Draft
Delisting Decision
For

Sulphur Creek

Assessment Unit ID # AL06030004-0403-800

Nutrients

Alabama Department of Environmental Management
Water Quality Branch
Water Division
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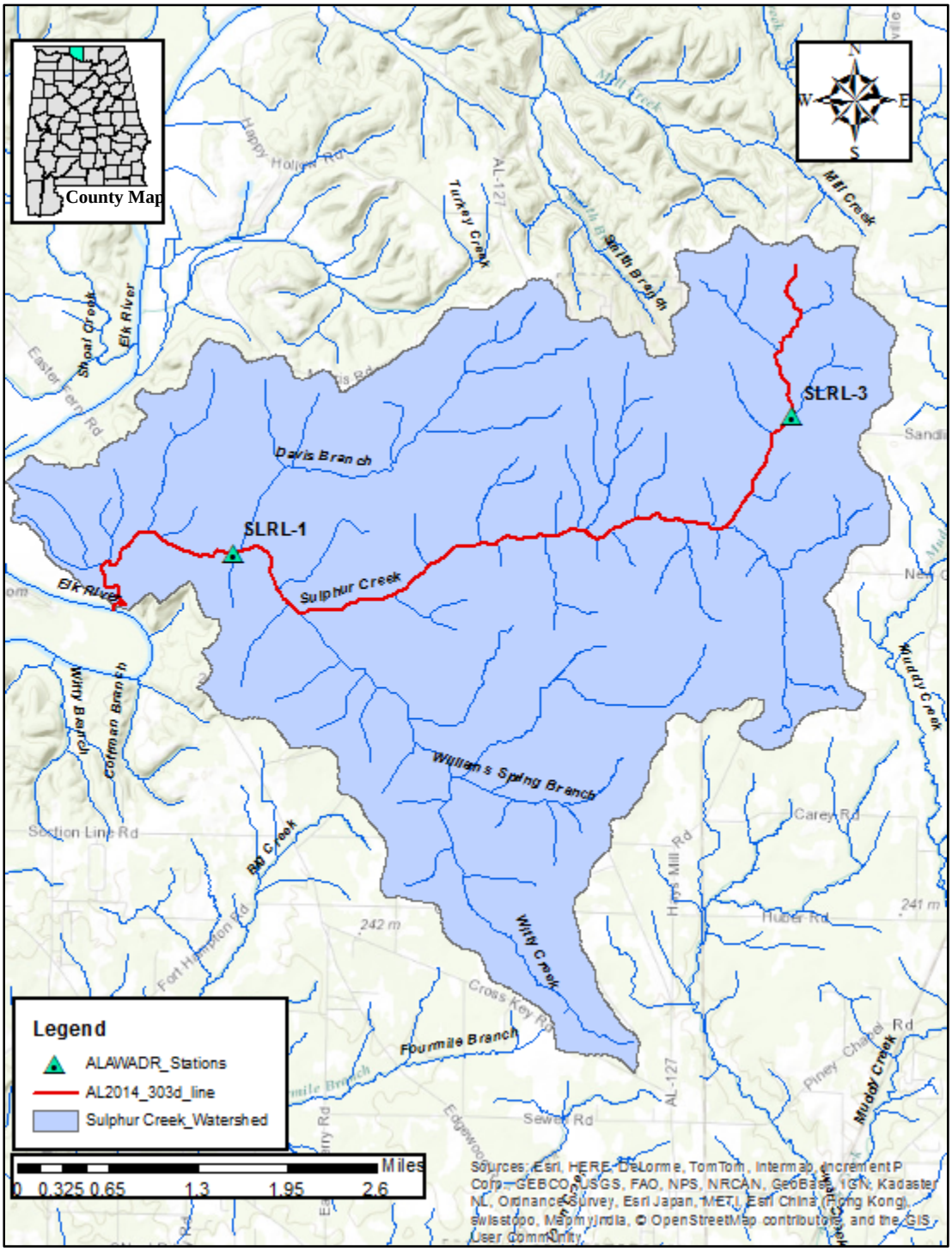
Figure 1: Sulphur Creek Location Map in the Tennessee River Basin



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1.0 Executive Summary

Sulphur Creek, located in Limestone County, is part of the Tennessee River Basin. Sulphur Creek flows into the Elk River, which is a tributary of Wheeler Lake of the Tennessee River. It has a length of 8.34 miles and a total drainage area of approximately 19 square miles. The Sulphur Creek watershed consists of agriculture and forested land. The whole watershed is within the 8-digit hydrologic unit code (HUC) 06030004. The impaired segment is listed in Table 1.

Sulphur Creek was first placed on the State of Alabama's §303(d) List for nutrients in 2008 as a result of water quality data collected by the Alabama Department of Environmental Management (ADEM) from 2004-2006. The sources of impairment were listed as agriculture and industrial. Subsequent data from ADEM's surface water quality monitoring program have shown no impairment with respect to nutrients.

The most recent water quality data available for Sulphur Creek was collected in 2013. ADEM collected samples at SLRL-1 and SLRL-3. The ecoregional comparison indicates that the creek shows no exceedances for Total Phosphorus (TP) and chlorophyll a. Total Nitrogen (TN) levels were slightly elevated above ecoregional reference values. None of the samples analyzed for Dissolved Oxygen (DO) exceeded the water quality criteria. Based on the 2013 indices by ecoregion and drainage area, the bioassessment results indicated the macroinvertebrate community to be in "fair" condition at station SLRL-1. Overall habitat quality was categorized as "optimal" at station SLRL-1.

In addition, between August 12, 2012, and August 15, 2012, diurnal DO data was collected at Sulphur Creek sampling stations SLRL-1 and SLRL-3. DO concentrations at the stations remained within acceptable levels. The pH probe used at station SLRL-3 failed post calibration; however, pH readings at SLRL-1 were within acceptable levels.

This report addresses the results of the delisting analysis for Sulphur Creek. Based on the assessment of all available water quality data, ADEM has determined that Sulphur Creek is not impaired due to nutrients and that water quality standards are being attained. The available data includes instream nutrient values, pH readings, habitat and macroinvertebrate assessments, and dissolved oxygen concentrations. The Department concludes that even though total nitrogen concentrations are elevated above reference conditions, the overall water quality data and watershed information support the delisting decision. Therefore, ADEM will not develop a Total Maximum Daily Load (TMDL) in light of "more recent or accurate data," which is just cause for delisting a waterbody according to Title 40 of the Code of Federal Regulations (CFR), Part 130.7(b)(6)(iv).

Table 1: Sulphur Creek Segment from the 2014 §303(d) List

ID	Use	Cause	Date of Data	Size	Downstream/Upstream Locations
AL06030004-0403-800	F&W	Nutrients	2004-2006	8.34 miles	Elk River / Its Source

2.0 Basis for §303(d) Listing

Section 303(d) of the Clean Water Act (CWA), as amended by the Water Quality Act of 1987 and EPA's Water Quality Planning and Management Regulations [Title 40 of the Code of Federal Regulations (CFR), Part 130], requires states to identify waterbodies which are not meeting water quality standards applicable to their designated use classifications. The identified waters are prioritized based on severity of pollution with respect to designated use classifications. TMDLs for all pollutants causing violation of applicable water quality standards are established for each waterbody identified as impaired. Such loads are established at levels necessary to implement the applicable water quality standards with seasonal variations and margins of safety. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a waterbody, based on the relationship between pollution sources and instream water quality conditions, so that states can establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

As mentioned in the executive summary, the 303(d) list sites studies from 2004-2006 as the supporting data sources. ADEM collected samples from station SLRL-1 on Sulphur Creek as part of the Historical Rivers and Streams Monitoring Schedule. In accordance with ADEM's water quality regulations, the applicable water quality criterion for instream pH for Sulphur Creek is $6.0 \leq pH \leq 8.5$ standard units (s.u.). The data from Historical Rivers and Streams monitoring 2004-2006 indicated values greater than 8.5 standard units (s.u.) for 5 of the 23 samples collected. Of the pH readings that were taken, 22% exceeded the applicable water quality criterion for instream pH. To be listed, the pH exceedance rate must be greater than 10%. The data collected by ADEM, shown in Table 2, indicated dissolved oxygen values greater than 5.5 mg/L. The total nitrogen median value was below ecoreference values, but the total phosphorous median was at the ecoreference value. There were not enough chlorophyll a samples collected to meet the eight sample requirement. The original listing for nutrients impairment was attributed to both industrial and agricultural sources. Sulphur Creek was listed for nutrient impairment based on the study showing high pH and DO readings. The results of this study are displayed in Tables 2 through 4.

