.00	2.95	0.00	0.11	0.08	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
37	35.100	30.00	0.00	1.00	0.00	3.07	0.00	2.94	0.00	2.94	0.00	0.11	0.08	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
38	35.000	30.00	0.00	1.00	0.00	3.08	0.00	2.93	0.00	2.93	0.00	0.11	0.08	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
39	34.900	30.00	0.00	1.00	0.00	3.08	0.00	2.92	0.00	2.92	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
40	34.800	30.00	0.00	1.00	0.00	3.09	0.00	2.91	0.00	2.91	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
41	34.700	30.00	0.00	1.00	0.00	3.09	0.00	2.91	0.00	2.91	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
42	34.600	30.00	0.00	1.00	0.00	3.09	0.00	2.90	0.00	2.90	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
43	34.500	30.00	0.00	1.00	0.00	3.10	0.00	2.89	0.00	2.89	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
44	34.400	30.00	0.00	1.00	0.00	3.10	0.00	2.88	0.00	2.88	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
45	34.300	30.00	0.00	1.00	0.00	3.11	0.00	2.87	0.00	2.87	0.00	0.11	0.09	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
46	34.200	30.00	0.00	1.00	0.00	3.11	0.00	2.87	0.00	2.87	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
47	34.100	30.00	0.00	1.00	0.00	3.12	0.00	2.86	0.00	2.86	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
48	34.000	30.00	0.00	1.00	0.00	3.12	0.00	2.85	0.00	2.85	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
49	33.900	30.00	0.00	1.00	0.00	3.12	0.00	2.84	0.00	2.84	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
50	33.800	30.00	0.00	1.00	0.00	3.13	0.00	2.84	0.00	2.84	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
51	33.700	30.00	0.00	1.00	0.00	3.13	0.00	2.83	0.00	2.83	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
52	33.600	30.00	0.00	1.00	0.00	3.14	0.00	2.82	0.00	2.82	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
53	33.500	30.00	0.00	1.00	0.00	3.14	0.00	2.81	0.00	2.81	0.00	0.11	0.10	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
54	33.400	30.00	0.00	1.00	0.00	3.14	0.00	2.81	0.00	2.81	0.00	0.11	0.11	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
55	33.300	30.00	0.00	1.00	0.00	3.15	0.00	2.80	0.00	2.80	0.00	0.11	0.11	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
56	33.200	30.00	0.00	1.00	0.00	3.15	0.00	2.79	0.00	2.79	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
57	33.100	30.00	0.00	1.00	0.00	3.15	0.00	2.78	0.00	2.78	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
58	33.000	30.00	0.00	1.00	0.00	3.16	0.00	2.78	0.00	2.78	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
59	32.900	30.00	0.00	1.00	0.00	3.16	0.00	2.77	0.00	2.77	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
60	32.800	30.00	0.00	1.00	0.00	3.17	0.00	2.76	0.00	2.76	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
61	32.700	30.00	0.00	1.00	0.00	3.17	0.00	2.75	0.00	2.75	0.00	0.11	0.11	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
62	32.600	30.00	0.00	1.00	0.00	3.17	0.00	2.75	0.00	2.75	0.00	0.11	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
63	32.500	30.00	0.00	1.00	0.00	3.18	0.00	2.74	0.00	2.74	0.00	0.10	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
64	32.400	30.00	0.00	1.00	0.00	3.18	0.00	2.73	0.00	2.73	0.00	0.10	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
65	32.300	30.00	0.00	1.00	0.00	3.19	0.00	2.73	0.00	2.73	0.00	0.10	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
66	32.200	30.00	0.00	1.00	0.00	3.19	0.00	2.72	0.00	2.72	0.00	0.10	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
67	32.100	30.00	0.00	1.00	0.00	3.19	0.00	2.71	0.00	2.71	0.00	0.10	0.12	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
68	32.000	30.00	0.00	1.00	0.00	3.20	0.00	2.70	0.00	2.70	0.00	0.10	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
69	31.900	30.00	0.00	1.00	0.00	3.20	0.00	2.70	0.00	2.70	0.00	0.10	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
70	31.800	30.00	0.00	1.00	0.00	3.20	0.00	2.69	0.00	2.69	0.00	0.10	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
71	31.700	30.00	0.00	1.00	0.00	3.21	0.00	2.68	0.00	2.68	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
72	31.600	30.00	0.00	1.00	0.00	3.21	0.00	2.68	0.00	2.68	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
73	31.500	30.00	0.00	1.00	0.00	3.21	0.00	2.67	0.00	2.67	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
74	31.400	30.00	0.00	1.00	0.00	3.22	0.00	2.66	0.00	2.66	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
75	31.300	30.00	0.00	1.00	0.00	3.22	0.00	2.66	0.00	2.66	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
76	31.200	30.00	0.00	1.00	0.00	3.23	0.00	2.65	0.00	2.65	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
77	31.100	30.00	0.00	1.00	0.00	3.23	0.00	2.64	0.00	2.64	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
78	31.000	30.00	0.00	1.00	0.00	3.23	0.00	2.64	0.00	2.64	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
79	30.900	30.00	0.00	1.00	0.00	3.24	0.00	2.63	0.00	2.63	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
80	30.800	30.00	0.00	1.00	0.00	3.24	0.00	2.63	0.00	2.63	0.00	0.10	0.13	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
81	30.700	30.00	0.00	1.00	0.00	3.24	0.00	2.62	0.00	2.62	0.00	0.10	0.14	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
82	30.600	30.00	0.00	1.00	0.00	3.25	0.00	2.61	0.00	2.61	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0

83	30.500	30.00	0.00	1.00	0.00	3.25	0.00	2.61	0.00	2.61	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
84	30.400	30.00	0.00	1.00	0.00	3.25	0.00	2.60	0.00	2.60	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
85	30.300	30.00	0.00	1.00	0.00	3.26	0.00	2.59	0.00	2.59	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
86	30.200	30.00	0.00	1.00	0.00	3.26	0.00	2.59	0.00	2.59	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
87	30.100	30.00	0.00	1.00	0.00	3.26	0.00	2.58	0.00	2.58	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
88	30.000	30.00	0.00	1.00	0.00	3.27	0.00	2.57	0.00	2.57	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
89	29.900	30.00	0.00	1.00	0.00	3.27	0.00	2.57	0.00	2.57	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
90	29.800	30.00	0.00	1.00	0.00	3.27	0.00	2.56	0.00	2.56	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
91	29.700	30.00	0.00	1.00	0.00	3.28	0.00	2.56	0.00	2.56	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
92	29.600	30.00	0.00	1.00	0.00	3.28	0.00	2.55	0.00	2.55	0.00	0.10	0.14	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
93	29.500	30.00	0.00	1.00	0.00	3.28	0.00	2.54	0.00	2.54	0.00	0.10	0.15	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
94	29.400	30.00	0.00	1.00	0.00	3.29	0.00	2.54	0.00	2.54	0.00	0.10	0.15	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
95	29.300	30.00	0.00	1.00	0.00	3.29	0.00	2.53	0.00	2.53	0.00	0.10	0.15	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
96	29.200	30.00	0.00	1.00	0.00	3.29	0.00	2.53	0.00	2.53	0.00	0.10	0.15	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
97	29.100	30.00	0.00	1.00	0.00	3.30	0.00	2.52	0.00	2.52	0.00	0.10	0.15	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
98	29.000	30.00	0.00	1.00	0.00	3.30	0.00	2.52	0.00	2.52	0.00	0.10	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
99	28.900	30.00	0.00	1.00	0.00	3.30	0.00	2.51	0.00	2.51	0.00	0.10	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
100	28.800	30.00	0.00	1.00	0.00	3.31	0.00	2.50	0.00	2.50	0.00	0.10	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
101	28.700	30.00	0.00	1.00	0.00	3.31	0.00	2.50	0.00	2.50	0.00	0.09	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
102	28.600	30.00	0.00	1.00	0.00	3.31	0.00	2.49	0.00	2.49	0.00	0.09	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
103	28.500	30.00	0.00	1.00	0.00	3.32	0.00	2.49	0.00	2.49	0.00	0.09	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
104	28.400	30.00	0.00	1.00	0.00	3.32	0.00	2.48	0.00	2.48	0.00	0.09	0.15	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
105	28.300	30.00	0.00	1.00	0.00	3.32	0.00	2.48	0.00	2.48	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
106	28.200	30.00	0.00	1.00	0.00	3.33	0.00	2.47	0.00	2.47	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
107	28.100	30.00	0.00	1.00	0.00	3.33	0.00	2.46	0.00	2.46	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
108	28.000	30.00	0.00	1.00	0.00	3.33	0.00	2.46	0.00	2.46	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
109	27.900	30.00	0.00	1.00	0.00	3.33	0.00	2.45	0.00	2.45	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
110	27.800	30.00	0.00	1.00	0.00	3.34	0.00	2.45	0.00	2.45	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
111	27.700	30.00	0.00	1.00	0.00	3.34	0.00	2.44	0.00	2.44	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
112	27.600	30.00	0.00	1.00	0.00	3.34	0.00	2.44	0.00	2.44	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
113	27.500	30.00	0.00	1.00	0.00	3.35	0.00	2.43	0.00	2.43	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
114	27.400	30.00	0.00	1.00	0.00	3.35	0.00	2.43	0.00	2.43	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
115	27.300	30.00	0.00	1.00	0.00	3.35	0.00	2.42	0.00	2.42	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
116	27.200	30.00	0.00	1.00	0.00	3.36	0.00	2.42	0.00	2.42	0.00	0.09	0.16	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
117	27.100	30.00	0.00	1.00	0.00	3.36	0.00	2.41	0.00	2.41	0.00	0.09	0.16	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
118	27.000	30.00	0.00	1.00	0.00	3.36	0.00	2.41	0.00	2.41	0.00	0.09	0.16	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
119	26.900	30.00	0.00	1.00	0.00	3.36	0.00	2.40	0.00	2.40	0.00	0.09	0.16	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
120	26.800	30.00	0.00	1.00	0.00	3.37	0.00	2.40	0.00	2.40	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
121	26.700	30.00	0.00	1.00	0.00	3.37	0.00	2.39	0.00	2.39	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
122	26.600	30.00	0.00	1.00	0.00	3.37	0.00	2.39	0.00	2.39	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
123	26.500	30.00	0.00	1.00	0.00	3.38	0.00	2.38	0.00	2.38	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
124	26.400	30.00	0.00	1.00	0.00	3.38	0.00	2.38	0.00	2.38	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
125	26.300	30.00	0.00	1.00	0.00	3.38	0.00	2.37	0.00	2.37	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
126	26.200	30.00	0.00	1.00	0.00	3.39	0.00	2.37	0.00	2.37	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
127	26.100	30.00	0.00	1.00	0.00	3.39	0.00	2.36	0.00	2.36	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
128	26.000	30.00	0.00	1.00	0.00	3.39	0.00	2.36	0.00	2.36	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
129	25.900	30.00	0.00	1.00	0.00	3.39	0.00	2.35	0.00	2.35	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
130	25.800	30.00	0.00	1.00	0.00	3.40	0.00	2.35	0.00	2.35	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0

131	25.700	30.00	0.00	1.00	0.00	3.40	0.00	2.34	0.00	2.34	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
132	25.600	30.00	0.00	1.00	0.00	3.40	0.00	2.34	0.00	2.34	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
133	25.500	30.00	0.00	1.00	0.00	3.41	0.00	2.33	0.00	2.33	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
134	25.400	30.00	0.00	1.00	0.00	3.41	0.00	2.33	0.00	2.33	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
135	25.300	30.00	0.00	1.00	0.00	3.41	0.00	2.32	0.00	2.32	0.00	0.09	0.17	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
136	25.200	30.00	0.00	1.00	0.00	3.41	0.00	2.32	0.00	2.32	0.00	0.09	0.18	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
137	25.100	30.00	0.00	1.00	0.00	3.42	0.00	2.31	0.00	2.31	0.00	0.09	0.18	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
138	25.000	30.00	0.00	1.00	0.00	3.42	0.00	2.31	0.00	2.31	0.00	0.09	0.18	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
139	24.900	30.00	0.00	1.00	0.00	3.42	0.00	2.30	0.00	2.30	0.00	0.09	0.18	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
140	24.800	30.00	0.00	1.00	0.00	3.43	0.00	2.30	0.00	2.30	0.00	0.09	0.18	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.0
141	24.700	30.00	0.00	1.00	0.00	3.43	0.00	2.29	0.00	2.29	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
142	24.600	30.00	0.00	1.00	0.00	3.43	0.00	2.29	0.00	2.29	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
143	24.500	30.00	0.00	1.00	0.00	3.43	0.00	2.28	0.00	2.28	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
144	24.400	30.00	0.00	1.00	0.00	3.44	0.00	2.28	0.00	2.28	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
145	24.300	30.00	0.00	1.00	0.00	3.44	0.00	2.28	0.00	2.28	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
146	24.200	30.00	0.00	1.00	0.00	3.44	0.00	2.27	0.00	2.27	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
147	24.100	30.00	0.00	1.00	0.00	3.44	0.00	2.27	0.00	2.27	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
148	24.000	30.00	0.00	1.00	0.00	3.45	0.00	2.26	0.00	2.26	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
149	23.900	30.00	0.00	1.00	0.00	3.45	0.00	2.26	0.00	2.26	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
150	23.800	30.00	0.00	1.00	0.00	3.45	0.00	2.25	0.00	2.25	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
151	23.700	30.00	0.00	1.00	0.00	3.45	0.00	2.25	0.00	2.25	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
152	23.600	30.00	0.00	1.00	0.00	3.46	0.00	2.24	0.00	2.24	0.00	0.09	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
153	23.500	30.00	0.00	1.00	0.00	3.46	0.00	2.24	0.00	2.24	0.00	0.08	0.18	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
154	23.400	30.00	0.00	1.00	0.00	3.46	0.00	2.24	0.00	2.24	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
155	23.300	30.00	0.00	1.00	0.00	3.47	0.00	2.23	0.00	2.23	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
156	23.200	30.00	0.00	1.00	0.00	3.47	0.00	2.23	0.00	2.23	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
157	23.100	30.00	0.00	1.00	0.00	3.47	0.00	2.22	0.00	2.22	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
158	23.000	30.00	0.00	1.00	0.00	3.47	0.00	2.22	0.00	2.22	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
159	22.900	30.00	0.00	1.00	0.00	3.48	0.00	2.22	0.00	2.22	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
160	22.800	30.00	0.00	1.00	0.00	3.48	0.00	2.21	0.00	2.21	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
161	22.700	30.00	0.00	1.00	0.00	3.48	0.00	2.21	0.00	2.21	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
162	22.600	30.00	0.00	1.00	0.00	3.48	0.00	2.20	0.00	2.20	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
163	22.500	30.00	0.00	1.00	0.00	3.49	0.00	2.20	0.00	2.20	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
164	22.400	30.00	0.00	1.00	0.00	3.49	0.00	2.19	0.00	2.19	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
165	22.300	30.00	0.00	1.00	0.00	3.49	0.00	2.19	0.00	2.19	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
166	22.200	30.00	0.00	1.00	0.00	3.49	0.00	2.19	0.00	2.19	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
167	22.100	30.00	0.00	1.00	0.00	3.50	0.00	2.18	0.00	2.18	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
168	22.000	30.00	0.00	1.00	0.00	3.50	0.00	2.18	0.00	2.18	0.00	0.08	0.19	0.27	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.0
169	21.900	30.00	0.00	1.00	0.00	3.50	0.00	2.17	0.00	2.17	0.00	0.08	0.19	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.0
170	21.800	30.00	0.00	1.00	0.00	3.50	0.00	2.17	0.00	2.17	0.00	0.08	0.19	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.0
171	21.700	30.00	0.00	1.00	0.00	3.51	0.00	2.17	0.00	2.17	0.00	0.08	0.19	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.0
172	21.600	30.00	0.00	1.00	0.00	3.51	0.00	2.16	0.00	2.16	0.00	0.08	0.19	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.0

LA-QUAL Model for Beech Creek upstream of Lake Columbia
Summer projection to meet 3.0 mg/L DO at temp of 30 C

STREAM SUMMARY REPORT: Beech Creek

TRAVEL TIME	=		8.51 DAYS		
MAXIMUM EFFLUENT	=		0.00 PERCENT		
FLOW	=	0.03238	TO	0.09700	m^3/s
DISPERSION	=	0.0000	TO	0.0000	m^2/s
VELOCITY	=	0.01787	TO	0.02864	m/s
DEPTH	=	0.30	TO	0.49	m
WIDTH	=	6.01	TO	6.85	m
BOD DECAY	=	0.00	TO	0.00	per day
NH3 DECAY	=	0.35	TO	0.39	per day
SOD	=	4.85	TO	4.85	$g/m^2/d$
NH3 SED SOURCE	=	0.01	TO	0.01	$g/m^2/d$
PO4 SED SOURCE	=	0.00	TO	0.00	$g/m^2/d$
REAERATION	=	2.61	TO	3.67	per day
BOD SETTLING	=	0.00	TO	0.00	per day
ORG-N DECAY	=	0.00	TO	0.00	per day
ORG-N SETTLING	=	0.00	TO	0.00	per day
TEMPERATURE	=	30.00	TO	30.00	deg C
DISSOLVED OXYGEN	=	3.02	TO	4.34	mg/L

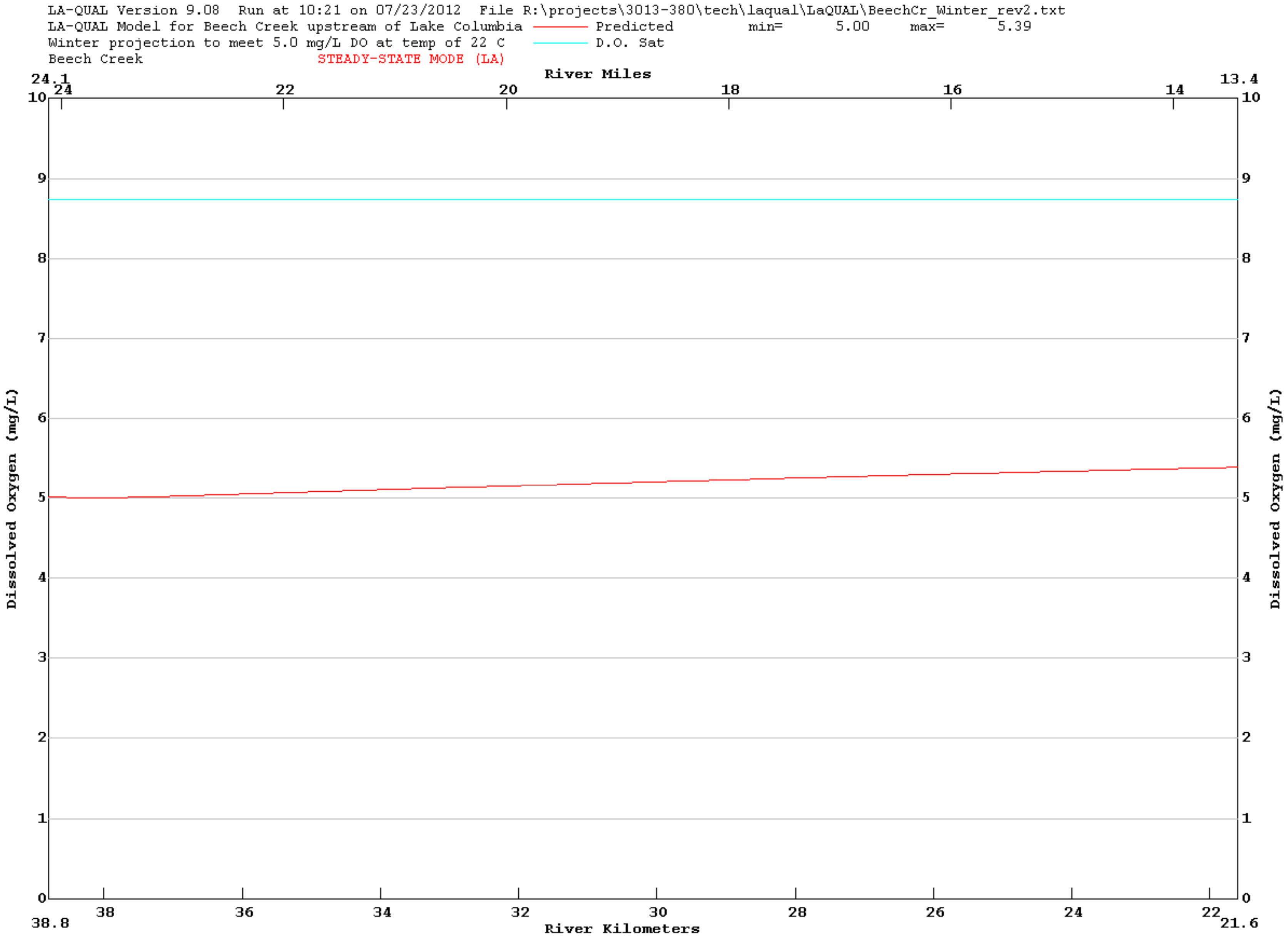
LA-QUAL Model for Beech Creek upstream of Lake Columbia
Summer projection to meet 3.0 mg/L DO at temp of 30 C

INPUT/OUTPUT LOADING SUMMARY

	FLOW m³/s	DO kg/d	BOD1 kg/d	BOD2 kg/d	ORG-N kg/d	NH3-N kg/d	NO3-N kg/d	ORG-P kg/d	PO4-P kg/d	CHL A	PERIP	NCM
HEADWATER FLOW	0.03200	13.01	0.00	8.97	0.00	0.38	0.00	0.00	0.00	0.00		0.00
INCREMENTAL INFLOW	0.06500	26.42	0.00	18.21	0.00	0.76	0.00	0.00	0.00	0.00		0.00
INCREMENTAL OUTFLOW	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WASTELOADS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WITHDRAWLS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
FLOW THRU LOWER BNDRY	-0.09700	-29.41	0.00	-18.13	0.00	-0.69	-1.63	0.00	0.00	0.00		0.00
DISPERSION THRU LOWER BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
DISPERSION THRU HDWTR BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
NON-POINT INPUT		0.00	0.00	28.20	0.00			0.00				0.00
NATURAL REAERATION		576.55										
DAM REAERATION		0.00										
SOD BACKGROUND		-542.27										
BOD1 DECAY		0.00	0.00									
BOD1 SETTLING		0.00	0.00									
ANAEROBIC BOD1 DECAY			0.00									
BOD2 DECAY		-37.25		-37.25								
BOD2 SETTLING		0.00		0.00								
ANAEROBIC BOD2 DECAY				0.00								
BOD2 HYDROLYSIS			0.00	0.00								
ORG-N DECAY		0.00			0.00	0.00						
ORG-N SETTLING					0.00	0.00						
NH3-N DECAY (NITRIFICATION)		-7.05				-1.63	1.63					
NH3-N BACKGROUND SEDIMENT SOURCE						1.17						
DENITRIFICATION			0.00				0.00					
ORG-P HYDROLYSIS								0.00	0.00			
ORG-P SETTLING								0.00	0.00			
PO4-P BACKGROUND SEDIMENT SOURCE									0.00			
PHYTOPLANKTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00	0.00		
PHYTOPLANKTON RESPIRATION/EXCRETION		0.00				0.00			0.00	0.00		
PHYTOPLANKTON SETTLING		0.00				0.00			0.00	0.00		
PHYTOPLANKTON DEATH			0.00	0.00	0.00			0.00		0.00		
PERIPHYTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00		0.00	
PERIPHYTON RESPIRATION/EXCRETION		0.00				0.00			0.00		0.00	
PERIPHYTON DEATH			0.00	0.00	0.00			0.00			0.00	
NCM DECAY		0.00										0.00
NCM SETTLING		0.00										0.00

TOTAL INPUTS	0.09700	615.97	0.00	55.38	0.00	2.31	1.63	0.00	0.00	0.00	0.00	0.00
TOTAL OUTPUTS	-0.09700	-615.97	0.00	-55.38	0.00	-2.32	-1.63	0.00	0.00	0.00	0.00	0.00
NET CONVERGENCE ERROR	0.00000	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

.....EXECUTION COMPLETED



Graph of predicted DO for Beech Creek for winter projection

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LA-QUAL Version 9.08
Louisiana Department of Environmental Quality

Input file is R:\projects\3013-380\tech\laqual\LaQUAL\BeechCr_Winter_rev2.txt
Running in steady-state mode using LA defaults
Output produced at 10:21 on 07/23/2012

$$$ DATA TYPE 1 (TITLES AND CONTROL CARDS) $$$

CARD TYPE        CONTROL TITLES

TITLE01          LA-QUAL Model for Beech Creek upstream of Lake Columbia
TITLE02          Winter projection to meet 5.0 mg/L DO at temp of 22 C
CNTROL03  YES    METRIC UNITS
ENDATA01

$$$ DATA TYPE 2 (MODEL OPTIONS) $$$

CARD TYPE        MODEL OPTION

MODOPT01   NO    TEMPERATURE
MODOPT02   NO    SALINITY
MODOPT03   NO    CONSERVATIVE
MODOPT04   NO    CONSERVATIVE
MODOPT05  YES    DISSOLVED OXYGEN
MODOPT06  YES    BOD2 BIOC
MODOPT07  YES    NITROGEN
MODOPT08   NO    PHOSPHORUS
MODOPT09   NO    PHYTOPLANKTON
MODOPT10   NO    PERIPHYTON
MODOPT11   NO    COLIFORM
MODOPT12   NO    NONCONSERVATIVE
ENDATA02

$$$ DATA TYPE 3 (PROGRAM CONSTANTS) $$$

CARD TYPE        DESCRIPTION OF CONSTANT                     VALUE

PROGRAM          HYDRAULIC CALCULATION METHOD      =         2.00000 (widths and depths)
PROGRAM          MAXIMUM ITERATION LIMIT           =       999.00000
PROGRAM          N INHIBITION EQUATION             =         1.00000 (two-step)
ENDATA03