Table 2: Data for 303(d) Listing- *Historical Rivers & Streams Monitoring 2004-2006.*

Station ID	Visit Date	pH_SU	DO mgl	NO3 NO2 N mgl	TKN mgl	TKN dc	TN	Total P mgl	Total P dc
SLRL-1	3/16/2004	7.93	10.92	1.014	0.397		1.411	0.08	
SLRL-1	4/8/2004	8.61	12.32	1.257	0.226		1.483	0.01	< MDL .02
SLRL-1	5/13/2004	8.05	9.2	1.773	0.166		1.939	0.115	
SLRL-1	6/23/2004	7.99	8.35	1.28	0.075	< MDL .15	1.355	0.089	
SLRL-1	7/12/2004	8.41	10.33	1.29	0.075	< MDL .15	1.365	0.054	
SLRL-1	9/14/2004	7.33	8.22	1.072	0.202		1.274	0.055	
SLRL-1	10/6/2004	8.49	11.45	1.017	0.075	< MDL .15	1.092	0.03	
SLRL-1	3/16/2005	8.05	12.94	1.482	0.075	< MDL .15	1.557	0.05	< MDL .1
SLRL-1	4/5/2005	7.83	10.94	1.019	0.075	< MDL .15	1.094	0.05	< MDL .1
SLRL-1	5/5/2005	8.59	12.61	1.315	0.075	< MDL .15	1.39	0.05	< MDL .1
SLRL-1	6/8/2005	8.37	8.93	1.411	0.075	< MDL .15	1.486	0.05	< MDL .1
SLRL-1	7/21/2005	8.32	9.57	1.219	0.075	< MDL .15	1.294	0.05	< MDL .1
SLRL-1	8/30/2005	7.88	8.59	0.543	0.832		1.375	0.209	
SLRL-1	9/19/2005	8.21	10.23	0.834	0.322		1.156	0.05	< MDL .1
SLRL-1	10/18/2005	8.24	12.61	1.13	0.351		1.481	0.05	< MDL .1
SLRL-1	3/13/2006	8.56	13.52	1.126	0.219		1.345	0.05	< MDL .1
SLRL-1	4/20/2006	7.96	9	1.507	0.19		1.697	0.05	< MDL .1
SLRL-1	5/8/2006	8.38	10.87	1.242	0.171		1.413	0.05	< MDL .1
SLRL-1	6/15/2006	8.62	8.33	1.449	0.075	< MDL .15	1.524	0.05	< MDL .1
SLRL-1	7/17/2006	8.64	10.22	1.111	0.342		1.453	0.05	< MDL .1
SLRL-1	8/29/2006	7.92	7.56	0.718	0.185		0.903	0.05	< MDL .1
SLRL-1	9/7/2006	8.32	9.97	0.667	0.075	< MDL .15	0.742	0.05	< MDL .1
SLRL-1	10/5/2006	8.43	10.51	0.59	0.173		0.763	0.05	< MDL .1

Note: Sample less than MDL recorded as half MDL

Table 3: Data Summary for 303(d) Listing- ADEM's Field Criteria

SLRL-1		
	pH	**DO**
# samples	23	23
Water Quality Criteria	6<x<8.5	x>5.5
# exceedances	5	High DO
allowable exceedances	4	4

Table 4: Data Summary for 303(d) Listing- Ecoregional Reference Guidelines for TP & TN

SLRL-1		
	TP(mg/L)	**TN(mg/L)**
Ecoreference: 71- Level III	0.0497	1.57
Basis of Comparison	90th%ile	90th%ile
Result to Compare	Median	Median
Median (2004-2006)	0.05	1.375

3.0 Source Assessment

Both point and non-point sources may contribute nutrient impairment to a given waterbody. Potential sources of nutrient impairment can be numerous and often occur in combination. In rural areas, storm runoff from row crops, livestock pastures, animal waste application sites, and feedlots can transport significant loads of organic loading. Nationwide, poorly treated municipal sewage comprises a major source of organic compounds that are hydrolyzed to create additional organic loading. Urban storm water runoff, sanitary sewer overflows, and combined sewer overflows can be significant sources of organic loading.

All potential point and non-point sources of nutrient enrichment for the listed portion of Sulphur Creek were identified using an evaluation of land use/land cover information from the 2011 National Land Cover Dataset (NLCD) and from ADEM's NPDES database inventory.

3.1 Point Sources

National Pollutant Discharge Elimination System (NPDES) permitted facilities are an important consideration in evaluating a watershed. Table 5 lists relevant data for the facilities. Figure 2 is a map of their respective locations in the watershed.

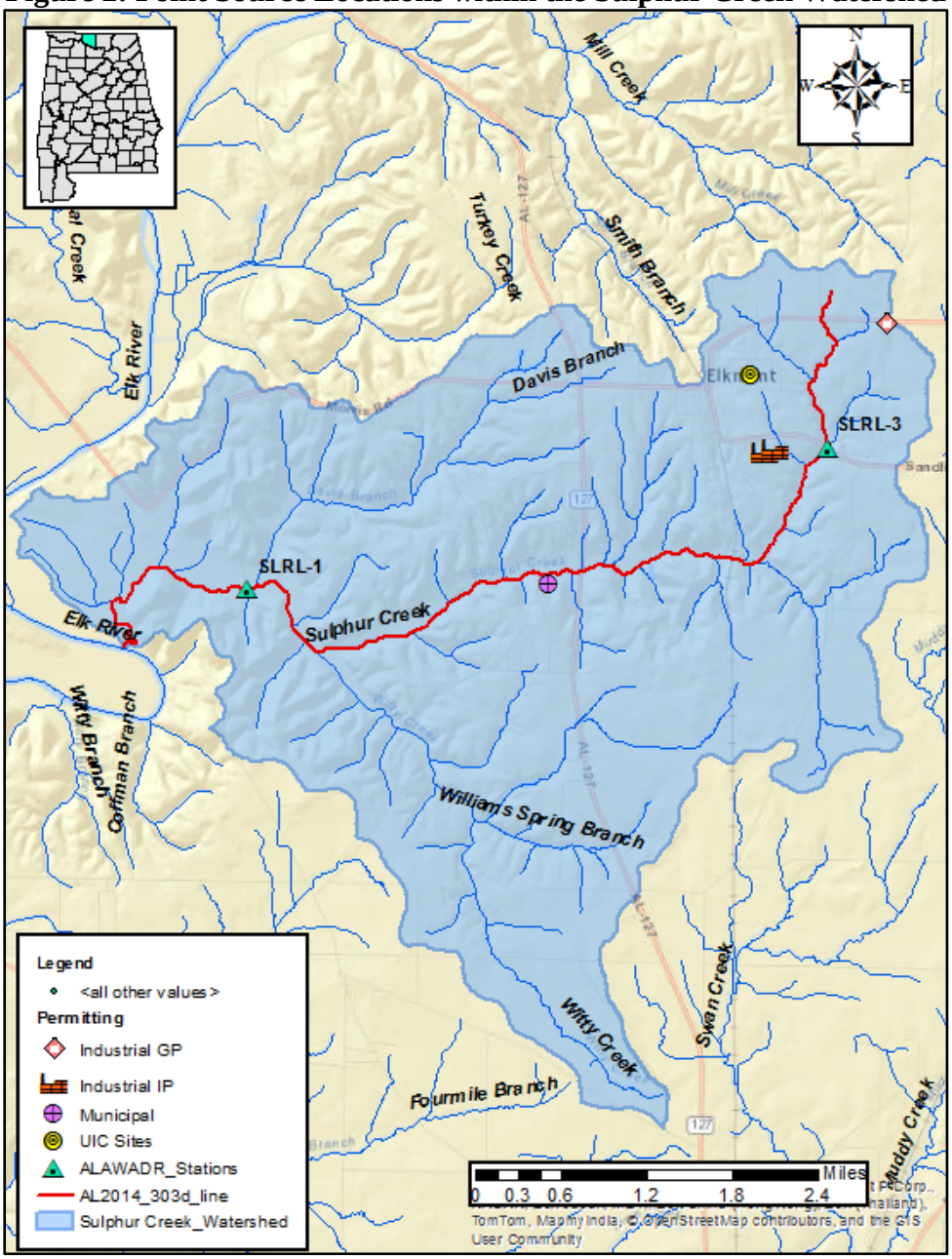
Continuous Point Sources:
There are two facilities permitted under the NPDES program to discharge into the Sulphur Creek watershed. Limestone County Water and Sewer Authority, a municipal facility, has a permitted discharge to Sulphur Creek. Aviagen Inc., a poultry hatchery operation, currently discharges to an unnamed tributary to Sulphur Creek.