$$$ DATA TYPE 4 (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

 CARD TYPE     RATE CODE     THETA VALUE

ENDATA04
```

$$$ CONSTANTS TYPE 5 (TEMPERATURE DATA) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA05

$$$ DATA TYPE 6 (PHYTOPLANKTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA06

$$$ DATA TYPE 7 (PERIPHYTON CONSTANTS) $$$

CARD TYPE	DESCRIPTION OF CONSTANT	VALUE

ENDATA07

$$$ DATA TYPE 8 (REACH IDENTIFICATION DATA) $$$

CARD TYPE	REACH	ID	NAME	BEGIN REACH km		END REACH km	ELEM LENGTH km	REACH LENGTH km	ELEMS PER RCH	BEGIN ELEM NUM	END ELEM NUM
REACH ID	1	B1	Beech Creek	38.80	TO	21.60	0.1000	17.20	172	1	172

ENDATA08

$$$ DATA TYPE 9 (ADVECTIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	WIDTH "A"	WIDTH "B"	WIDTH "C"	DEPTH "D"	DEPTH "E"	DEPTH "F"	SLOPE	MANNINGS "N"
HYDR-1	1	B1	9.068	0.120	0.000	1.412	0.450	0.000	0.00000	0.000

ENDATA09

$$$ DATA TYPE 10 (DISPERSIVE HYDRAULIC COEFFICIENTS) $$$

CARD TYPE	REACH	ID	TIDAL RANGE	DISPERSION "A"	DISPERSION "B"	DISPERSION "C"	DISPERSION "D"

ENDATA10

$$$ DATA TYPE 11 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	ID	TEMP deg C	SALIN ppt	DO mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	PERIP g/m²	BOD1 mg/L	BOD2 mg/L	ORG-N mg/L	ORG-P mg/L	COLI #/100mL	NCM	CM-1	CM-2
INITIAL	1	B1	22.00	0.00	5.00	0.20	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00

ENDATA11

$$$ DATA TYPE 12 (REAERATION, SEDIMENT OXYGEN DEMAND, BOD COEFFICIENTS) $$$

CARD TYPE	RCH NUM	RCH ID	K2 OPT	K2 "A"	K2 "B"	K2 "C"	BKGRND SOD $g/m^2/d$	AEROB BOD DECAY per day	BOD SETT m/d	SETTLD SOD AVAIL frac	ANAER BOD DECAY per day	AEROB BOD2 DECAY per day	BOD2 SETT m/d	ANAER BOD2 DECAY per day	BOD2 HYDR TO BOD1 per day
COEFF-1	1	B1	15 LOUISIANA	0.000	0.000	0.000	2.915	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000

ENDATA12

$$$ DATA TYPE 13 (NITROGEN AND PHOSPHORUS COEFFICIENTS) $$$

CARD TYPE	REACH	ID	ORG-N DECA per day	ORG-N SETT m/d	SETTLD ORGN AVAIL frac	NH3 DECA per day	BKGRND NH3 SRCE $g/m^2/d$	BKGRND PO4 SRCE $g/m^2/d$	DENIT RATE per day	ORGP DECA per day	ORGP SETT m/d	SETTLD ORGP AVAIL frac
COEFF-2	1	B1	0.000	0.000	0.000	0.200	0.006	0.000	0.000	0.000	0.000	0.000

ENDATA13

$$$ DATA TYPE 14 (ALGAE PHYTOPLANKTON AND PERIPHYTON COEFFICIENTS) $$$

CARD TYPE	REACH	ID	SECCHI DEPTH m	CHL A: ALGAE frac	PHYTO SETT m/d	PHYTO DEATH per day	MAX PHYTO GROW per day	PHYTO RESP per day	PERIP DEATH per day	MAX PERIP GROW per day	PERIP RESP per day	BANK SHADING frac

ENDATA14

$$$ DATA TYPE 15 (COLIFORM AND NONCONSERVATIVE COEFFICIENTS) $$$

CARD TYPE	REACH	ID	COLIFORM DIE-OFF per day	NCM DECAY per day	NCM SETT m/d

ENDATA15

$$$ DATA TYPE 16 (INCREMENTAL DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

CARD TYPE	REACH	ID	OUTFLOW m^3/s	INFLOW m^3/s	TEMP deg C	SALIN ppt	CM-1	CM-2	IN/DIST	OUT/DIST
INCR-1	1	B1	0.00000	0.06500	22.00	0.00	0.00	0.00	0.00378	0.00000

ENDATA16

$$$ DATA TYPE 17 (INCREMENTAL DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	REACH	ID	DO mg/L	BOD1 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	BOD2 mg/L
INCR-2	1	B1	5.02	0.00	0.00	0.15	0.00	3.66

ENDATA17

$$$ DATA TYPE 18 (INCREMENTAL DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	REACH	ID	PO4	PHYTO CHL A	COLI	NCM	ORGP
			mg/L	µg/L	#/100mL		mg/L

ENDATA18

$$$ DATA TYPE 19 (NONPOINT SOURCE DATA) $$$

CARD TYPE	REACH	ID	BOD1	ORG-N	COLI	NCM	DO	BOD2	ORG-P
			kg/d	kg/d	#/day		kg/d	kg/d	kg/d
NONPOINT	1	B1	0.00	0.00	0.00	0.00	0.00	31.80	0.00

ENDATA19

$$$ DATA TYPE 20 (HEADWATER FOR FLOW, TEMPERATURE, SALINITY AND CONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	UNIT	FLOW	FLOW	TEMP	SALIN	CM-1	CM-2	HDW DISP EXCHG
				m^3/s	cfs	deg C	ppt			frac
HDWTR-1	1	Beech Creek	0	0.03200	1.12994	22.00	0.00	0.000	0.000	0.000

ENDATA20

$$$ DATA TYPE 21 (HEADWATER DATA FOR DO, BOD, AND NITROGEN) $$$

CARD TYPE	ELEMENT	NAME	DO	BOD#1	ORG-N	NH3-N	NO3-N	BOD2
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
HDWTR-2	1	Beech Creek	5.02	0.00	0.00	0.15	0.00	3.66

ENDATA21

$$$ DATA TYPE 22 (HEADWATER DATA FOR PHOSPHORUS, PHYTOPLANKTON, COLIFORM, AND NONCONSERVATIVES) $$$

CARD TYPE	ELEMENT	NAME	PO4-P	PHYTO CHL A	COLI	NCM	ORG-P
			mg/L	µg/L	#/100mL		mg/L

ENDATA22

$$$ DATA TYPE 23 (JUNCTION DATA) $$$

CARD TYPE	JUNCTION ELEMENT	UPSTRM ELEMENT	RIVER KILOM	NAME

ENDATA23

$$$ DATA TYPE 24 (WASTELOAD DATA FOR FLOW, TEMPERATURE, SALINITY, AND CONSERVATIVES) $$$

```
CARD TYPE  ELEMENT    RKILO  NAME                            FLOW        FLOW      FLOW    TEMP    SALIN      CM-1      CM-2
                                                             m³/s         cfs       MGD   deg C      ppt

ENDATA24

$$$ DATA TYPE 25 (WASTELOAD DATA FOR DO, BOD, AND NITROGEN) $$$
                                                                               % BOD                              %
CARD TYPE     ELEMENT   NAME                          DO        BOD      RMVL     ORG-N     NH3-N   NITRIF     NO3-N      BOD2
                                                    mg/L      mg/L              mg/L      mg/L               mg/L      mg/L

ENDATA25

$$$ DATA TYPE 26 (WASTELOAD DATA FOR PHOSPHORUS, PHYTOPLANTON, COLIFORM, AND NONCONSERVATIVES) $$$
                                                            PHYTO
CARD TYPE     ELEMENT   NAME                       PO4-P     CHL A      COLI       NCM     ORG-P
                                                    mg/L      μg/L   #/100mL              mg/L

ENDATA26

$$$ DATA TYPE 27 (LOWER BOUNDARY CONDITIONS) $$$

CARD TYPE    CONSTITUENT                    CONCENTRATION

ENDATA27

$$$ DATA TYPE 28 (DAM DATA) $$$

CARD TYPE     ELEMENT   NAME                  EQN      "A"       "B"       "H"