Non-Continuous Point Sources:
Watkins Oil Company Inc. maintains an Industrial General permit to an unnamed tributary to Sulphur Creek. Elkmont High School operates an underground injection control system in the Sulphur Creek Watershed.

Table 5: Point Sources- NPDES Regulated Facilities in the Sulphur Creek Watershed

Facility	Permit #	Permit type	Permit Status	Active Discharge/Receiving Stream
Limestone County Water and Sewer Authority	AL0056545	Municipal	In Effect	SULPHUR CREEK
Aviagen Inc	AL0032271	Industrial IP	In Effect	UT SULPHUR CREEK
Elkmont High School	ALSI9942002	UIC Sites	In Effect	
Watkins Oil Company Inc.	ALG340480	Industrial GP	In Effect	UT SULPHUR CREEK

Figure 2: Point Source Locations within the Sulphur Creek Watershed



3.2 Nonpoint Sources

Nonpoint impacts in the Sulphur Creek watershed are considered to come from its land uses. Land use percentages were determined from the 2011 National Land Cover Dataset (NLCD). Table 6 lists the land use areas and percentages in the watershed as shown in Figure 3. Figure 4 is a map of the watershed's land use. As can be seen from an inspection of the table and map, the predominant land uses in the watershed are 43.58% agriculture and 43.78% forested. The watershed is relatively small measuring at a total area of 19.16 square miles.

Table 6: Land Use Data

Land Use Description	Square Miles	Percent (%)
Open Water	0.015637137	0.08%
Developed, Open Space	0.985487149	5.14%
Developed, Low Intensity	0.143514172	0.75%
Developed, Medium Intensity	0.055598711	0.29%
Developed, High Intensity	0.01250971	0.07%
Deciduous Forest	5.175197502	27.00%
Evergreen Forest	0.861085034	4.49%
Mixed Forest	1.956032145	10.21%
Shrub/Scrub	0.85135526	4.44%
Herbaceuous	0.358264193	1.87%
Hay/Pasture	5.942459712	31.01%
Cultivated Crops	2.408814147	12.57%
Woody Wetlands	0.389538468	2.03%
Emergent Herbaceuous Wetlands	0.009382282	0.05%
Total Land Use	**19.16487562**	**100.00%**
Cumulative Land Use	**Square Miles**	**Percent (%)**
Developed	1.197109743	6.25%
Forested	8.391235432	43.78%
Agriculture	8.351273859	43.58%
Grassland/Shrubs	1.209619452	6.31%
Other	0.015637137	0.08%
Total Land Use	**19.16487562**	**100.00%**

Figure 3: Pie Chart of Land Use Distribution in Sulphur Creek Watershed

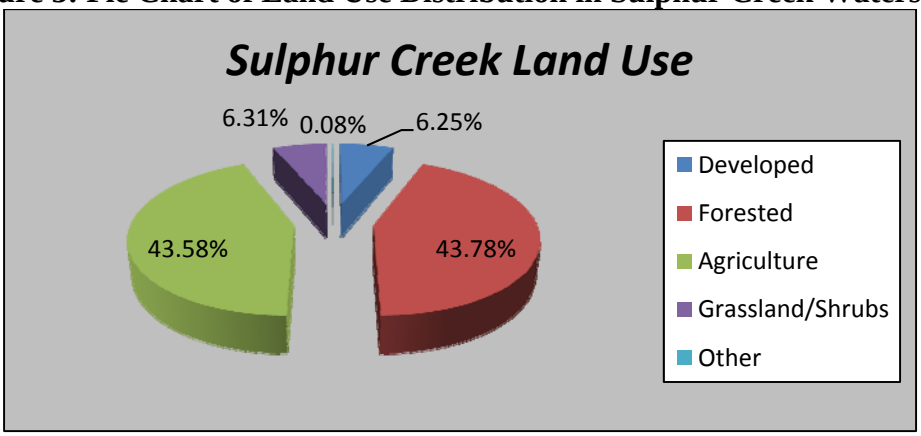
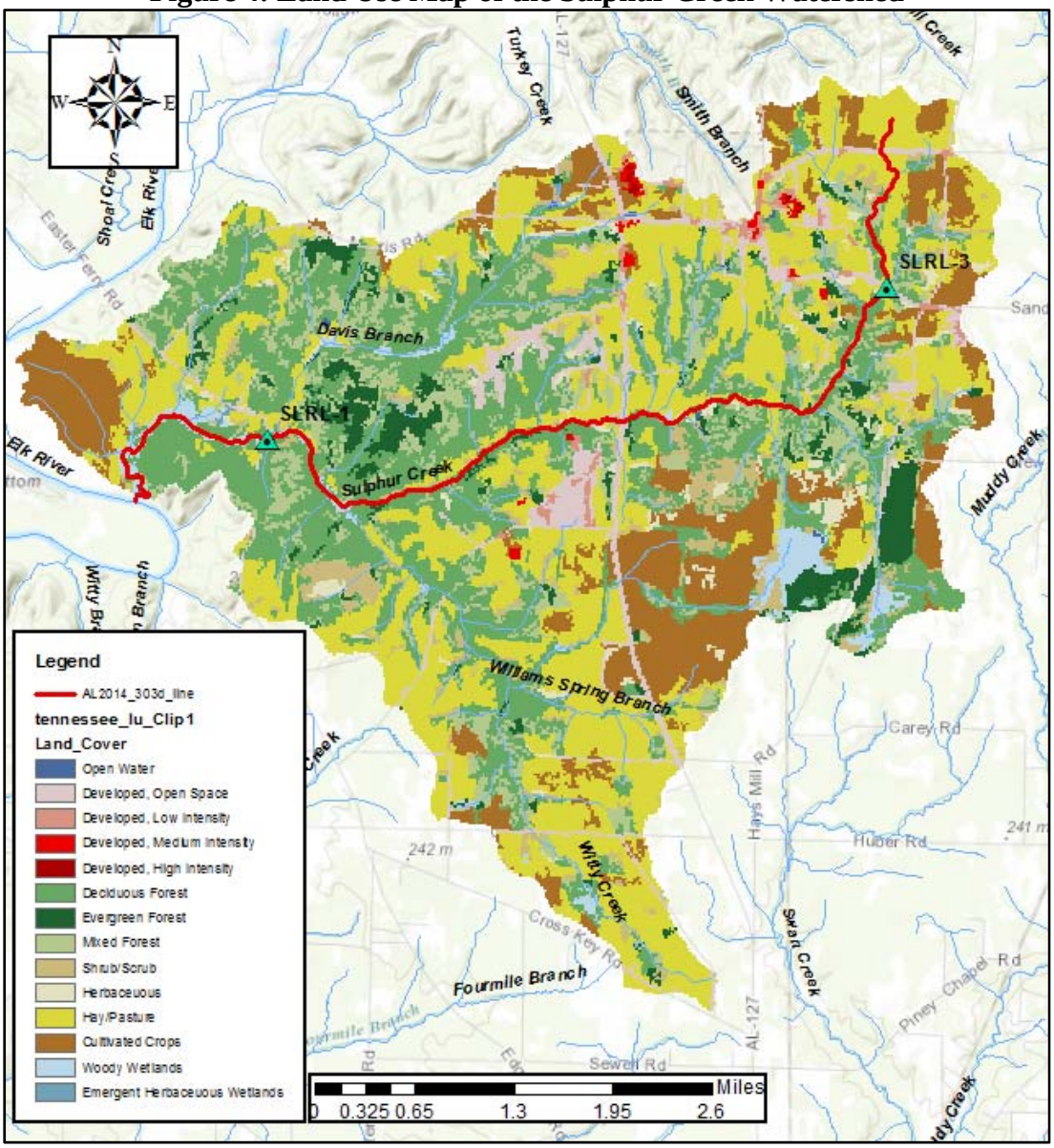


Figure 4: Land Use Map of the Sulphur Creek Watershed



4.0 Technical Basis for Delisting Decision

4.1 Water Quality Target Identification

Historically, in the absence of established numeric nutrient criteria, ADEM and/or EPA would use available data and information coupled with best professional judgment to determine overall use support for a given waterbody. Narrative criteria continue to serve as a regulatory basis for determining use support and making listing/delisting decisions of waters in regards to Alabama's 303(d) List. ADEM's Narrative Criteria, as shown in ADEM's Administrative Code, Rule 335-6-10-.06, are as follows:

335-6-10-.06 <u>Minimum Conditions Applicable to All State Waters</u>. *The following minimum conditions are applicable to all State waters, at all places and at all times, regardless of their uses:*

(a) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes that settle to form bottom deposits which are unsightly, putrescent or interfere directly or indirectly with any classified water use.