ENDATA28

$$$ DATA TYPE 29 (SENSITIVITY ANALYSIS DATA) $$$

CARD TYPE       PARAMETER     COL 1     COL 2     COL 3     COL 4     COL 5     COL 6     COL 7     COL 8

ENDATA29

$$$ DATA TYPE 30 (PLOT CONTROL CARDS) $$$

NUMBER OF PLOTS =  1
NUMBER OF REACHES IN PLOT 1 =   1
PLOT RCH  1
ENDATA30

$$$ DATA TYPE 31 (OVERLAY PLOT DATA) $$$
```

ENDATA31

.....NO ERRORS DETECTED IN INPUT DATA
.....HYDRAULIC CALCULATIONS COMPLETED
.....TRIDIAGONAL MATRIX TERMS INITIALIZED
.....OXYGEN DEPENDENT RATES CONVERGENT IN 1 ITERATIONS
.....CONSTITUENT CALCULATIONS COMPLETED
.....GRAPHICS DATA FOR PLOT 1 WRITTEN TO UNIT 11

FINAL REPORT Beech Creek LA-QUAL Model for Beech Creek upstream of Lake Columbia
REACH NO. 1 Beech Creek Winter projection to meet 5.0 mg/L DO at temp of 22 C

****************************** REACH INPUTS ******************************

ELEM NO.	TYPE	FLOW	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	PO4-P mg/L	CHL A µg/L	COLI #/100mL	NCM
1	HDWTR	0.03200	22.00	0.00	0.00	0.00	5.02	0.00	3.66	0.00	3.66	0.00	0.15	0.00	0.00	0.00	0.00	0.00
EACH	INCR	0.00038	22.00	0.00	0.00	0.00	5.02	0.00	3.66			0.00	0.15	0.00	0.00	0.00	0.00	

****************************** HYDRAULIC PARAMETER VALUES ******************************

ELEM NO.	BEGIN DIST km	ENDING DIST km	FLOW m³/s	PCT EFF	ADVCTV VELO m/s	TRAVEL TIME days	CUM TIME days	DEPTH m	WIDTH m	VOLUME m³	SURFACE AREA m²	X-SECT AREA m²	TIDAL PRISM m³	TIDAL VELO m/s	DISPRSN m²/s	MEAN VELO m/s
1	38.80	38.70	0.03238	0.0	0.01787	0.06	0.06	0.30	6.01	181.21	600.82	1.81	0.00	0.000	0.000	0.018
2	38.70	38.60	0.03276	0.0	0.01796	0.06	0.13	0.30	6.02	182.42	601.65	1.82	0.00	0.000	0.000	0.018
3	38.60	38.50	0.03313	0.0	0.01805	0.06	0.19	0.30	6.02	183.61	602.48	1.84	0.00	0.000	0.000	0.018
4	38.50	38.40	0.03351	0.0	0.01813	0.06	0.26	0.31	6.03	184.80	603.30	1.85	0.00	0.000	0.000	0.018
5	38.40	38.30	0.03389	0.0	0.01822	0.06	0.32	0.31	6.04	185.99	604.11	1.86	0.00	0.000	0.000	0.018
6	38.30	38.20	0.03427	0.0	0.01831	0.06	0.38	0.31	6.05	187.17	604.92	1.87	0.00	0.000	0.000	0.018
7	38.20	38.10	0.03465	0.0	0.01840	0.06	0.45	0.31	6.06	188.34	605.72	1.88	0.00	0.000	0.000	0.018
8	38.10	38.00	0.03502	0.0	0.01848	0.06	0.51	0.31	6.07	189.51	606.50	1.90	0.00	0.000	0.000	0.018
9	38.00	37.90	0.03540	0.0	0.01857	0.06	0.57	0.31	6.07	190.67	607.29	1.91	0.00	0.000	0.000	0.019
10	37.90	37.80	0.03578	0.0	0.01865	0.06	0.63	0.32	6.08	191.83	608.06	1.92	0.00	0.000	0.000	0.019
11	37.80	37.70	0.03616	0.0	0.01874	0.06	0.70	0.32	6.09	192.98	608.83	1.93	0.00	0.000	0.000	0.019
12	37.70	37.60	0.03653	0.0	0.01882	0.06	0.76	0.32	6.10	194.13	609.59	1.94	0.00	0.000	0.000	0.019
13	37.60	37.50	0.03691	0.0	0.01890	0.06	0.82	0.32	6.10	195.27	610.34	1.95	0.00	0.000	0.000	0.019
14	37.50	37.40	0.03729	0.0	0.01899	0.06	0.88	0.32	6.11	196.41	611.09	1.96	0.00	0.000	0.000	0.019
15	37.40	37.30	0.03767	0.0	0.01907	0.06	0.94	0.32	6.12	197.54	611.83	1.98	0.00	0.000	0.000	0.019
16	37.30	37.20	0.03805	0.0	0.01915	0.06	1.00	0.32	6.13	198.67	612.56	1.99	0.00	0.000	0.000	0.019
17	37.20	37.10	0.03842	0.0	0.01923	0.06	1.06	0.33	6.13	199.79	613.29	2.00	0.00	0.000	0.000	0.019

18	37.10	37.00	0.03880	0.0	0.01931	0.06	1.12	0.33	6.14	200.91	614.01	2.01	0.00	0.000	0.000	0.019
19	37.00	36.90	0.03918	0.0	0.01939	0.06	1.18	0.33	6.15	202.02	614.72	2.02	0.00	0.000	0.000	0.019
20	36.90	36.80	0.03956	0.0	0.01947	0.06	1.24	0.33	6.15	203.13	615.43	2.03	0.00	0.000	0.000	0.019
21	36.80	36.70	0.03994	0.0	0.01955	0.06	1.30	0.33	6.16	204.23	616.13	2.04	0.00	0.000	0.000	0.020
22	36.70	36.60	0.04031	0.0	0.01963	0.06	1.36	0.33	6.17	205.33	616.83	2.05	0.00	0.000	0.000	0.020
23	36.60	36.50	0.04069	0.0	0.01971	0.06	1.42	0.33	6.18	206.43	617.52	2.06	0.00	0.000	0.000	0.020
24	36.50	36.40	0.04107	0.0	0.01979	0.06	1.48	0.34	6.18	207.52	618.21	2.08	0.00	0.000	0.000	0.020
25	36.40	36.30	0.04145	0.0	0.01987	0.06	1.53	0.34	6.19	208.60	618.89	2.09	0.00	0.000	0.000	0.020
26	36.30	36.20	0.04183	0.0	0.01995	0.06	1.59	0.34	6.20	209.69	619.56	2.10	0.00	0.000	0.000	0.020
27	36.20	36.10	0.04220	0.0	0.02002	0.06	1.65	0.34	6.20	210.76	620.23	2.11	0.00	0.000	0.000	0.020
28	36.10	36.00	0.04258	0.0	0.02010	0.06	1.71	0.34	6.21	211.84	620.89	2.12	0.00	0.000	0.000	0.020
29	36.00	35.90	0.04296	0.0	0.02018	0.06	1.76	0.34	6.22	212.91	621.55	2.13	0.00	0.000	0.000	0.020
30	35.90	35.80	0.04334	0.0	0.02025	0.06	1.82	0.34	6.22	213.97	622.21	2.14	0.00	0.000	0.000	0.020
31	35.80	35.70	0.04372	0.0	0.02033	0.06	1.88	0.35	6.23	215.03	622.86	2.15	0.00	0.000	0.000	0.020
32	35.70	35.60	0.04409	0.0	0.02040	0.06	1.93	0.35	6.23	216.09	623.50	2.16	0.00	0.000	0.000	0.020
33	35.60	35.50	0.04447	0.0	0.02048	0.06	1.99	0.35	6.24	217.15	624.14	2.17	0.00	0.000	0.000	0.020
34	35.50	35.40	0.04485	0.0	0.02055	0.06	2.05	0.35	6.25	218.19	624.77	2.18	0.00	0.000	0.000	0.021
35	35.40	35.30	0.04523	0.0	0.02063	0.06	2.10	0.35	6.25	219.24	625.40	2.19	0.00	0.000	0.000	0.021
36	35.30	35.20	0.04560	0.0	0.02070	0.06	2.16	0.35	6.26	220.28	626.03	2.20	0.00	0.000	0.000	0.021
37	35.20	35.10	0.04598	0.0	0.02078	0.06	2.22	0.35	6.27	221.32	626.65	2.21	0.00	0.000	0.000	0.021
38	35.10	35.00	0.04636	0.0	0.02085	0.06	2.27	0.35	6.27	222.36	627.26	2.22	0.00	0.000	0.000	0.021
39	35.00	34.90	0.04674	0.0	0.02092	0.06	2.33	0.36	6.28	223.39	627.87	2.23	0.00	0.000	0.000	0.021
40	34.90	34.80	0.04712	0.0	0.02100	0.06	2.38	0.36	6.28	224.42	628.48	2.24	0.00	0.000	0.000	0.021
41	34.80	34.70	0.04749	0.0	0.02107	0.05	2.44	0.36	6.29	225.44	629.08	2.25	0.00	0.000	0.000	0.021
42	34.70	34.60	0.04787	0.0	0.02114	0.05	2.49	0.36	6.30	226.46	629.68	2.26	0.00	0.000	0.000	0.021
43	34.60	34.50	0.04825	0.0	0.02121	0.05	2.55	0.36	6.30	227.48	630.28	2.27	0.00	0.000	0.000	0.021
44	34.50	34.40	0.04863	0.0	0.02128	0.05	2.60	0.36	6.31	228.49	630.87	2.28	0.00	0.000	0.000	0.021
45	34.40	34.30	0.04901	0.0	0.02135	0.05	2.65	0.36	6.31	229.50	631.45	2.30	0.00	0.000	0.000	0.021
46	34.30	34.20	0.04938	0.0	0.02142	0.05	2.71	0.36	6.32	230.51	632.04	2.31	0.00	0.000	0.000	0.021
47	34.20	34.10	0.04976	0.0	0.02149	0.05	2.76	0.37	6.33	231.51	632.61	2.32	0.00	0.000	0.000	0.021
48	34.10	34.00	0.05014	0.0	0.02156	0.05	2.82	0.37	6.33	232.51	633.19	2.33	0.00	0.000	0.000	0.022
49	34.00	33.90	0.05052	0.0	0.02163	0.05	2.87	0.37	6.34	233.51	633.76	2.34	0.00	0.000	0.000	0.022
50	33.90	33.80	0.05090	0.0	0.02170	0.05	2.92	0.37	6.34	234.51	634.33	2.35	0.00	0.000	0.000	0.022
51	33.80	33.70	0.05127	0.0	0.02177	0.05	2.98	0.37	6.35	235.50	634.89	2.35	0.00	0.000	0.000	0.022
52	33.70	33.60	0.05165	0.0	0.02184	0.05	3.03	0.37	6.35	236.48	635.45	2.36	0.00	0.000	0.000	0.022
53	33.60	33.50	0.05203	0.0	0.02191	0.05	3.08	0.37	6.36	237.47	636.01	2.37	0.00	0.000	0.000	0.022
54	33.50	33.40	0.05241	0.0	0.02198	0.05	3.13	0.37	6.37	238.45	636.56	2.38	0.00	0.000	0.000	0.022
55	33.40	33.30	0.05278	0.0	0.02205	0.05	3.19	0.38	6.37	239.43	637.11	2.39	0.00	0.000	0.000	0.022
56	33.30	33.20	0.05316	0.0	0.02211	0.05	3.24	0.38	6.38	240.40	637.65	2.40	0.00	0.000	0.000	0.022
57	33.20	33.10	0.05354	0.0	0.02218	0.05	3.29	0.38	6.38	241.38	638.20	2.41	0.00	0.000	0.000	0.022
58	33.10	33.00	0.05392	0.0	0.02225	0.05	3.34	0.38	6.39	242.35	638.73	2.42	0.00	0.000	0.000	0.022
59	33.00	32.90	0.05430	0.0	0.02232	0.05	3.40	0.38	6.39	243.31	639.27	2.43	0.00	0.000	0.000	0.022
60	32.90	32.80	0.05467	0.0	0.02238	0.05	3.45	0.38	6.40	244.28	639.80	2.44	0.00	0.000	0.000	0.022
61	32.80	32.70	0.05505	0.0	0.02245	0.05	3.50	0.38	6.40	245.24	640.33	2.45	0.00	0.000	0.000	0.022
62	32.70	32.60	0.05543	0.0	0.02251	0.05	3.55	0.38	6.41	246.20	640.86	2.46	0.00	0.000	0.000	0.023
63	32.60	32.50	0.05581	0.0	0.02258	0.05	3.60	0.39	6.41	247.15	641.38	2.47	0.00	0.000	0.000	0.023
64	32.50	32.40	0.05619	0.0	0.02265	0.05	3.65	0.39	6.42	248.10	641.90	2.48	0.00	0.000	0.000	0.023
65	32.40	32.30	0.05656	0.0	0.02271	0.05	3.70	0.39	6.42	249.05	642.42	2.49	0.00	0.000	0.000	0.023

66	32.30	32.20	0.05694	0.0	0.02278	0.05	3.75	0.39	6.43	250.00	642.93	2.50	0.00	0.000	0.000	0.023
67	32.20	32.10	0.05732	0.0	0.02284	0.05	3.80	0.39	6.43	250.95	643.44	2.51	0.00	0.000	0.000	0.023
68	32.10	32.00	0.05770	0.0	0.02291	0.05	3.86	0.39	6.44	251.89	643.95	2.52	0.00	0.000	0.000	0.023
69	32.00	31.90	0.05808	0.0	0.02297	0.05	3.91	0.39	6.44	252.83	644.45	2.53	0.00	0.000	0.000	0.023
70	31.90	31.80	0.05845	0.0	0.02303	0.05	3.96	0.39	6.45	253.76	644.95	2.54	0.00	0.000	0.000	0.023
71	31.80	31.70	0.05883	0.0	0.02310	0.05	4.01	0.39	6.45	254.70	645.45	2.55	0.00	0.000	0.000	0.023
72	31.70	31.60	0.05921	0.0	0.02316	0.05	4.06	0.40	6.46	255.63	645.95	2.56	0.00	0.000	0.000	0.023
73	31.60	31.50	0.05959	0.0	0.02323	0.05	4.11	0.40	6.46	256.56	646.44	2.57	0.00	0.000	0.000	0.023
74	31.50	31.40	0.05997	0.0	0.02329	0.05	4.16	0.40	6.47	257.48	646.93	2.57	0.00	0.000	0.000	0.023
75	31.40	31.30	0.06034	0.0	0.02335	0.05	4.20	0.40	6.47	258.41	647.42	2.58	0.00	0.000	0.000	0.023
76	31.30	31.20	0.06072	0.0	0.02341	0.05	4.25	0.40	6.48	259.33	647.91	2.59	0.00	0.000	0.000	0.023
77	31.20	31.10	0.06110	0.0	0.02348	0.05	4.30	0.40	6.48	260.25	648.39	2.60	0.00	0.000	0.000	0.023
78	31.10	31.00	0.06148	0.0	0.02354	0.05	4.35	0.40	6.49	261.16	648.87	2.61	0.00	0.000	0.000	0.024
79	31.00	30.90	0.06185	0.0	0.02360	0.05	4.40	0.40	6.49	262.08	649.35	2.62	0.00	0.000	0.000	0.024
80	30.90	30.80	0.06223	0.0	0.02366	0.05	4.45	0.40	6.50	262.99	649.82	2.63	0.00	0.000	0.000	0.024
81	30.80	30.70	0.06261	0.0	0.02373	0.05	4.50	0.41	6.50	263.90	650.29	2.64	0.00	0.000	0.000	0.024
82	30.70	30.60	0.06299	0.0	0.02379	0.05	4.55	0.41	6.51	264.80	650.76	2.65	0.00	0.000	0.000	0.024
83	30.60	30.50	0.06337	0.0	0.02385	0.05	4.60	0.41	6.51	265.71	651.23	2.66	0.00	0.000	0.000	0.024
84	30.50	30.40	0.06374	0.0	0.02391	0.05	4.65	0.41	6.52	266.61	651.70	2.67	0.00	0.000	0.000	0.024
85	30.40	30.30	0.06412	0.0	0.02397	0.05	4.69	0.41	6.52	267.51	652.16	2.68	0.00	0.000	0.000	0.024
86	30.30	30.20	0.06450	0.0	0.02403	0.05	4.74	0.41	6.53	268.41	652.62	2.68	0.00	0.000	0.000	0.024
87	30.20	30.10	0.06488	0.0	0.02409	0.05	4.79	0.41	6.53	269.30	653.08	2.69	0.00	0.000	0.000	0.024
88	30.10	30.00	0.06526	0.0	0.02415	0.05	4.84	0.41	6.54	270.20	653.53	2.70	0.00	0.000	0.000	0.024
89	30.00	29.90	0.06563	0.0	0.02421	0.05	4.89	0.41	6.54	271.09	653.98	2.71	0.00	0.000	0.000	0.024
90	29.90	29.80	0.06601	0.0	0.02427	0.05	4.93	0.42	6.54	271.98	654.43	2.72	0.00	0.000	0.000	0.024
91	29.80	29.70	0.06639	0.0	0.02433	0.05	4.98	0.42	6.55	272.86	654.88	2.73	0.00	0.000	0.000	0.024
92	29.70	29.60	0.06677	0.0	0.02439	0.05	5.03	0.42	6.55	273.75	655.33	2.74	0.00	0.000	0.000	0.024
93	29.60	29.50	0.06715	0.0	0.02445	0.05	5.08	0.42	6.56	274.63	655.77	2.75	0.00	0.000	0.000	0.024
94	29.50	29.40	0.06752	0.0	0.02451	0.05	5.12	0.42	6.56	275.51	656.21	2.76	0.00	0.000	0.000	0.025
95	29.40	29.30	0.06790	0.0	0.02457	0.05	5.17	0.42	6.57	276.39	656.65	2.76	0.00	0.000	0.000	0.025
96	29.30	29.20	0.06828	0.0	0.02463	0.05	5.22	0.42	6.57	277.26	657.09	2.77	0.00	0.000	0.000	0.025
97	29.20	29.10	0.06866	0.0	0.02468	0.05	5.26	0.42	6.58	278.14	657.53	2.78	0.00	0.000	0.000	0.025
98	29.10	29.00	0.06904	0.0	0.02474	0.05	5.31	0.42	6.58	279.01	657.96	2.79	0.00	0.000	0.000	0.025
99	29.00	28.90	0.06941	0.0	0.02480	0.05	5.36	0.43	6.58	279.88	658.39	2.80	0.00	0.000	0.000	0.025
100	28.90	28.80	0.06979	0.0	0.02486	0.05	5.40	0.43	6.59	280.74	658.82	2.81	0.00	0.000	0.000	0.025
101	28.80	28.70	0.07017	0.0	0.02492	0.05	5.45	0.43	6.59	281.61	659.25	2.82	0.00	0.000	0.000	0.025
102	28.70	28.60	0.07055	0.0	0.02497	0.05	5.50	0.43	6.60	282.47	659.67	2.82	0.00	0.000	0.000	0.025
103	28.60	28.50	0.07092	0.0	0.02503	0.05	5.54	0.43	6.60	283.34	660.10	2.83	0.00	0.000	0.000	0.025
104	28.50	28.40	0.07130	0.0	0.02509	0.05	5.59	0.43	6.61	284.19	660.52	2.84	0.00	0.000	0.000	0.025
105	28.40	28.30	0.07168	0.0	0.02515	0.05	5.63	0.43	6.61	285.05	660.94	2.85	0.00	0.000	0.000	0.025
106	28.30	28.20	0.07206	0.0	0.02520	0.05	5.68	0.43	6.61	285.91	661.35	2.86	0.00	0.000	0.000	0.025
107	28.20	28.10	0.07244	0.0	0.02526	0.05	5.73	0.43	6.62	286.76	661.77	2.87	0.00	0.000	0.000	0.025
108	28.10	28.00	0.07281	0.0	0.02532	0.05	5.77	0.43	6.62	287.61	662.18	2.88	0.00	0.000	0.000	0.025
109	28.00	27.90	0.07319	0.0	0.02537	0.05	5.82	0.44	6.63	288.46	662.59	2.88	0.00	0.000	0.000	0.025
110	27.90	27.80	0.07357	0.0	0.02543	0.05	5.86	0.44	6.63	289.31	663.00	2.89	0.00	0.000	0.000	0.025
111	27.80	27.70	0.07395	0.0	0.02549	0.05	5.91	0.44	6.63	290.16	663.41	2.90	0.00	0.000	0.000	0.025
112	27.70	27.60	0.07433	0.0	0.02554	0.05	5.95	0.44	6.64	291.00	663.82	2.91	0.00	0.000	0.000	0.026
113	27.60	27.50	0.07470	0.0	0.02560	0.05	6.00	0.44	6.64	291.84	664.22	2.92	0.00	0.000	0.000	0.026

114	27.50	27.40	0.07508	0.0	0.02565	0.05	6.04	0.44	6.65	292.68	664.62	2.93	0.00	0.000	0.000	0.026
115	27.40	27.30	0.07546	0.0	0.02571	0.05	6.09	0.44	6.65	293.52	665.02	2.94	0.00	0.000	0.000	0.026
116	27.30	27.20	0.07584	0.0	0.02576	0.04	6.13	0.44	6.65	294.36	665.42	2.94	0.00	0.000	0.000	0.026
117	27.20	27.10	0.07622	0.0	0.02582	0.04	6.18	0.44	6.66	295.20	665.82	2.95	0.00	0.000	0.000	0.026
118	27.10	27.00	0.07659	0.0	0.02587	0.04	6.22	0.44	6.66	296.03	666.21	2.96	0.00	0.000	0.000	0.026
119	27.00	26.90	0.07697	0.0	0.02593	0.04	6.27	0.45	6.67	296.86	666.61	2.97	0.00	0.000	0.000	0.026
120	26.90	26.80	0.07735	0.0	0.02598	0.04	6.31	0.45	6.67	297.69	667.00	2.98	0.00	0.000	0.000	0.026
121	26.80	26.70	0.07773	0.0	0.02604	0.04	6.36	0.45	6.67	298.52	667.39	2.99	0.00	0.000	0.000	0.026
122	26.70	26.60	0.07810	0.0	0.02609	0.04	6.40	0.45	6.68	299.35	667.78	2.99	0.00	0.000	0.000	0.026
123	26.60	26.50	0.07848	0.0	0.02615	0.04	6.45	0.45	6.68	300.17	668.17	3.00	0.00	0.000	0.000	0.026
124	26.50	26.40	0.07886	0.0	0.02620	0.04	6.49	0.45	6.69	300.99	668.55	3.01	0.00	0.000	0.000	0.026
125	26.40	26.30	0.07924	0.0	0.02625	0.04	6.53	0.45	6.69	301.81	668.93	3.02	0.00	0.000	0.000	0.026
126	26.30	26.20	0.07962	0.0	0.02631	0.04	6.58	0.45	6.69	302.63	669.32	3.03	0.00	0.000	0.000	0.026
127	26.20	26.10	0.07999	0.0	0.02636	0.04	6.62	0.45	6.70	303.45	669.70	3.03	0.00	0.000	0.000	0.026
128	26.10	26.00	0.08037	0.0	0.02641	0.04	6.67	0.45	6.70	304.27	670.08	3.04	0.00	0.000	0.000	0.026
129	26.00	25.90	0.08075	0.0	0.02647	0.04	6.71	0.46	6.70	305.08	670.45	3.05	0.00	0.000	0.000	0.026
130	25.90	25.80	0.08113	0.0	0.02652	0.04	6.75	0.46	6.71	305.90	670.83	3.06	0.00	0.000	0.000	0.027
131	25.80	25.70	0.08151	0.0	0.02657	0.04	6.80	0.46	6.71	306.71	671.20	3.07	0.00	0.000	0.000	0.027
132	25.70	25.60	0.08188	0.0	0.02663	0.04	6.84	0.46	6.72	307.52	671.58	3.08	0.00	0.000	0.000	0.027
133	25.60	25.50	0.08226	0.0	0.02668	0.04	6.88	0.46	6.72	308.33	671.95	3.08	0.00	0.000	0.000	0.027
134	25.50	25.40	0.08264	0.0	0.02673	0.04	6.93	0.46	6.72	309.13	672.32	3.09	0.00	0.000	0.000	0.027
135	25.40	25.30	0.08302	0.0	0.02679	0.04	6.97	0.46	6.73	309.94	672.69	3.10	0.00	0.000	0.000	0.027
136	25.30	25.20	0.08340	0.0	0.02684	0.04	7.01	0.46	6.73	310.74	673.05	3.11	0.00	0.000	0.000	0.027
137	25.20	25.10	0.08377	0.0	0.02689	0.04	7.06	0.46	6.73	311.54	673.42	3.12	0.00	0.000	0.000	0.027
138	25.10	25.00	0.08415	0.0	0.02694	0.04	7.10	0.46	6.74	312.34	673.78	3.12	0.00	0.000	0.000	0.027
139	25.00	24.90	0.08453	0.0	0.02699	0.04	7.14	0.46	6.74	313.14	674.14	3.13	0.00	0.000	0.000	0.027
140	24.90	24.80	0.08491	0.0	0.02705	0.04	7.19	0.47	6.75	313.94	674.50	3.14	0.00	0.000	0.000	0.027
141	24.80	24.70	0.08529	0.0	0.02710	0.04	7.23	0.47	6.75	314.73	674.86	3.15	0.00	0.000	0.000	0.027
142	24.70	24.60	0.08566	0.0	0.02715	0.04	7.27	0.47	6.75	315.53	675.22	3.16	0.00	0.000	0.000	0.027
143	24.60	24.50	0.08604	0.0	0.02720	0.04	7.31	0.47	6.76	316.32	675.58	3.16	0.00	0.000	0.000	0.027
144	24.50	24.40	0.08642	0.0	0.02725	0.04	7.36	0.47	6.76	317.11	675.93	3.17	0.00	0.000	0.000	0.027
145	24.40	24.30	0.08680	0.0	0.02730	0.04	7.40	0.47	6.76	317.90	676.29	3.18	0.00	0.000	0.000	0.027
146	24.30	24.20	0.08717	0.0	0.02735	0.04	7.44	0.47	6.77	318.69	676.64	3.19	0.00	0.000	0.000	0.027
147	24.20	24.10	0.08755	0.0	0.02740	0.04	7.48	0.47	6.77	319.48	676.99	3.19	0.00	0.000	0.000	0.027
148	24.10	24.00	0.08793	0.0	0.02746	0.04	7.52	0.47	6.77	320.26	677.34	3.20	0.00	0.000	0.000	0.027
149	24.00	23.90	0.08831	0.0	0.02751	0.04	7.57	0.47	6.78	321.05	677.69	3.21	0.00	0.000	0.000	0.028
150	23.90	23.80	0.08869	0.0	0.02756	0.04	7.61	0.47	6.78	321.83	678.04	3.22	0.00	0.000	0.000	0.028
151	23.80	23.70	0.08906	0.0	0.02761	0.04	7.65	0.48	6.78	322.61	678.38	3.23	0.00	0.000	0.000	0.028
152	23.70	23.60	0.08944	0.0	0.02766	0.04	7.69	0.48	6.79	323.39	678.73	3.23	0.00	0.000	0.000	0.028
153	23.60	23.50	0.08982	0.0	0.02771	0.04	7.73	0.48	6.79	324.17	679.07	3.24	0.00	0.000	0.000	0.028
154	23.50	23.40	0.09020	0.0	0.02776	0.04	7.78	0.48	6.79	324.94	679.41	3.25	0.00	0.000	0.000	0.028
155	23.40	23.30	0.09058	0.0	0.02781	0.04	7.82	0.48	6.80	325.72	679.76	3.26	0.00	0.000	0.000	0.028
156	23.30	23.20	0.09095	0.0	0.02786	0.04	7.86	0.48	6.80	326.49	680.10	3.26	0.00	0.000	0.000	0.028
157	23.20	23.10	0.09133	0.0	0.02791	0.04	7.90	0.48	6.80	327.27	680.43	3.27	0.00	0.000	0.000	0.028
158	23.10	23.00	0.09171	0.0	0.02796	0.04	7.94	0.48	6.81	328.04	680.77	3.28	0.00	0.000	0.000	0.028
159	23.00	22.90	0.09209	0.0	0.02801	0.04	7.98	0.48	6.81	328.81	681.11	3.29	0.00	0.000	0.000	0.028
160	22.90	22.80	0.09247	0.0	0.02806	0.04	8.02	0.48	6.81	329.57	681.44	3.30	0.00	0.000	0.000	0.028
161	22.80	22.70	0.09284	0.0	0.02811	0.04	8.07	0.48	6.82	330.34	681.78	3.30	0.00	0.000	0.000	0.028

162	22.70	22.60	0.09322	0.0	0.02815	0.04	8.11	0.49	6.82	331.11	682.11	3.31	0.00	0.000	0.000	0.028
163	22.60	22.50	0.09360	0.0	0.02820	0.04	8.15	0.49	6.82	331.87	682.44	3.32	0.00	0.000	0.000	0.028
164	22.50	22.40	0.09398	0.0	0.02825	0.04	8.19	0.49	6.83	332.64	682.77	3.33	0.00	0.000	0.000	0.028
165	22.40	22.30	0.09435	0.0	0.02830	0.04	8.23	0.49	6.83	333.40	683.10	3.33	0.00	0.000	0.000	0.028
166	22.30	22.20	0.09473	0.0	0.02835	0.04	8.27	0.49	6.83	334.16	683.43	3.34	0.00	0.000	0.000	0.028
167	22.20	22.10	0.09511	0.0	0.02840	0.04	8.31	0.49	6.84	334.92	683.75	3.35	0.00	0.000	0.000	0.028
168	22.10	22.00	0.09549	0.0	0.02845	0.04	8.35	0.49	6.84	335.67	684.08	3.36	0.00	0.000	0.000	0.028
169	22.00	21.90	0.09587	0.0	0.02850	0.04	8.39	0.49	6.84	336.43	684.40	3.36	0.00	0.000	0.000	0.028
170	21.90	21.80	0.09624	0.0	0.02854	0.04	8.43	0.49	6.85	337.19	684.73	3.37	0.00	0.000	0.000	0.029
171	21.80	21.70	0.09662	0.0	0.02859	0.04	8.47	0.49	6.85	337.94	685.05	3.38	0.00	0.000	0.000	0.029
172	21.70	21.60	0.09700	0.0	0.02864	0.04	8.51	0.49	6.85	338.69	685.37	3.39	0.00	0.000	0.000	0.029
TOT						8.51				45743.36	111752.21					
AVG					0.0234			0.41	6.50			2.66				

*** BIOLOGICAL AND PHYSICAL COEFFICIENTS ***

ELEM NO.	ENDING DIST	SAT D.O. mg/L	REAER RATE 1/da	BOD1 DECAY 1/da	BOD1 SETT 1/da	ABOD1 DECAY 1/da	BOD1 HYDR 1/da	BOD2 DECAY 1/da	BOD2 SETT 1/da	ABOD2 DECAY 1/da	BKGD SOD *	FULL SOD *	CORR SOD *	ORG-N HYDR 1/da	ORG-N SETT 1/da	NH3-N DECAY 1/da	NH3-N SRCE *	DENIT RATE 1/da	ORG-P HYDR 1/da	ORG-P SETT 1/da	PO4 SRCE *	PHYTO PROD **	PERIP PROD **	COLI DECAY 1/da	NCM DECAY 1/da	NCM SETT 1/da
1	38.700	8.74	3.17	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	38.600	8.74	3.16	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	38.500	8.74	3.15	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	38.400	8.74	3.13	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	38.300	8.74	3.12	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	38.200	8.74	3.11	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	38.100	8.74	3.10	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	38.000	8.74	3.09	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	37.900	8.74	3.08	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	37.800	8.74	3.07	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	37.700	8.74	3.06	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	37.600	8.74	3.05	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	37.500	8.74	3.04	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	37.400	8.74	3.03	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	37.300	8.74	3.02	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	37.200	8.74	3.01	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	37.100	8.74	3.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	37.000	8.74	2.99	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	36.900	8.74	2.98	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	36.800	8.74	2.97	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	36.700	8.74	2.96	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	36.600	8.74	2.95	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	36.500	8.74	2.94	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	36.400	8.74	2.93	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	36.300	8.74	2.92	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	36.200	8.74	2.92	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

27	36.100	8.74	2.91	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	36.000	8.74	2.90	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	35.900	8.74	2.89	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	35.800	8.74	2.88	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	35.700	8.74	2.88	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	35.600	8.74	2.87	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	35.500	8.74	2.86	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	35.400	8.74	2.85	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	35.300	8.74	2.84	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	35.200	8.74	2.84	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	35.100	8.74	2.83	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	35.000	8.74	2.82	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	34.900	8.74	2.81	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	34.800	8.74	2.81	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	34.700	8.74	2.80	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	34.600	8.74	2.79	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	34.500	8.74	2.79	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	34.400	8.74	2.78	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	34.300	8.74	2.77	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	34.200	8.74	2.77	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	34.100	8.74	2.76	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	34.000	8.74	2.75	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	33.900	8.74	2.75	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	33.800	8.74	2.74	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
51	33.700	8.74	2.73	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	33.600	8.74	2.73	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
53	33.500	8.74	2.72	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	33.400	8.74	2.72	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	33.300	8.74	2.71	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	33.200	8.74	2.70	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	33.100	8.74	2.70	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	33.000	8.74	2.69	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	32.900	8.74	2.69	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	32.800	8.74	2.68	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	32.700	8.74	2.67	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	32.600	8.74	2.67	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	32.500	8.74	2.66	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
64	32.400	8.74	2.66	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	32.300	8.74	2.65	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	32.200	8.74	2.65	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
67	32.100	8.74	2.64	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	32.000	8.74	2.64	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
69	31.900	8.74	2.63	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	31.800	8.74	2.62	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
71	31.700	8.74	2.62	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	31.600	8.74	2.61	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73	31.500	8.74	2.61	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	31.400	8.74	2.60	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

75	31.300	8.74	2.60	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	31.200	8.74	2.59	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
77	31.100	8.74	2.59	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	31.000	8.74	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	30.900	8.74	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	30.800	8.74	2.58	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
81	30.700	8.74	2.57	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	30.600	8.74	2.57	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
83	30.500	8.74	2.56	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	30.400	8.74	2.56	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	30.300	8.74	2.55	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	30.200	8.74	2.55	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	30.100	8.74	2.54	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	30.000	8.74	2.54	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	29.900	8.74	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	29.800	8.74	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	29.700	8.74	2.53	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	29.600	8.74	2.52	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	29.500	8.74	2.52	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	29.400	8.74	2.51	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	29.300	8.74	2.51	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	29.200	8.74	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	29.100	8.74	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	29.000	8.74	2.50	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	28.900	8.74	2.49	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	28.800	8.74	2.49	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	28.700	8.74	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	28.600	8.74	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	28.500	8.74	2.48	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	28.400	8.74	2.47	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	28.300	8.74	2.47	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	28.200	8.74	2.46	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	28.100	8.74	2.46	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
108	28.000	8.74	2.46	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	27.900	8.74	2.45	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	27.800	8.74	2.45	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	27.700	8.74	2.44	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	27.600	8.74	2.44	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	27.500	8.74	2.44	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	27.400	8.74	2.43	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	27.300	8.74	2.43	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	27.200	8.74	2.43	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	27.100	8.74	2.42	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118	27.000	8.74	2.42	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	26.900	8.74	2.42	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	26.800	8.74	2.41	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	26.700	8.74	2.41	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
122	26.600	8.74	2.41	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

123	26.500	8.74	2.40	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