(b) State waters shall be free from floating debris, oil, scum, and other floating materials attributable to sewage, industrial wastes or other wastes in amounts sufficient to be unsightly or which interfere directly or indirectly with any classified water use.

(c) State waters shall be free from substances attributable to sewage, industrial wastes or other wastes in concentrations or combinations, which are toxic or harmful to human, animal or aquatic life to the extent commensurate with the designated usage of such waters.

ADEM is continuing its efforts to develop comprehensive numeric nutrient criteria for all surface waters throughout Alabama, including rivers/streams, lakes/reservoirs, wetlands, and coastal/estuarine waters. However, until numeric nutrient criteria or some form of quantitative interpretations of ADEM's narrative criteria are developed, the Department will continue to use all available data and information coupled with best professional judgment to make informed decisions regarding overall use support and when establishing numeric targets for TMDLs.

For purposes of evaluating attainment of the above narrative criteria, ADEM will use both EPA's national recommended water quality criteria and ADEM's ecoregional reference guidelines. EPA's recommended criteria are published in section 304(a) of the Clean Water Act and lists guidelines for approximately 150 pollutants. In 2010, ADEM published ecoregional reference guidelines for a number of parameters and pollutants. A listing of the guidelines can be found in Appendix 7.4. Reference streams, also referred to as "reference reaches" or "ecoregional reference sites," are defined as relatively homogeneous areas of similar climate, land form, soil, natural vegetation, hydrology, and other ecologically relevant variables (USEPA, 2000b) which have remained comparatively undisturbed or minimally impacted by human activity over an extended period of time in relation to other waters of the State. While not necessarily pristine or completely undisturbed by humans, reference streams do represent desirable chemical, physical and biological conditions for a given ecoregion that can be used for evaluation purposes.

The reference streams selected for a particular analysis depends primarily on the available number of reference streams and associated data within a particular ecoregion. Therefore, the total number of reference sites selected and the aerial scale (i.e., Ecoregion Level III, Level IV) used to represent a reference condition will often vary on a case-by-case basis. ADEM elected to use the 90th percentile of the data distributions from the selected reference sites. In Figure 10, the ecoreference location map, the impaired segment is shown to be in two Level IV ecoregions, 71h and 71g. Since there are no published Level IV values for ecoregion 71h or 71g, the Level III values from ecoregion 71 were employed.

<u>Nutrient Criteria:</u> Alabama does not currently have numeric nutrient criteria for rivers and streams with respect to assessment and listing decisions. Typically, numeric targets are

established using ADEM's 2010 Ecoregional Reference Guidelines and enforced under the narrative criteria discussed above. The 90th percentile of the data distribution was considered an appropriate target, since it falls within an acceptable range of "least-impacted" conditions (i.e. upper quartile). If the TP and TN concentrations of the subject impaired stream are relatively the same or below reference condition levels, then the stream is considered not to be impaired for nutrients. If TP and TN concentrations within the impaired stream are shown to be above reference conditions, then other water quality data and information are used in the evaluation. Additional data and information that can be used includes, but is certainly not limited to, diurnal dissolved oxygen readings, habitat assessments, and macroinvertebrate and fish community indices.

For ecoregion 71, the 90th percentile value for TP was determined to be 0.0497 mg/L. The ecoregional reference value for TN is 1.57 mg/L. Chlorophyll a is another parameter to consider when evaluating nutrient impairment. The 90th percentile concentration of chlorophyll a from the ecological reference is 4.255 ug/L.

For the purpose of determining use support for nutrients, the following guidelines regarding interpretation of biological data will be used:

- Fully Supporting - Macroinvertebrates determined to be Excellent (Unimpaired), Good (Slightly Impaired), and Fair (Moderately Impaired) rating if Chemical/Physical/Field Data indicates compliance.
- Partial Supporting - Macroinvertebrates determined to be Fair (Moderately Impaired) and Chemical/Physical/Field Data indicates impairment.
- Not Supporting - Macroinvertebrates determined to be Poor (Severely Impaired) and Chemical/Physical/Field Data indicates impairment.

Habitat assessment scores are based on a variety of habitat conditions. The ratings include optimal, suboptimal, marginal or poor. The habitat assessment categories and interpretations are listed in Table 7.

Table 7: Biometric Interpretation of Habitat Assessment

METRIC	Category	INTERPRETATION
Habitat Assessment	Optimal	Conditions meet natural expectations
	Sub-optimal	Satisfies expectations under most conditions
	Marginal	Moderate levels of degradation
	Poor	Substantially altered

4.2 Data Availability and Analysis

It should be noted that even though Sulphur Creek was sampled prior to 2013, only the data that is approximately six years in age or less will be used in this analysis, which is consistent with Alabama's Water Quality Assessment and Listing Methodology (ADEM, 2014). The source of data that was utilized in the evaluation of Sulphur Creek is from ADEM's 303(d) sampling program. Physical, chemical and biological data were collected at the following two sampling stations: SLRL-1 and SLRL-3. A description of the stations and their corresponding coordinates are listed in Table 8.

Table 8: ADEM Sampling Stations on Sulphur Creek

Station Name	Agency Name	Latitude	Longitude	Description
SLRL-1	ADEM	34.9083	-87.0298	Sulphur Cr at unnamed Limestone Co. Rd. (Eater Ferry Road Bridge)
SLRL-3	ADEM	34.92269	-86.95817	Sulphur Creek at Sandlin Road

An analysis of the nutrient data was conducted by comparing median TP and TN concentrations from Sulphur Creek stations to the 90th percentile values listed for ecoregion 71. The 90th percentile ecoreference concentrations for TP and TN are 0.0497 mg/L and 1.57 mg/L, respectively. Median TP concentrations at stations SLRL-1 and SLRL-3 were both below ecological reference stream levels with concentrations reported at 0.045 mg/L and 0.024 mg/L, respectively. TN concentrations were elevated at station SLRL-3 with a median value of 2.03 mg/L. The station SLRL-1 median value was lower at 1.59 mg/L. Chlorophyll a concentrations within the impaired stream are shown to be well below ecoreference conditions. Table 9 below provides TP, TN, and chlorophyll a data for both stations located on the impaired portion of Sulphur Creek.

Table 9: Data Summary for SLRL-1 and SLRL-3

SLRL-1			
	TP	**TN**	**chl a (ug/l)**
Mean:	0.053	1.58	1.566
Median:	**0.045**	**1.59**	**1.070**
75th %tile:	0.066	1.65	2.005
90th %tile:	0.080	1.77	2.670
Ecoreference	**0.0497**	**1.57**	**4.255**
SLRL-3			
	TP	**TN**	**chl a (ug/l)**
Mean:	0.025	2.03	1.747
Median:	**0.024**	**2.03**	**1.035**
75th %tile:	0.030	2.18	1.873
90th %tile:	0.033	2.19	3.205
Ecoreference	**0.0497**	**1.57**	**4.255**

In 2013, 72-hour continuous data for dissolved oxygen was collected on Sulphur Creek during the month of August as part of an intensive water quality study. The stations sampled were SLRL-1 and SLRL-3. DO concentrations at both stations remained within normal levels during this sampling event, ranging between 7.45 mg/l and 9.78 mg/l, further providing evidence that Sulphur Creek is not impaired for nutrients. The diurnal data for each station is shown in Figures 5 and 6.

Figure 5: Diurnal Data Summary for Station SLRL-1 (August 2013)