124	26.400	8.74	2.40	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	26.300	8.74	2.40	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126	26.200	8.74	2.39	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
127	26.100	8.74	2.39	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	26.000	8.74	2.39	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	25.900	8.74	2.38	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	25.800	8.74	2.38	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
131	25.700	8.74	2.38	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
132	25.600	8.74	2.37	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
133	25.500	8.74	2.37	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
134	25.400	8.74	2.37	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
135	25.300	8.74	2.36	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
136	25.200	8.74	2.36	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
137	25.100	8.74	2.36	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
138	25.000	8.74	2.35	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
139	24.900	8.74	2.35	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140	24.800	8.74	2.35	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
141	24.700	8.74	2.34	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
142	24.600	8.74	2.34	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
143	24.500	8.74	2.34	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
144	24.400	8.74	2.34	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
145	24.300	8.74	2.33	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
146	24.200	8.74	2.33	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
147	24.100	8.74	2.33	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
148	24.000	8.74	2.32	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
149	23.900	8.74	2.32	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	23.800	8.74	2.32	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
151	23.700	8.74	2.31	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
152	23.600	8.74	2.31	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
153	23.500	8.74	2.31	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
154	23.400	8.74	2.31	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
155	23.300	8.74	2.30	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
156	23.200	8.74	2.30	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
157	23.100	8.74	2.30	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
158	23.000	8.74	2.30	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	22.900	8.74	2.29	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	22.800	8.74	2.29	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	22.700	8.74	2.29	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
162	22.600	8.74	2.28	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
163	22.500	8.74	2.28	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
164	22.400	8.74	2.28	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
165	22.300	8.74	2.28	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
166	22.200	8.74	2.27	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	22.100	8.74	2.27	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
168	22.000	8.74	2.27	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
169	21.900	8.74	2.27	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170	21.800	8.74	2.26	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

171	21.700	8.74	2.26	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
172	21.600	8.74	2.26	0.00	0.00	0.00	0.00	0.22	0.00	0.00	3.31	3.31	3.31	0.00	0.00	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AVG 20 DEG C RATE			2.50	0.00	0.00	0.00	0.00	0.20	0.00	0.00	2.91			0.00	0.00	0.20	0.01	0.00	0.00	0.00	0.00			0.00	0.00	0.00

* g/m²/d ** mg/L/day

** WATER QUALITY CONSTITUENT VALUES **

ELEM NO.	ENDING DIST	TEMP deg C	SALN ppt	CM-1	CM-2	DO mg/L	BOD1 mg/L	BOD2 mg/L	EBOD1 mg/L	EBOD2 mg/L	ORG-N mg/L	NH3-N mg/L	NO3-N mg/L	TOT-N mg/L	EORG-N mg/L	ETOT-N mg/L	ORG-P mg/L	PO4-P mg/L	TOT-P mg/L	EORG-P mg/L	ETOT-P mg/L	CHL A µg/L
1	38.700	22.00	0.00	1.00	0.00	5.01	0.00	3.67	0.00	3.67	0.00	0.15	0.00	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
2	38.600	22.00	0.00	1.00	0.00	5.01	0.00	3.68	0.00	3.68	0.00	0.15	0.00	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
3	38.500	22.00	0.00	1.00	0.00	5.01	0.00	3.70	0.00	3.70	0.00	0.15	0.01	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
4	38.400	22.00	0.00	1.00	0.00	5.00	0.00	3.71	0.00	3.71	0.00	0.15	0.01	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
5	38.300	22.00	0.00	1.00	0.00	5.00	0.00	3.72	0.00	3.72	0.00	0.15	0.01	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
6	38.200	22.00	0.00	1.00	0.00	5.00	0.00	3.73	0.00	3.73	0.00	0.15	0.01	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
7	38.100	22.00	0.00	1.00	0.00	5.00	0.00	3.74	0.00	3.74	0.00	0.15	0.01	0.16	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.0
8	38.000	22.00	0.00	1.00	0.00	5.00	0.00	3.75	0.00	3.75	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
9	37.900	22.00	0.00	1.00	0.00	5.00	0.00	3.76	0.00	3.76	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
10	37.800	22.00	0.00	1.00	0.00	5.01	0.00	3.76	0.00	3.76	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
11	37.700	22.00	0.00	1.00	0.00	5.01	0.00	3.77	0.00	3.77	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
12	37.600	22.00	0.00	1.00	0.00	5.01	0.00	3.78	0.00	3.78	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
13	37.500	22.00	0.00	1.00	0.00	5.01	0.00	3.78	0.00	3.78	0.00	0.15	0.02	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
14	37.400	22.00	0.00	1.00	0.00	5.01	0.00	3.79	0.00	3.79	0.00	0.15	0.03	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
15	37.300	22.00	0.00	1.00	0.00	5.02	0.00	3.79	0.00	3.79	0.00	0.15	0.03	0.17	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.0
16	37.200	22.00	0.00	1.00	0.00	5.02	0.00	3.80	0.00	3.80	0.00	0.15	0.03	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
17	37.100	22.00	0.00	1.00	0.00	5.02	0.00	3.80	0.00	3.80	0.00	0.15	0.03	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
18	37.000	22.00	0.00	1.00	0.00	5.02	0.00	3.81	0.00	3.81	0.00	0.14	0.03	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
19	36.900	22.00	0.00	1.00	0.00	5.03	0.00	3.81	0.00	3.81	0.00	0.14	0.03	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
20	36.800	22.00	0.00	1.00	0.00	5.03	0.00	3.81	0.00	3.81	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
21	36.700	22.00	0.00	1.00	0.00	5.03	0.00	3.81	0.00	3.81	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
22	36.600	22.00	0.00	1.00	0.00	5.03	0.00	3.82	0.00	3.82	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
23	36.500	22.00	0.00	1.00	0.00	5.04	0.00	3.82	0.00	3.82	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
24	36.400	22.00	0.00	1.00	0.00	5.04	0.00	3.82	0.00	3.82	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
25	36.300	22.00	0.00	1.00	0.00	5.04	0.00	3.82	0.00	3.82	0.00	0.14	0.04	0.18	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.0
26	36.200	22.00	0.00	1.00	0.00	5.04	0.00	3.82	0.00	3.82	0.00	0.14	0.04	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
27	36.100	22.00	0.00	1.00	0.00	5.05	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
28	36.000	22.00	0.00	1.00	0.00	5.05	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
29	35.900	22.00	0.00	1.00	0.00	5.05	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
30	35.800	22.00	0.00	1.00	0.00	5.05	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
31	35.700	22.00	0.00	1.00	0.00	5.06	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
32	35.600	22.00	0.00	1.00	0.00	5.06	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
33	35.500	22.00	0.00	1.00	0.00	5.06	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
34	35.400	22.00	0.00	1.00	0.00	5.06	0.00	3.82	0.00	3.82	0.00	0.14	0.05	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
35	35.300	22.00	0.00	1.00	0.00	5.07	0.00	3.82	0.00	3.82	0.00	0.14	0.06	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0

36	35.200	22.00	0.00	1.00	0.00	5.07	0.00	3.82	0.00	3.82	0.00	0.14	0.06	0.19	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.0
37	35.100	22.00	0.00	1.00	0.00	5.07	0.00	3.82	0.00	3.82	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
38	35.000	22.00	0.00	1.00	0.00	5.08	0.00	3.82	0.00	3.82	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
39	34.900	22.00	0.00	1.00	0.00	5.08	0.00	3.81	0.00	3.81	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
40	34.800	22.00	0.00	1.00	0.00	5.08	0.00	3.81	0.00	3.81	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
41	34.700	22.00	0.00	1.00	0.00	5.08	0.00	3.81	0.00	3.81	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
42	34.600	22.00	0.00	1.00	0.00	5.09	0.00	3.81	0.00	3.81	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
43	34.500	22.00	0.00	1.00	0.00	5.09	0.00	3.81	0.00	3.81	0.00	0.14	0.06	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
44	34.400	22.00	0.00	1.00	0.00	5.09	0.00	3.80	0.00	3.80	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
45	34.300	22.00	0.00	1.00	0.00	5.09	0.00	3.80	0.00	3.80	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
46	34.200	22.00	0.00	1.00	0.00	5.10	0.00	3.80	0.00	3.80	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
47	34.100	22.00	0.00	1.00	0.00	5.10	0.00	3.80	0.00	3.80	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
48	34.000	22.00	0.00	1.00	0.00	5.10	0.00	3.79	0.00	3.79	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
49	33.900	22.00	0.00	1.00	0.00	5.11	0.00	3.79	0.00	3.79	0.00	0.13	0.07	0.20	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.0
50	33.800	22.00	0.00	1.00	0.00	5.11	0.00	3.79	0.00	3.79	0.00	0.13	0.07	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
51	33.700	22.00	0.00	1.00	0.00	5.11	0.00	3.78	0.00	3.78	0.00	0.13	0.07	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
52	33.600	22.00	0.00	1.00	0.00	5.11	0.00	3.78	0.00	3.78	0.00	0.13	0.07	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
53	33.500	22.00	0.00	1.00	0.00	5.12	0.00	3.78	0.00	3.78	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
54	33.400	22.00	0.00	1.00	0.00	5.12	0.00	3.77	0.00	3.77	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
55	33.300	22.00	0.00	1.00	0.00	5.12	0.00	3.77	0.00	3.77	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
56	33.200	22.00	0.00	1.00	0.00	5.12	0.00	3.76	0.00	3.76	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
57	33.100	22.00	0.00	1.00	0.00	5.13	0.00	3.76	0.00	3.76	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
58	33.000	22.00	0.00	1.00	0.00	5.13	0.00	3.76	0.00	3.76	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
59	32.900	22.00	0.00	1.00	0.00	5.13	0.00	3.75	0.00	3.75	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
60	32.800	22.00	0.00	1.00	0.00	5.13	0.00	3.75	0.00	3.75	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
61	32.700	22.00	0.00	1.00	0.00	5.14	0.00	3.75	0.00	3.75	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
62	32.600	22.00	0.00	1.00	0.00	5.14	0.00	3.74	0.00	3.74	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
63	32.500	22.00	0.00	1.00	0.00	5.14	0.00	3.74	0.00	3.74	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
64	32.400	22.00	0.00	1.00	0.00	5.15	0.00	3.73	0.00	3.73	0.00	0.13	0.08	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
65	32.300	22.00	0.00	1.00	0.00	5.15	0.00	3.73	0.00	3.73	0.00	0.13	0.09	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
66	32.200	22.00	0.00	1.00	0.00	5.15	0.00	3.72	0.00	3.72	0.00	0.13	0.09	0.21	0.00	0.21	0.00	0.00	0.00	0.00	0.00	0.0
67	32.100	22.00	0.00	1.00	0.00	5.15	0.00	3.72	0.00	3.72	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
68	32.000	22.00	0.00	1.00	0.00	5.16	0.00	3.71	0.00	3.71	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
69	31.900	22.00	0.00	1.00	0.00	5.16	0.00	3.71	0.00	3.71	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
70	31.800	22.00	0.00	1.00	0.00	5.16	0.00	3.71	0.00	3.71	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
71	31.700	22.00	0.00	1.00	0.00	5.16	0.00	3.70	0.00	3.70	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
72	31.600	22.00	0.00	1.00	0.00	5.17	0.00	3.70	0.00	3.70	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
73	31.500	22.00	0.00	1.00	0.00	5.17	0.00	3.69	0.00	3.69	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
74	31.400	22.00	0.00	1.00	0.00	5.17	0.00	3.69	0.00	3.69	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
75	31.300	22.00	0.00	1.00	0.00	5.17	0.00	3.68	0.00	3.68	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
76	31.200	22.00	0.00	1.00	0.00	5.18	0.00	3.68	0.00	3.68	0.00	0.13	0.09	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
77	31.100	22.00	0.00	1.00	0.00	5.18	0.00	3.67	0.00	3.67	0.00	0.13	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
78	31.000	22.00	0.00	1.00	0.00	5.18	0.00	3.67	0.00	3.67	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
79	30.900	22.00	0.00	1.00	0.00	5.18	0.00	3.66	0.00	3.66	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
80	30.800	22.00	0.00	1.00	0.00	5.19	0.00	3.66	0.00	3.66	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
81	30.700	22.00	0.00	1.00	0.00	5.19	0.00	3.65	0.00	3.65	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
82	30.600	22.00	0.00	1.00	0.00	5.19	0.00	3.65	0.00	3.65	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
83	30.500	22.00	0.00	1.00	0.00	5.19	0.00	3.64	0.00	3.64	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0

84	30.400	22.00	0.00	1.00	0.00	5.20	0.00	3.64	0.00	3.64	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
85	30.300	22.00	0.00	1.00	0.00	5.20	0.00	3.63	0.00	3.63	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
86	30.200	22.00	0.00	1.00	0.00	5.20	0.00	3.63	0.00	3.63	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
87	30.100	22.00	0.00	1.00	0.00	5.20	0.00	3.62	0.00	3.62	0.00	0.12	0.10	0.22	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.0
88	30.000	22.00	0.00	1.00	0.00	5.21	0.00	3.62	0.00	3.62	0.00	0.12	0.10	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
89	29.900	22.00	0.00	1.00	0.00	5.21	0.00	3.61	0.00	3.61	0.00	0.12	0.10	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
90	29.800	22.00	0.00	1.00	0.00	5.21	0.00	3.61	0.00	3.61	0.00	0.12	0.10	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
91	29.700	22.00	0.00	1.00	0.00	5.21	0.00	3.60	0.00	3.60	0.00	0.12	0.10	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
92	29.600	22.00	0.00	1.00	0.00	5.22	0.00	3.60	0.00	3.60	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
93	29.500	22.00	0.00	1.00	0.00	5.22	0.00	3.59	0.00	3.59	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
94	29.400	22.00	0.00	1.00	0.00	5.22	0.00	3.59	0.00	3.59	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
95	29.300	22.00	0.00	1.00	0.00	5.22	0.00	3.58	0.00	3.58	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
96	29.200	22.00	0.00	1.00	0.00	5.23	0.00	3.58	0.00	3.58	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
97	29.100	22.00	0.00	1.00	0.00	5.23	0.00	3.57	0.00	3.57	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
98	29.000	22.00	0.00	1.00	0.00	5.23	0.00	3.57	0.00	3.57	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
99	28.900	22.00	0.00	1.00	0.00	5.23	0.00	3.56	0.00	3.56	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
100	28.800	22.00	0.00	1.00	0.00	5.23	0.00	3.56	0.00	3.56	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
101	28.700	22.00	0.00	1.00	0.00	5.24	0.00	3.55	0.00	3.55	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
102	28.600	22.00	0.00	1.00	0.00	5.24	0.00	3.55	0.00	3.55	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
103	28.500	22.00	0.00	1.00	0.00	5.24	0.00	3.54	0.00	3.54	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
104	28.400	22.00	0.00	1.00	0.00	5.24	0.00	3.54	0.00	3.54	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
105	28.300	22.00	0.00	1.00	0.00	5.25	0.00	3.53	0.00	3.53	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
106	28.200	22.00	0.00	1.00	0.00	5.25	0.00	3.53	0.00	3.53	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
107	28.100	22.00	0.00	1.00	0.00	5.25	0.00	3.52	0.00	3.52	0.00	0.12	0.11	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
108	28.000	22.00	0.00	1.00	0.00	5.25	0.00	3.52	0.00	3.52	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
109	27.900	22.00	0.00	1.00	0.00	5.26	0.00	3.51	0.00	3.51	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
110	27.800	22.00	0.00	1.00	0.00	5.26	0.00	3.51	0.00	3.51	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
111	27.700	22.00	0.00	1.00	0.00	5.26	0.00	3.50	0.00	3.50	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
112	27.600	22.00	0.00	1.00	0.00	5.26	0.00	3.50	0.00	3.50	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
113	27.500	22.00	0.00	1.00	0.00	5.26	0.00	3.49	0.00	3.49	0.00	0.12	0.12	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.0
114	27.400	22.00	0.00	1.00	0.00	5.27	0.00	3.49	0.00	3.49	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
115	27.300	22.00	0.00	1.00	0.00	5.27	0.00	3.48	0.00	3.48	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
116	27.200	22.00	0.00	1.00	0.00	5.27	0.00	3.47	0.00	3.47	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
117	27.100	22.00	0.00	1.00	0.00	5.27	0.00	3.47	0.00	3.47	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
118	27.000	22.00	0.00	1.00	0.00	5.28	0.00	3.46	0.00	3.46	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
119	26.900	22.00	0.00	1.00	0.00	5.28	0.00	3.46	0.00	3.46	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
120	26.800	22.00	0.00	1.00	0.00	5.28	0.00	3.45	0.00	3.45	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
121	26.700	22.00	0.00	1.00	0.00	5.28	0.00	3.45	0.00	3.45	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
122	26.600	22.00	0.00	1.00	0.00	5.29	0.00	3.44	0.00	3.44	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
123	26.500	22.00	0.00	1.00	0.00	5.29	0.00	3.44	0.00	3.44	0.00	0.12	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
124	26.400	22.00	0.00	1.00	0.00	5.29	0.00	3.43	0.00	3.43	0.00	0.11	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
125	26.300	22.00	0.00	1.00	0.00	5.29	0.00	3.43	0.00	3.43	0.00	0.11	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
126	26.200	22.00	0.00	1.00	0.00	5.29	0.00	3.42	0.00	3.42	0.00	0.11	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
127	26.100	22.00	0.00	1.00	0.00	5.30	0.00	3.42	0.00	3.42	0.00	0.11	0.12	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
128	26.000	22.00	0.00	1.00	0.00	5.30	0.00	3.41	0.00	3.41	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
129	25.900	22.00	0.00	1.00	0.00	5.30	0.00	3.41	0.00	3.41	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
130	25.800	22.00	0.00	1.00	0.00	5.30	0.00	3.40	0.00	3.40	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
131	25.700	22.00	0.00	1.00	0.00	5.30	0.00	3.40	0.00	3.40	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0

132	25.600	22.00	0.00	1.00	0.00	5.31	0.00	3.39	0.00	3.39	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
133	25.500	22.00	0.00	1.00	0.00	5.31	0.00	3.39	0.00	3.39	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
134	25.400	22.00	0.00	1.00	0.00	5.31	0.00	3.38	0.00	3.38	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
135	25.300	22.00	0.00	1.00	0.00	5.31	0.00	3.38	0.00	3.38	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
136	25.200	22.00	0.00	1.00	0.00	5.32	0.00	3.37	0.00	3.37	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
137	25.100	22.00	0.00	1.00	0.00	5.32	0.00	3.37	0.00	3.37	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
138	25.000	22.00	0.00	1.00	0.00	5.32	0.00	3.36	0.00	3.36	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
139	24.900	22.00	0.00	1.00	0.00	5.32	0.00	3.36	0.00	3.36	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
140	24.800	22.00	0.00	1.00	0.00	5.32	0.00	3.35	0.00	3.35	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
141	24.700	22.00	0.00	1.00	0.00	5.33	0.00	3.35	0.00	3.35	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
142	24.600	22.00	0.00	1.00	0.00	5.33	0.00	3.34	0.00	3.34	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
143	24.500	22.00	0.00	1.00	0.00	5.33	0.00	3.34	0.00	3.34	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
144	24.400	22.00	0.00	1.00	0.00	5.33	0.00	3.33	0.00	3.33	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
145	24.300	22.00	0.00	1.00	0.00	5.33	0.00	3.33	0.00	3.33	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
146	24.200	22.00	0.00	1.00	0.00	5.34	0.00	3.32	0.00	3.32	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
147	24.100	22.00	0.00	1.00	0.00	5.34	0.00	3.32	0.00	3.32	0.00	0.11	0.13	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.0
148	24.000	22.00	0.00	1.00	0.00	5.34	0.00	3.31	0.00	3.31	0.00	0.11	0.13	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
149	23.900	22.00	0.00	1.00	0.00	5.34	0.00	3.31	0.00	3.31	0.00	0.11	0.13	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
150	23.800	22.00	0.00	1.00	0.00	5.34	0.00	3.31	0.00	3.31	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
151	23.700	22.00	0.00	1.00	0.00	5.35	0.00	3.30	0.00	3.30	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
152	23.600	22.00	0.00	1.00	0.00	5.35	0.00	3.30	0.00	3.30	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
153	23.500	22.00	0.00	1.00	0.00	5.35	0.00	3.29	0.00	3.29	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
154	23.400	22.00	0.00	1.00	0.00	5.35	0.00	3.29	0.00	3.29	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
155	23.300	22.00	0.00	1.00	0.00	5.36	0.00	3.28	0.00	3.28	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
156	23.200	22.00	0.00	1.00	0.00	5.36	0.00	3.28	0.00	3.28	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
157	23.100	22.00	0.00	1.00	0.00	5.36	0.00	3.27	0.00	3.27	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
158	23.000	22.00	0.00	1.00	0.00	5.36	0.00	3.27	0.00	3.27	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
159	22.900	22.00	0.00	1.00	0.00	5.36	0.00	3.26	0.00	3.26	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
160	22.800	22.00	0.00	1.00	0.00	5.37	0.00	3.26	0.00	3.26	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
161	22.700	22.00	0.00	1.00	0.00	5.37	0.00	3.25	0.00	3.25	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
162	22.600	22.00	0.00	1.00	0.00	5.37	0.00	3.25	0.00	3.25	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
163	22.500	22.00	0.00	1.00	0.00	5.37	0.00	3.24	0.00	3.24	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
164	22.400	22.00	0.00	1.00	0.00	5.37	0.00	3.24	0.00	3.24	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
165	22.300	22.00	0.00	1.00	0.00	5.38	0.00	3.23	0.00	3.23	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
166	22.200	22.00	0.00	1.00	0.00	5.38	0.00	3.23	0.00	3.23	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
167	22.100	22.00	0.00	1.00	0.00	5.38	0.00	3.22	0.00	3.22	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
168	22.000	22.00	0.00	1.00	0.00	5.38	0.00	3.22	0.00	3.22	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
169	21.900	22.00	0.00	1.00	0.00	5.38	0.00	3.22	0.00	3.22	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
170	21.800	22.00	0.00	1.00	0.00	5.38	0.00	3.21	0.00	3.21	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
171	21.700	22.00	0.00	1.00	0.00	5.39	0.00	3.21	0.00	3.21	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0
172	21.600	22.00	0.00	1.00	0.00	5.39	0.00	3.20	0.00	3.20	0.00	0.11	0.14	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.0

LA-QUAL Model for Beech Creek upstream of Lake Columbia
Winter projection to meet 5.0 mg/L DO at temp of 22 C

STREAM SUMMARY REPORT: Beech Creek

TRAVEL TIME	=		8.51 DAYS		
MAXIMUM EFFLUENT	=		0.00 PERCENT		
FLOW	=	0.03238	TO	0.09700	m^3/s
DISPERSION	=	0.0000	TO	0.0000	m^2/s
VELOCITY	=	0.01787	TO	0.02864	m/s
DEPTH	=	0.30	TO	0.49	m
WIDTH	=	6.01	TO	6.85	m
BOD DECAY	=	0.00	TO	0.00	per day
NH3 DECAY	=	0.21	TO	0.22	per day
SOD	=	3.31	TO	3.31	$g/m^2/d$
NH3 SED SOURCE	=	0.01	TO	0.01	$g/m^2/d$
PO4 SED SOURCE	=	0.00	TO	0.00	$g/m^2/d$
REAERATION	=	2.26	TO	3.17	per day
BOD SETTLING	=	0.00	TO	0.00	per day
ORG-N DECAY	=	0.00	TO	0.00	per day
ORG-N SETTLING	=	0.00	TO	0.00	per day
TEMPERATURE	=	22.00	TO	22.00	deg C
DISSOLVED OXYGEN	=	5.00	TO	5.39	mg/L

LA-QUAL Model for Beech Creek upstream of Lake Columbia
Winter projection to meet 5.0 mg/L DO at temp of 22 C

INPUT/OUTPUT LOADING SUMMARY

	FLOW m³/s	DO kg/d	BOD1 kg/d	BOD2 kg/d	ORG-N kg/d	NH3-N kg/d	NO3-N kg/d	ORG-P kg/d	PO4-P kg/d	CHL A	PERIP	NCM
HEADWATER FLOW	0.03200	13.88	0.00	10.11	0.00	0.43	0.00	0.00	0.00	0.00		0.00
INCREMENTAL INFLOW	0.06500	28.19	0.00	20.54	0.00	0.86	0.00	0.00	0.00	0.00		0.00
INCREMENTAL OUTFLOW	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WASTELOADS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
WITHDRAWLS	0.00000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
FLOW THRU LOWER BNDRY	-0.09700	-45.16	0.00	-26.84	0.00	-0.90	-1.21	0.00	0.00	0.00		0.00
DISPERSION THRU LOWER BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
DISPERSION THRU HDWTR BNDRY		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
NON-POINT INPUT		0.00	0.00	31.80	0.00			0.00				0.00
NATURAL REAERATION		413.42										
DAM REAERATION		0.00										
SOD BACKGROUND		-369.48										
BOD1 DECAY		0.00	0.00									
BOD1 SETTLING		0.00	0.00									
ANAEROBIC BOD1 DECAY			0.00									
BOD2 DECAY		-35.61		-35.61								
BOD2 SETTLING		0.00		0.00								
ANAEROBIC BOD2 DECAY				0.00								
BOD2 HYDROLYSIS			0.00	0.00								
ORG-N DECAY		0.00			0.00	0.00						
ORG-N SETTLING					0.00	0.00						
NH3-N DECAY (NITRIFICATION)		-5.25				-1.21	1.21					
NH3-N BACKGROUND SEDIMENT SOURCE						0.81						
DENITRIFICATION			0.00				0.00					
ORG-P HYDROLYSIS								0.00	0.00			
ORG-P SETTLING								0.00	0.00			
PO4-P BACKGROUND SEDIMENT SOURCE									0.00			
PHYTOPLANKTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00	0.00		
PHYTOPLANKTON RESPIRATION/EXCRETION		0.00				0.00			0.00	0.00		
PHYTOPLANKTON SETTLING		0.00				0.00			0.00	0.00		
PHYTOPLANKTON DEATH			0.00	0.00	0.00			0.00		0.00		
PERIPHYTON GROWTH/PHOTOSYNTHESIS		0.00				0.00	0.00		0.00		0.00	
PERIPHYTON RESPIRATION/EXCRETION		0.00				0.00			0.00		0.00	
PERIPHYTON DEATH			0.00	0.00	0.00			0.00			0.00	
NCM DECAY		0.00										0.00
NCM SETTLING		0.00										0.00

TOTAL INPUTS	0.09700	455.48	0.00	62.45	0.00	2.10	1.21	0.00	0.00	0.00	0.00	0.00
TOTAL OUTPUTS	-0.09700	-455.51	0.00	-62.45	0.00	-2.11	-1.21	0.00	0.00	0.00	0.00	0.00
NET CONVERGENCE ERROR	0.00000	-0.02	0.00	0.00	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.00

.....EXECUTION COMPLETED

APPENDIX Q

DO TMDL Calculations

SUMMER TMDL CALCULATIONS FOR BEECH CREEK UPSTREAM OF LAKE COLUMBIA

stream length = 17.2 km
stream width = 6.43 m

	Flow rate in model	Conc's in model		Constituent loads		Oxygen demand		Oxygen demand from benthic sources				Total oxygen demand
		CBOD	NH3-N	CBOD	NH3-N	CBOD	NH3-N	Rate of NH3 source in model	Rate of O2 demand at 20 C	Rate of O2 demand w/ temp. correction	Load of O2 demand for entire reach	
	(m3/sec)	(mg/L)	(mg/L)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(g/m2/day)	(g/m2/day)	(g/m2/day)	(kg/day)	(kg/day)
Headwater	0.032	3.243	0.136	8.97	0.376	8.97	1.63					10.6
Incremental inflow	0.065	3.243	0.136	18.21	0.764	18.21	3.31					21.52