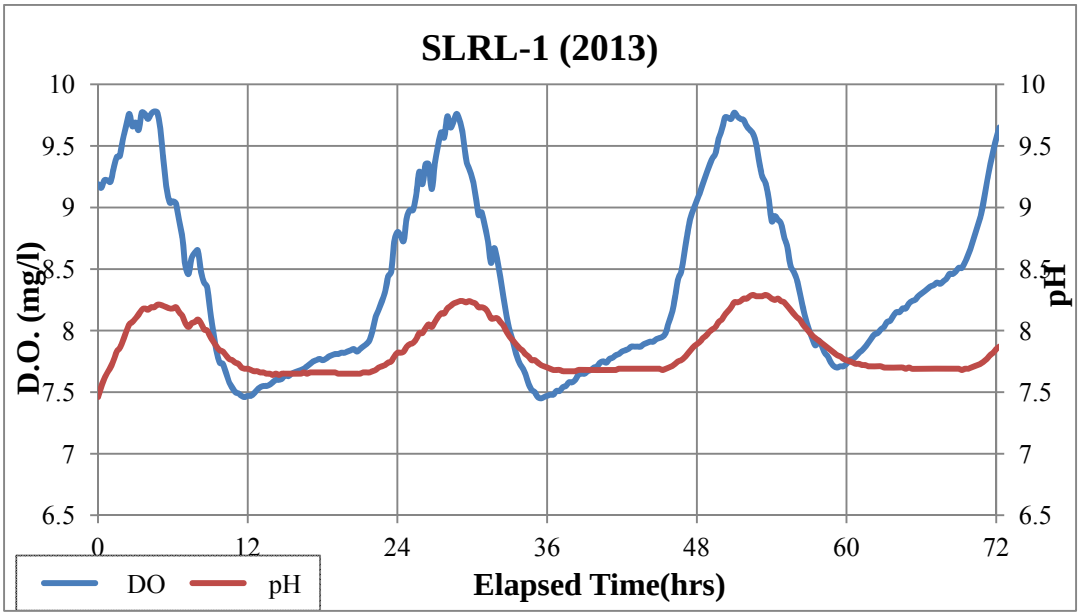
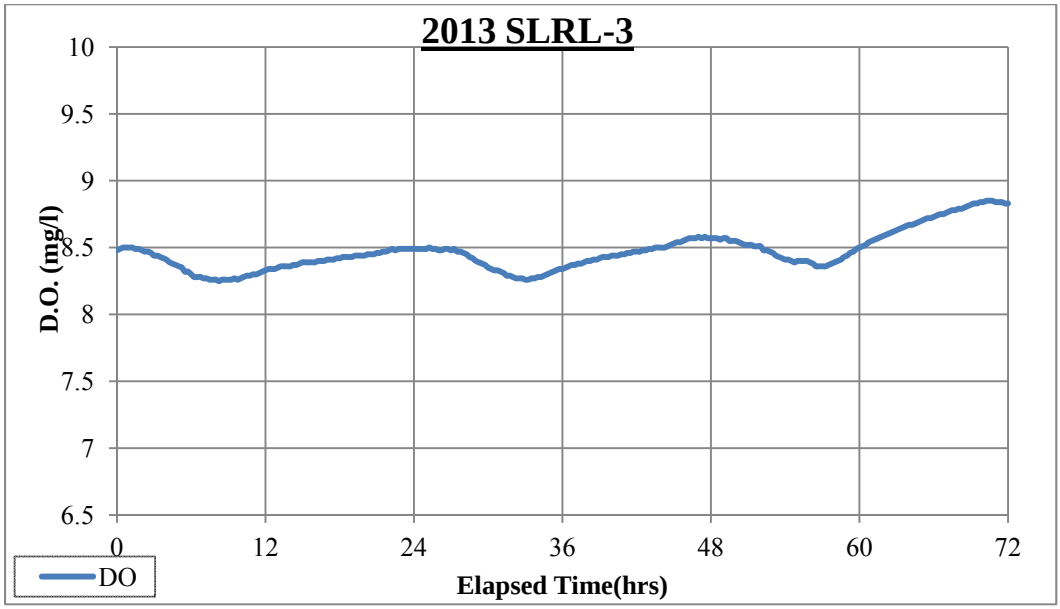
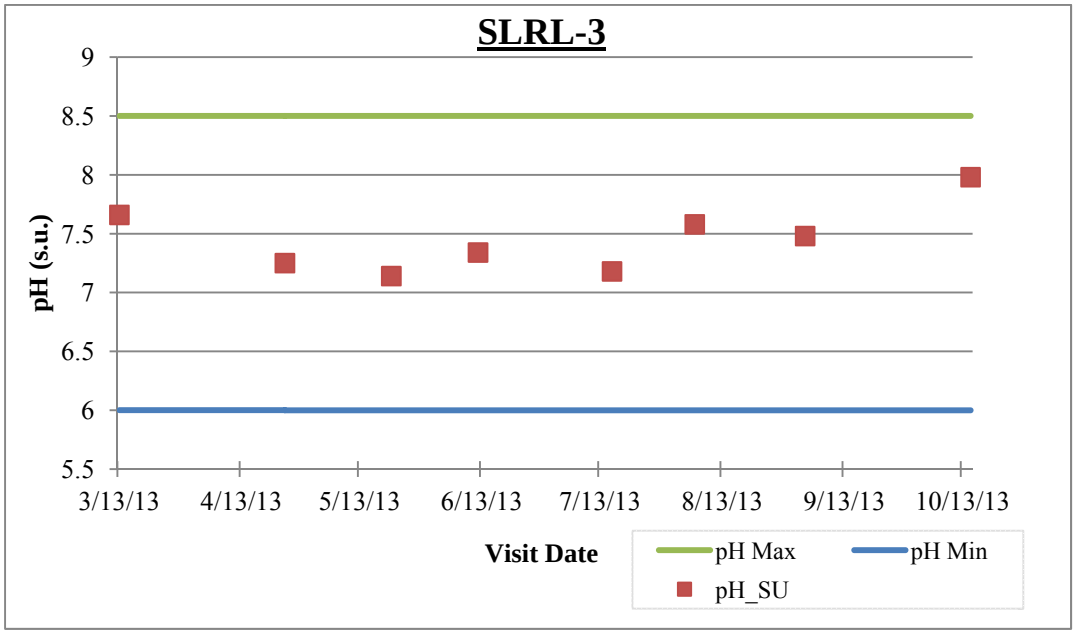


Figure 6: Diurnal Data Summary for Station SLRL-3 (August 2013)



During the August 2013 study, the pH at station SLRL-1 remained in acceptable range. The pH probe used at station SLRL-3 failed post calibration; therefore, pH readings at SLRL-3 are not considered reliable for the 2013 sampling trip. However, eight pH readings were collected during monthly water quality sampling in 2013. The 2013 pH readings did not exceed ADEM's criteria, ranging between 6.0 and 8.5 s.u., as shown in Figure 7.

Figure 7: Water Quality Data vs. pH Criteria



Habitat and Macroinvertebrate (Ephemeroptera-Plecoptera-Trichoptera taxa) assessments were performed by ADEM's Field Operations Division at SLRL-1. In 2013, the habitat assessment score came to an "optimal" rating. There was an indication of vegetation on the bedrock from the instream habitat quality score. SLRL-1 shows optimal levels of sediment deposition. Sinuosity, a measure of diversity of the habitat, was measured to be optimal at SLRL-1. Riparian buffer, which protects streams from pollutants, scored sub-optimal. The macroinvertebrate assessments for station SLRL-1 scored "fair," indicating compliance. A complete list of available data used in this delisting report and pictures of both stations can be found in Appendices 7.2-7.5.

Based on the instream nutrient values, pH readings, habitat and macroinvertebrate assessments, and dissolved oxygen concentrations, ADEM does not consider Sulphur Creek to be impaired as a result of nutrient over enrichment. The Department concludes that even though total nitrogen concentrations are elevated above reference conditions, the overall water quality data and watershed information support the delisting decision. The available data that was utilized to support this delisting decision can be found in Appendix 7.2.

5.0 Conclusions

From examination of all available water quality data and information provided for Sulphur Creek, ADEM has determined that an impairment due to nutrients does not currently exist. Therefore, ADEM will not develop a TMDL for this pollutant in light of "more recent data," which is just cause for delisting a waterbody according to Title 40 of the Code of Federal Regulations (CFR), Part 130.7(b)(6)(iv). Sulphur Creek will be proposed for delisting as a part of the development process for Alabama's *2016 §303(d) List of Impaired Waters.*

6.0 Public Participation

As part of the public participation process, this Delisting Decision (DD) will be placed on public notice and made available for review and comment. A public notice will be prepared and published in the major daily newspapers in Montgomery, Huntsville, Birmingham, and Mobile, as well as submitted to persons who have requested to be on ADEM's postal and electronic mailing distributions. In addition, the public notice and subject document will be made available on ADEM's Website: www.adem.state.al.us. The public can also request paper or electronic copies of the report by contacting Ms. Kimberly Minton at 334-271-7826 or kminton@adem.state.al.us. The public will be given an opportunity to review the DD and submit comments to the Department in writing. At the end of the public review period, all written comments received during the public notice period will become part of the administrative record. ADEM will consider all comments received by the public prior to finalization of this DD and subsequent submission to EPA Region 4 for final review and approval.

7.0 Appendices

7.1 References

1. Alabama Department of Environmental Management, 2008-2014 Section 303(d) List

2. Alabama's 303(d) Monitoring Program. 2004-2005 & 2013. ADEM.

3. Alabama's Water Quality Monitoring of Elk River-Grant Stations. 2006. ADEM.

4. ADEM Administrative Code, 2013. Water Quality Program, Chapter 335-6-10, Water Quality Criteria, and Chapter 335-6-11, Use Classifications for Interstate and Intrastate Waters.