NPS loads (Data Type 19)				28.20		28.2						28.2
Sediment oxygen demand									2.585	4.852	536.66	536.66
Benthic NH3 source								0.0056	0.02425	0.02425	2.68	2.68
											Total =	599.66

WINTER TMDL CALCULATIONS FOR BEECH CREEK UPSTREAM OF LAKE COLUMBIA

stream length = 17.2 km
stream width = 6.43 m

	Flow rate in model	Conc's in model		Constituent loads		Oxygen demand		Oxygen demand from benthic sources				Total oxygen demand
		CBOD	NH3-N	CBOD	NH3-N	CBOD	NH3-N	Rate of NH3 source in model	Rate of O2 demand at 20 C	Rate of O2 demand w/ temp. correction	Load of O2 demand for entire reach	
	(m3/sec)	(mg/L)	(mg/L)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(g/m2/day)	(g/m2/day)	(g/m2/day)	(kg/day)	(kg/day)
Headwater	0.032	3.657	0.154	10.11	0.426	10.11	1.84					11.95
Incremental inflow	0.065	3.657	0.154	20.54	0.865	20.54	3.74					24.28
NPS loads (Data Type 19)				31.80		31.8						31.8
Sediment oxygen demand									2.915	3.306	365.66	365.66
Benthic NH3 source								0.0064	0.02771	0.02771	3.06	3.06
											Total =	436.75

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APPENDIX R

Allowable Loads for Individual Point Sources

INDIVIDUAL WLAs FOR LEAD AND COPPER

FOR POINT SOURCES IN THE BODCAU CREEK AND DORCHEAT BAYOU WATERSHEDS

Ratio of dissolved to total recoverable (based on TSS of 5.5 mg/L): 0.20252793 for lead 0.38167253 for copper

First Impaired Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Dissolved lead		Total lead		Diss. copper		Total copper	
				Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)
11140205-010	ARR153250	Arkansas Hwy Dept. Job #030348	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-010	ARR153430	Capps Broiler Farm	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-010	AR0046345	Springhill School	0.013	0.73	0.00008	3.60	0.0004	reach not impaired for copper			
11140205-007	ARR153453	Arkansas Hwy Dept. Job #030386	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-006	AR0045535	Canfield Baptist Assembly	0.014	0.54	0.00007	2.67	0.00032	3.47	0.00041	9.09	0.00107
11140205-006	AR0035696	City of Lewisville	0.2	0.54	0.00091	2.67	0.00446	3.47	0.0058	9.09	0.01518
11140205-006	ARG640078	City of Lewisville	0.0035	0.54	0.00002	2.67	0.00008	3.47	0.00011	9.09	0.00027
11140205-006	AR0048305	City of Stamps	Variable (HCR)	0.54	Variable	2.67	Variable	3.47	Variable	9.09	Variable
11140205-006	ARG640031	City of Stamps	< 0.5	0.54	0.00226	2.67	0.01113	3.47	0.01448	9.09	0.03794
11140205-006	AR0000493	Entergy Arkansas-Harvey Couch	0.382	0.54	0.00173	2.67	0.0085	3.47	0.01107	9.09	0.02899
11140205-006	ARR00A689	Entergy Arkansas-Harvey Couch	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-006	ARR000486	R-N-R Recycling	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							

First Impaired Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Dissolved lead		Total lead		Diss. copper		Total copper	
				Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)
11140205-006	ARR000713	Smith Equipment/ Dickson Barrow	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-006	ARR000567	Turner Borrow Pit Site	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140205-002	AR0051004	Eagle View Subdivision	0.018	0.54	0.000082	2.67	0.00041	3.47	0.0005213	9.09	0.00137
11140205-002	ARR153303	Eagle View Subdivision	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-026	ARG640092	City of Buckner	< 0.7	0.69	0.0040	3.41	0.01991	reach not impaired for copper			
11140203-026	ARG640064	City of Willisville	0.5	0.69	0.0029	3.41	0.01422	reach not impaired for copper			
11140203-026	ARR153520	Ted Waters Broiler Farm	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-025	AR0047953	Deltic Timber-Waldo	0.2 [B]	0.68	0.00115	3.36	0.00561	reach not impaired for copper			
11140203-025	ARR000744	Deltic Timber-Waldo	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-025	ARR00A972	Ludwig, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-025	AR0048054	Quad Hardwood Products	0.2 [B]	0.68	0.00115	3.36	0.00561	reach not impaired for copper			
11140203-923	AR0047635	Albemarle-West Plant	0.452 [C]	0.54	0.002	2.67	0.0101	reach not impaired for copper			
11140203-923	ARR00A588	Albemarle-West Plant	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	AR0000434	Amfuel-Magnolia	0.0381 [C]	0.54	0.0002	2.67	0.0009	reach not impaired for copper			

First Impaired Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Dissolved lead		Total lead		Diss. copper		Total copper	
				Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)
11140203-923	ARR00B815	Amfuel-Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR00C153	Baker Petrolite/ Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	AR0043613	City of Magnolia	2.5	0.54	0.0113	2.67	0.0558	reach not impaired for copper			
11140203-923	ARR00C419	City of Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	AR0021555	City of McNeil	0.2	0.54	0.0009	2.67	0.0045	reach not impaired for copper			
11140203-923	AR0043508	City of Waldo	0.35	0.54	0.0016	2.67	0.0079	reach not impaired for copper			
11140203-923	ARG160039	Columbia County Landfill	0.239	0.54	0.0011	2.67	0.0054	reach not impaired for copper			
11140203-923	ARR00C131	Evonik Foams, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR00B367	Hixson Lumber-Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR00B420	Jack B Kelly, Inc.	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARG640069	Magnolia Municipal Water Systm	0.136	0.54	0.0006	2.67	0.0031	reach not impaired for copper			
11140203-923	ARR00A305	Peace Flooring Company, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR153681	S. Ark. Telephone Co. New Fiber Route	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR00A892	Sapa Extrusions, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							

First Impaired Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Dissolved lead		Total lead		Diss. copper		Total copper	
				Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)	Conc. (µg/L)	Load (lbs/day)
11140203-923	ARR000628	Southern Aluminum Mfg, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR000380	Transit Mix/ Plant #2045	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	ARR00B379	Unit Structures, LLC	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-923	AR0051489	W2 Oil, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-023	ARG670662	Albemarle/ Brineline M-4730	0.1124	0.95	0.0009	4.69	0.0044	reach not impaired for copper			
11140203-023	ARR153385	Bonanza Creek/ Dorcheat Field	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-023	ARR000805	Bonanza Creek/ Dorcheat Gas	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-021	AR0038857	Albemarle-South	2.38 [C]	0.69	0.01370	3.41	0.0677	reach not impaired for copper			
11140203-021	ARG550213	Brister Baptist Church	< 0.001	0.69	0.00001	3.41	0.00003	reach not impaired for copper			
11140203-021	ARR00B689	CMC Steel-Arkansas	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)							
11140203-021	AR0046973	Magnolia Country Club	0.0035	0.69	0.00002	3.41	0.0001	reach not impaired for copper			

Notes:

A. City of Stamps discharges according to a hydrograph controlled release. Effluent flows are allowed to exceed the design flow (0.149 MGD) during high stream fl

B. These facilities are wet decks with variable, intermittent discharges. For load calculations, an effluent flow of 0.2 MGD was used based on Deltic Timber DMR d

C. Effluent flow rate is highest monthly average flow during most recent 24 months of available DMR data on ECHO web site (Oct 2009 - Sep 2011).

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INDIVIDUAL WLAs FOR CHLORIDE, SULFATE, AND TDS

FOR POINT SOURCES IN THE BODCAU CREEK AND DORCHEAT BAYOU WATERSHEDS

Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Chloride		Sulfate		TDS	
				Conc. (mg/L)	Load (tons/day)	Conc. (mg/L)	Load (tons/day)	Conc. (mg/L)	Load (tons/day)
11140205-010	ARR153250	Arkansas Hwy Dept. Job #030348	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-010	ARR153430	Capps Broiler Farm	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-010	AR0046345	Springhill School	0.013	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-007	ARR153453	Arkansas Hwy Dept. Job #030386	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-006	AR0045535	Canfield Baptist Assembly	0.014	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	AR0035696	City of Lewisville	0.2	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	ARG640078	City of Lewisville	0.0035	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	AR0048305	City of Stamps	Variable (HCR)	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	ARG640031	City of Stamps	< 0.5	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	AR0000493	Entergy Arkansas-Harvey Couch	0.382	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-006	ARR00A689	Entergy Arkansas-Harvey Couch	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-006	ARR000486	R-N-R Recycling	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-006	ARR000713	Smith Equipment/ Dickson Barrow	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					

Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Chloride Conc. (mg/L)	Chloride Load (tons/day)	Sulfate Conc. (mg/L)	Sulfate Load (tons/day)	TDS Conc. (mg/L)	TDS Load (tons/day)
11140205-006	ARR000567	Turner Borrow Pit Site	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140205-002	AR0051004	Eagle View Subdivision	0.018	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140205-002	ARR153303	Eagle View Subdivision	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-026	ARG640092	City of Buckner	< 0.7	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-026	ARG640064	City of Willisville	0.5	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-026	ARR153520	Ted Waters Broiler Farm	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-025	AR0047953	Deltic Timber-Waldo	0.2 [B]	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-025	ARR000744	Deltic Timber-Waldo	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-025	ARR00A972	Ludwig, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-025	AR0048054	Quad Hardwood Products	0.2 [B]	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	AR0047635	Albemarle-West Plant	0.452 [C]	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARR00A588	Albemarle-West Plant	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	AR0000434	Amfuel-Magnolia	0.0381 [C]	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARR00B815	Amfuel-Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR00C153	Baker Petrolite/ Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					

Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Chloride Conc. (mg/L)	Chloride Load (tons/day)	Sulfate Conc. (mg/L)	Sulfate Load (tons/day)	TDS Conc. (mg/L)	TDS Load (tons/day)
11140203-923	AR0043613	City of Magnolia	2.5	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARR00C419	City of Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	AR0021555	City of McNeil	0.2	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	AR0043508	City of Waldo	0.35	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARG160039	Columbia County Landfill	0.239	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARR00C131	Evonik Foams, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR00B367	Hixson Lumber-Magnolia	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR00B420	Jack B Kelly, Inc.	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARG640069	Magnolia Municipal Water Systm	0.136	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-923	ARR00A305	Peace Flooring Company, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR153681	S. Ark. Telephone Co. New Fiber Route	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR00A892	Sapa Extrusions, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR000628	Southern Aluminum Mfg, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR000380	Transit Mix/ Plant #2045	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-923	ARR00B379	Unit Structures, LLC	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					

Reach Downstream	Permit Number	Facility Name	Flow Rate (MGD)	Chloride		Sulfate		TDS	
				Conc. (mg/L)	Load (tons/day)	Conc. (mg/L)	Load (tons/day)	Conc. (mg/L)	Load (tons/day)
11140203-923	AR0051489	W2 Oil, Inc	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-023	ARG670662	Albemarle/ Brineline M-4730	0.1124	20	0.009	41	0.0193	200	0.094
11140203-023	ARR153385	Bonanza Creek/ Dorcheat Field	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-023	ARR000805	Bonanza Creek/ Dorcheat Gas	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-021	AR0038857	Albemarle-South	2.38 [C]	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-021	ARG550213	Brister Baptist Church	< 0.001	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	
11140203-021	ARR00B689	CMC Steel-Arkansas	n.a.	insufficient data to calculate load for individual facility (load included in WLA for reach)					
11140203-021	AR0046973	Magnolia Country Club	0.0035	reach not impaired for chloride		reach not impaired for sulfate		reach not impaired for TDS	

Notes:
A. City of Stamps discharges according to a hydrograph controlled release. Effluent flows are allowed to exceed the design flow (0.149 MGD) during high stream flow
B. These facilities are wet decks with variable, intermittent discharges. For load calculations, an effluent flow of 0.2 MGD was used based on Deltic Timber DMR data.
C. Effluent flow rate is highest monthly average flow during most recent 24 months of available DMR data on ECHO web site (Oct 2009 - Sep 2011).

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