5. United States Environmental Protection Agency. 1991. *Guidance for Water Quality-Based Decisions: The TMDL Process*, Office of Water, EPA 440/4-91-001.

6. Alabama Department of Environmental Management, Water Quality Assessment and Listing Methodology (ADEM 2014).

7. USEPA 304(a) National Recommended Water Quality Criteria (EPA OST, 2009).

8. Alabama Department of Environmental Management. *Alabama's 2010 Ecoregional Reference Guidelines*. 2010. ADEM

7.2 Water Quality Data

Table 10: Sulphur Creek Water Quality Data 2004-2006.

Station ID	Visit Date	pH_SU	DO mgl	NO3 NO2 N mgl	TKN mgl	TKN dc	TN	Total P mgl	Total P dc
SLRL-1	3/16/2004	7.93	10.92	1.014	0.397		1.411	0.08	
SLRL-1	4/8/2004	8.61	12.32	1.257	0.226		1.483	0.01	< MDL .02
SLRL-1	5/13/2004	8.05	9.2	1.773	0.166		1.939	0.115	
SLRL-1	6/23/2004	7.99	8.35	1.28	0.075	< MDL .15	1.355	0.089	
SLRL-1	7/12/2004	8.41	10.33	1.29	0.075	< MDL .15	1.365	0.054	
SLRL-1	9/14/2004	7.33	8.22	1.072	0.202		1.274	0.055	
SLRL-1	10/6/2004	8.49	11.45	1.017	0.075	< MDL .15	1.092	0.03	
SLRL-1	3/16/2005	8.05	12.94	1.482	0.075	< MDL .15	1.557	0.05	< MDL .1
SLRL-1	4/5/2005	7.83	10.94	1.019	0.075	< MDL .15	1.094	0.05	< MDL .1
SLRL-1	5/5/2005	8.59	12.61	1.315	0.075	< MDL .15	1.39	0.05	< MDL .1
SLRL-1	6/8/2005	8.37	8.93	1.411	0.075	< MDL .15	1.486	0.05	< MDL .1
SLRL-1	7/21/2005	8.32	9.57	1.219	0.075	< MDL .15	1.294	0.05	< MDL .1
SLRL-1	8/30/2005	7.88	8.59	0.543	0.832		1.375	0.209	
SLRL-1	9/19/2005	8.21	10.23	0.834	0.322		1.156	0.05	< MDL .1
SLRL-1	10/18/2005	8.24	12.61	1.13	0.351		1.481	0.05	< MDL .1
SLRL-1	3/13/2006	8.56	13.52	1.126	0.219		1.345	0.05	< MDL .1
SLRL-1	4/20/2006	7.96	9	1.507	0.19		1.697	0.05	< MDL .1
SLRL-1	5/8/2006	8.38	10.87	1.242	0.171		1.413	0.05	< MDL .1
SLRL-1	6/15/2006	8.62	8.33	1.449	0.075	< MDL .15	1.524	0.05	< MDL .1
SLRL-1	7/17/2006	8.64	10.22	1.111	0.342		1.453	0.05	< MDL .1
SLRL-1	8/29/2006	7.92	7.56	0.718	0.185		0.903	0.05	< MDL .1
SLRL-1	9/7/2006	8.32	9.97	0.667	0.075	< MDL .15	0.742	0.05	< MDL .1
SLRL-1	10/5/2006	8.43	10.51	0.59	0.173		0.763	0.05	< MDL .1

Note: Sample less than MDL recorded as half MDL

Table 11: Water Quality Data (DO, T H20, pH) 2013

Station ID	Activity Date	T H2O C	DO mgl	pH_SU
SLRL-1	3/13/2013	10.47	11.97	7.94
SLRL-1	4/24/2013	14.88	9.55	7.78
SLRL-1	5/21/2013	18.6	9.95	7.86
SLRL-1	6/12/2013	21.07	9.23	7.73
SLRL-1	7/16/2013	25.36	9.36	8.43
SLRL-1	8/6/2013	22.55	8.55	8.17
SLRL-1	9/3/2013	27.54	8.34	8.4
SLRL-1	10/15/2013	21.04	9.98	8.85
SLRL-3	3/13/2013	11.6	10.71	7.66
SLRL-3	4/24/2013	14.25	9.31	7.25
SLRL-3	5/21/2013	16.05	9.2	7.14
SLRL-3	6/12/2013	17.27	8.54	7.34
SLRL-3	7/16/2013	19.15	8.41	7.18
SLRL-3	8/6/2013	18.63	8	7.58
SLRL-3	9/3/2013	19.68	8.29	7.48
SLRL-3	10/15/2013	17.8	8.76	7.98

Table 12: Water Quality Data (TP, TN, chl a) 2013

Station ID	Visit Date	Chl A ugl	Chl A dc	NO3 NO2 N mgl	TKN mgl	TKN dc	TN	Total P mgl
SLRL-1	3/13/2013			1.29	0.266		1.556	0.037
SLRL-1	4/24/2013	1.07		1.32	0.304		1.624	0.033
SLRL-1	5/21/2013	1.07		1.44	0.306		1.746	0.042
SLRL-1	6/12/2013	2.67		1.35	0.071	< MDL .071	1.421	0.062
SLRL-1	7/16/2013	1.07		1.62	0.205		1.825	0.036
SLRL-1	8/6/2013	2.67		1.11	0.483		1.593	0.048
SLRL-1	9/3/2013	1.07		1.2	0.384		1.584	0.077
SLRL-1	10/15/2013	1.34		1.05	0.273		1.323	0.0884
SLRL-3	3/13/2013			1.67	0.239		1.909	0.029
SLRL-3	4/24/2013	1	< MDL 1	1.78	0.42		2.2	0.039
SLRL-3	5/21/2013			1.85	0.094	JI	1.944	0.018
SLRL-3	6/12/2013	2.14		1.81	0.071	< MDL .071	1.881	0.031
SLRL-3	7/16/2013	1	< MDL 1	1.95	0.231		2.181	0.02
SLRL-3	8/6/2013	4.27		1.82	0.362		2.182	0.019
SLRL-3	9/3/2013	1.07		1.77	0.34		2.11	0.02
SLRL-3	10/15/2013	1	< MDL 1	1.67	0.136	< MDL .136	1.806	0.0279

Table 13: 72 hour Diurnal Data 2013

Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH		Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH
SLRL-1	8/12/2013	9:00:40	0	21.53	9.19	7.46		SLRL-3	8/12/2013	10:00:42	0	18.5	8.48	5.26
SLRL-1	8/12/2013	9:15:40	0.25	21.66	9.16	7.54		SLRL-3	8/12/2013	10:15:42	0.25	18.54	8.49	14
SLRL-1	8/12/2013	9:30:40	0.5	21.8	9.22	7.61		SLRL-3	8/12/2013	10:30:42	0.5	18.6	8.5	14
SLRL-1	8/12/2013	9:45:40	0.75	21.96	9.22	7.66		SLRL-3	8/12/2013	10:45:42	0.75	18.64	8.5	14
SLRL-1	8/12/2013	10:00:40	1	22.05	9.21	7.7		SLRL-3	8/12/2013	11:00:42	1	18.67	8.5	14
SLRL-1	8/12/2013	10:15:40	1.25	22.25	9.32	7.76		SLRL-3	8/12/2013	11:15:42	1.25	18.72	8.5	14
SLRL-1	8/12/2013	10:30:40	1.5	22.5	9.41	7.83		SLRL-3	8/12/2013	11:30:42	1.5	18.76	8.49	14
SLRL-1	8/12/2013	10:45:40	1.75	22.68	9.42	7.86		SLRL-3	8/12/2013	11:45:42	1.75	18.81	8.49	14
SLRL-1	8/12/2013	11:00:40	2	22.87	9.56	7.92		SLRL-3	8/12/2013	12:00:42	2	18.84	8.48	14
SLRL-1	8/12/2013	11:15:40	2.25	23.19	9.66	7.99		SLRL-3	8/12/2013	12:15:42	2.25	18.88	8.47	14
SLRL-1	8/12/2013	11:30:40	2.5	23.44	9.76	8.05		SLRL-3	8/12/2013	12:30:42	2.5	18.93	8.47	14
SLRL-1	8/12/2013	11:45:40	2.75	23.53	9.66	8.07		SLRL-3	8/12/2013	12:45:42	2.75	18.97	8.46	14
SLRL-1	8/12/2013	12:00:40	3	23.71	9.69	8.1		SLRL-3	8/12/2013	13:00:42	3	19	8.44	14
SLRL-1	8/12/2013	12:15:40	3.25	23.85	9.63	8.13		SLRL-3	8/12/2013	13:15:42	3.25	19.05	8.44	14
SLRL-1	8/12/2013	12:30:40	3.5	24.17	9.77	8.17		SLRL-3	8/12/2013	13:30:42	3.5	19.13	8.43	14
SLRL-1	8/12/2013	12:45:40	3.75	24.45	9.76	8.18		SLRL-3	8/12/2013	13:45:42	3.75	19.24	8.42	14
SLRL-1	8/12/2013	13:00:40	4	24.79	9.72	8.17		SLRL-3	8/12/2013	14:00:42	4	19.33	8.41	14
SLRL-1	8/12/2013	13:15:40	4.25	25.03	9.76	8.19		SLRL-3	8/12/2013	14:15:42	4.25	19.37	8.39	14
SLRL-1	8/12/2013	13:30:40	4.5	25.22	9.78	8.19		SLRL-3	8/12/2013	14:30:42	4.5	19.42	8.38	14
SLRL-1	8/12/2013	13:45:40	4.75	25.47	9.77	8.21		SLRL-3	8/12/2013	14:45:42	4.75	19.46	8.37	14
SLRL-1	8/12/2013	14:00:40	5	25.59	9.63	8.21		SLRL-3	8/12/2013	15:00:42	5	19.51	8.36	14
SLRL-1	8/12/2013	14:15:40	5.25	25.78	9.37	8.2		SLRL-3	8/12/2013	15:15:42	5.25	19.52	8.35	14
SLRL-1	8/12/2013	14:30:40	5.5	25.89	9.15	8.19		SLRL-3	8/12/2013	15:30:42	5.5	19.51	8.32	14
SLRL-1	8/12/2013	14:45:40	5.75	25.97	9.04	8.18		SLRL-3	8/12/2013	15:45:42	5.75	19.52	8.32	14
SLRL-1	8/12/2013	15:00:40	6	26.04	9.05	8.18		SLRL-3	8/12/2013	16:00:42	6	19.53	8.3	14
SLRL-1	8/12/2013	15:15:40	6.25	25.95	9.03	8.19		SLRL-3	8/12/2013	16:15:42	6.25	19.54	8.28	14
SLRL-1	8/12/2013	15:30:40	6.5	25.73	8.89	8.15		SLRL-3	8/12/2013	16:30:42	6.5	19.57	8.28	14
SLRL-1	8/12/2013	15:45:40	6.75	25.53	8.76	8.12		SLRL-3	8/12/2013	16:45:42	6.75	19.6	8.28	14
SLRL-1	8/12/2013	16:00:40	7	25.35	8.52	8.06		SLRL-3	8/12/2013	17:00:42	7	19.63	8.27	14
SLRL-1	8/12/2013	16:15:40	7.25	25.27	8.46	8.03		SLRL-3	8/12/2013	17:15:42	7.25	19.64	8.27	14
SLRL-1	8/12/2013	16:30:40	7.5	25.29	8.59	8.06		SLRL-3	8/12/2013	17:30:42	7.5	19.63	8.26	14
SLRL-1	8/12/2013	16:45:40	7.75	25.34	8.63	8.07		SLRL-3	8/12/2013	17:45:42	7.75	19.63	8.26	14
SLRL-1	8/12/2013	17:00:40	8	25.39	8.65	8.09		SLRL-3	8/12/2013	18:00:42	8	19.64	8.26	14
SLRL-1	8/12/2013	17:15:40	8.25	25.3	8.48	8.06		SLRL-3	8/12/2013	18:15:42	8.25	19.64	8.25	14
SLRL-1	8/12/2013	17:30:40	8.5	25.17	8.39	8.01		SLRL-3	8/12/2013	18:30:42	8.5	19.59	8.26	14
SLRL-1	8/12/2013	17:45:40	8.75	25.08	8.35	8		SLRL-3	8/12/2013	18:45:42	8.75	19.54	8.26	14
SLRL-1	8/12/2013	18:00:40	9	24.95	8.15	7.95		SLRL-3	8/12/2013	19:00:42	9	19.51	8.26	14
SLRL-1	8/12/2013	18:15:40	9.25	24.81	7.98	7.91		SLRL-3	8/12/2013	19:15:42	9.25	19.47	8.26	14
SLRL-1	8/12/2013	18:30:40	9.5	24.64	7.83	7.87		SLRL-3	8/12/2013	19:30:42	9.5	19.44	8.27	14
SLRL-1	8/12/2013	18:45:40	9.75	24.5	7.74	7.84		SLRL-3	8/12/2013	19:45:42	9.75	19.4	8.26	14
SLRL-1	8/12/2013	19:00:40	10	24.37	7.73	7.83		SLRL-3	8/12/2013	20:00:42	10	19.37	8.27	14
SLRL-1	8/12/2013	19:15:40	10.25	24.27	7.66	7.8		SLRL-3	8/12/2013	20:15:42	10.25	19.33	8.28	14
SLRL-1	8/12/2013	19:30:40	10.5	24.15	7.58	7.77		SLRL-3	8/12/2013	20:30:42	10.5	19.29	8.29	14
SLRL-1	8/12/2013	19:45:40	10.75	24.04	7.54	7.76		SLRL-3	8/12/2013	20:45:42	10.75	19.26	8.29	14
SLRL-1	8/12/2013	20:00:40	11	23.93	7.5	7.74		SLRL-3	8/12/2013	21:00:42	11	19.22	8.3	14
SLRL-1	8/12/2013	20:15:40	11.25	23.82	7.49	7.73		SLRL-3	8/12/2013	21:15:42	11.25	19.18	8.3	14
SLRL-1	8/12/2013	20:30:40	11.5	23.72	7.47	7.7		SLRL-3	8/12/2013	21:30:42	11.5	19.15	8.31	14
SLRL-1	8/12/2013	20:45:40	11.75	23.62	7.46	7.69		SLRL-3	8/12/2013	21:45:42	11.75	19.11	8.32	14
SLRL-1	8/12/2013	21:00:40	12	23.52	7.47	7.69		SLRL-3	8/12/2013	22:00:42	12	19.07	8.33	14
SLRL-1	8/12/2013	21:15:40	12.25	23.43	7.47	7.68		SLRL-3	8/12/2013	22:15:42	12.25	19.04	8.34	14
SLRL-1	8/12/2013	21:30:40	12.5	23.33	7.49	7.67		SLRL-3	8/12/2013	22:30:42	12.5	19.01	8.34	14
SLRL-1	8/12/2013	21:45:40	12.75	23.24	7.52	7.67		SLRL-3	8/12/2013	22:45:42	12.75	18.98	8.34	14
SLRL-1	8/12/2013	22:00:40	13	23.15	7.54	7.66		SLRL-3	8/12/2013	23:00:42	13	18.95	8.35	14
SLRL-1	8/12/2013	22:15:40	13.25	23.08	7.55	7.66		SLRL-3	8/12/2013	23:15:42	13.25	18.94	8.36	14
SLRL-1	8/12/2013	22:30:40	13.5	23.02	7.55	7.65		SLRL-3	8/12/2013	23:30:42	13.5	18.92	8.36	14
SLRL-1	8/12/2013	22:45:40	13.75	22.95	7.56	7.65		SLRL-3	8/12/2013	23:45:42	13.75	18.9	8.36	14
SLRL-1	8/12/2013	23:00:40	14	22.89	7.58	7.64		SLRL-3	8/13/2013	0:00:42	14	18.87	8.36	14
SLRL-1	8/12/2013	23:15:40	14.25	22.83	7.6	7.65		SLRL-3	8/13/2013	0:15:42	14.25	18.85	8.37	14
SLRL-1	8/12/2013	23:30:40	14.5	22.77	7.6	7.64		SLRL-3	8/13/2013	0:30:42	14.5	18.82	8.37	14
SLRL-1	8/12/2013	23:45:40	14.75	22.71	7.61	7.65		SLRL-3	8/13/2013	0:45:42	14.75	18.8	8.38	14
SLRL-1	8/13/2013	0:00:40	15	22.63	7.64	7.65		SLRL-3	8/13/2013	1:00:42	15	18.78	8.39	14
SLRL-1	8/13/2013	0:15:40	15.25	22.58	7.63	7.65		SLRL-3	8/13/2013	1:15:42	15.25	18.77	8.39	14

Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH		Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH
SLRL-1	8/13/2013	0:30:40	15.5	22.52	7.65	7.65		SLRL-3	8/13/2013	1:30:42	15.5	18.74	8.39	14
SLRL-1	8/13/2013	0:45:40	15.75	22.46	7.66	7.65		SLRL-3	8/13/2013	1:45:42	15.75	18.72	8.39	14
SLRL-1	8/13/2013	1:00:40	16	22.41	7.67	7.65		SLRL-3	8/13/2013	2:00:42	16	18.7	8.39	14
SLRL-1	8/13/2013	1:15:40	16.25	22.36	7.68	7.65		SLRL-3	8/13/2013	2:15:42	16.25	18.69	8.4	14
SLRL-1	8/13/2013	1:30:40	16.5	22.31	7.69	7.66		SLRL-3	8/13/2013	2:30:42	16.5	18.67	8.4	14
SLRL-1	8/13/2013	1:45:40	16.75	22.26	7.71	7.65		SLRL-3	8/13/2013	2:45:42	16.75	18.65	8.4	14
SLRL-1	8/13/2013	2:00:40	17	22.2	7.73	7.66		SLRL-3	8/13/2013	3:00:42	17	18.63	8.41	14
SLRL-1	8/13/2013	2:15:40	17.25	22.15	7.75	7.66		SLRL-3	8/13/2013	3:15:42	17.25	18.61	8.41	14
SLRL-1	8/13/2013	2:30:40	17.5	22.11	7.76	7.66		SLRL-3	8/13/2013	3:30:42	17.5	18.6	8.41	14
SLRL-1	8/13/2013	2:45:40	17.75	22.06	7.77	7.66		SLRL-3	8/13/2013	3:45:42	17.75	18.58	8.42	14
SLRL-1	8/13/2013	3:00:40	18	22.03	7.76	7.66		SLRL-3	8/13/2013	4:00:42	18	18.57	8.42	14
SLRL-1	8/13/2013	3:15:40	18.25	22	7.77	7.66		SLRL-3	8/13/2013	4:15:42	18.25	18.55	8.43	14
SLRL-1	8/13/2013	3:30:40	18.5	21.96	7.79	7.66		SLRL-3	8/13/2013	4:30:42	18.5	18.55	8.43	14
SLRL-1	8/13/2013	3:45:40	18.75	21.92	7.8	7.66		SLRL-3	8/13/2013	4:45:42	18.75	18.54	8.43	14
SLRL-1	8/13/2013	4:00:40	19	21.89	7.81	7.66		SLRL-3	8/13/2013	5:00:42	19	18.52	8.43	14
SLRL-1	8/13/2013	4:15:40	19.25	21.87	7.81	7.65		SLRL-3	8/13/2013	5:15:42	19.25	18.51	8.44	14
SLRL-1	8/13/2013	4:30:40	19.5	21.85	7.82	7.65		SLRL-3	8/13/2013	5:30:42	19.5	18.5	8.44	14
SLRL-1	8/13/2013	4:45:40	19.75	21.82	7.82	7.65		SLRL-3	8/13/2013	5:45:42	19.75	18.49	8.44	14
SLRL-1	8/13/2013	5:00:40	20	21.79	7.83	7.65		SLRL-3	8/13/2013	6:00:42	20	18.48	8.44	14
SLRL-1	8/13/2013	5:15:40	20.25	21.77	7.84	7.65		SLRL-3	8/13/2013	6:15:42	20.25	18.47	8.45	14
SLRL-1	8/13/2013	5:30:40	20.5	21.73	7.85	7.65		SLRL-3	8/13/2013	6:30:42	20.5	18.46	8.45	14
SLRL-1	8/13/2013	5:45:40	20.75	21.71	7.83	7.65		SLRL-3	8/13/2013	6:45:42	20.75	18.46	8.45	14
SLRL-1	8/13/2013	6:00:40	21	21.68	7.85	7.65		SLRL-3	8/13/2013	7:00:42	21	18.45	8.46	14
SLRL-1	8/13/2013	6:15:40	21.25	21.66	7.87	7.66		SLRL-3	8/13/2013	7:15:42	21.25	18.44	8.46	14
SLRL-1	8/13/2013	6:30:40	21.5	21.63	7.89	7.66		SLRL-3	8/13/2013	7:30:42	21.5	18.44	8.47	14
SLRL-1	8/13/2013	6:45:40	21.75	21.61	7.92	7.66		SLRL-3	8/13/2013	7:45:42	21.75	18.44	8.47	14
SLRL-1	8/13/2013	7:00:40	22	21.58	8	7.67		SLRL-3	8/13/2013	8:00:42	22	18.46	8.48	14
SLRL-1	8/13/2013	7:15:40	22.25	21.59	8.11	7.68		SLRL-3	8/13/2013	8:15:42	22.25	18.47	8.49	14
SLRL-1	8/13/2013	7:30:40	22.5	21.59	8.17	7.7		SLRL-3	8/13/2013	8:30:42	22.5	18.48	8.48	14
SLRL-1	8/13/2013	7:45:40	22.75	21.6	8.24	7.71		SLRL-3	8/13/2013	8:45:42	22.75	18.49	8.49	14
SLRL-1	8/13/2013	8:00:40	23	21.63	8.31	7.72		SLRL-3	8/13/2013	9:00:42	23	18.51	8.49	14
SLRL-1	8/13/2013	8:15:40	23.25	21.68	8.44	7.74		SLRL-3	8/13/2013	9:15:42	23.25	18.53	8.49	14
SLRL-1	8/13/2013	8:30:40	23.5	21.72	8.48	7.75		SLRL-3	8/13/2013	9:30:42	23.5	18.53	8.49	14
SLRL-1	8/13/2013	8:45:40	23.75	21.86	8.73	7.79		SLRL-3	8/13/2013	9:45:42	23.75	18.54	8.49	14
SLRL-1	8/13/2013	9:00:40	24	21.88	8.8	7.82		SLRL-3	8/13/2013	10:00:42	24	18.55	8.49	14
SLRL-1	8/13/2013	9:15:40	24.25	21.86	8.77	7.82		SLRL-3	8/13/2013	10:15:42	24.25	18.57	8.49	14
SLRL-1	8/13/2013	9:30:40	24.5	21.92	8.73	7.83		SLRL-3	8/13/2013	10:30:42	24.5	18.59	8.49	14
SLRL-1	8/13/2013	9:45:40	24.75	22	8.92	7.87		SLRL-3	8/13/2013	10:45:42	24.75	18.6	8.49	14
SLRL-1	8/13/2013	10:00:40	25	22.06	8.98	7.89		SLRL-3	8/13/2013	11:00:42	25	18.63	8.49	14
SLRL-1	8/13/2013	10:15:40	25.25	22.11	8.98	7.9		SLRL-3	8/13/2013	11:15:42	25.25	18.64	8.5	14
SLRL-1	8/13/2013	10:30:40	25.5	22.2	9.1	7.93		SLRL-3	8/13/2013	11:30:42	25.5	18.66	8.49	14
SLRL-1	8/13/2013	10:45:40	25.75	22.34	9.29	7.98		SLRL-3	8/13/2013	11:45:42	25.75	18.68	8.49	14
SLRL-1	8/13/2013	11:00:40	26	22.38	9.19	7.98		SLRL-3	8/13/2013	12:00:42	26	18.71	8.48	14
SLRL-1	8/13/2013	11:15:40	26.25	22.57	9.35	8.02		SLRL-3	8/13/2013	12:15:42	26.25	18.73	8.48	14
SLRL-1	8/13/2013	11:30:40	26.5	22.64	9.35	8.05		SLRL-3	8/13/2013	12:30:42	26.5	18.78	8.49	14
SLRL-1	8/13/2013	11:45:40	26.75	22.65	9.15	8.03		SLRL-3	8/13/2013	12:45:42	26.75	18.82	8.49	14
SLRL-1	8/13/2013	12:00:40	27	22.78	9.36	8.07		SLRL-3	8/13/2013	13:00:42	27	18.85	8.48	14
SLRL-1	8/13/2013	12:15:40	27.25	23.01	9.5	8.11		SLRL-3	8/13/2013	13:15:42	27.25	18.86	8.49	14
SLRL-1	8/13/2013	12:30:40	27.5	23.19	9.61	8.14		SLRL-3	8/13/2013	13:30:42	27.5	18.89	8.47	14
SLRL-1	8/13/2013	12:45:40	27.75	23.33	9.57	8.14		SLRL-3	8/13/2013	13:45:42	27.75	18.95	8.47	14
SLRL-1	8/13/2013	13:00:40	28	23.55	9.74	8.18		SLRL-3	8/13/2013	14:00:42	28	19.03	8.46	14
SLRL-1	8/13/2013	13:15:40	28.25	23.69	9.65	8.2		SLRL-3	8/13/2013	14:15:42	28.25	19.11	8.45	14
SLRL-1	8/13/2013	13:30:40	28.5	23.87	9.7	8.22		SLRL-3	8/13/2013	14:30:42	28.5	19.1	8.43	14
SLRL-1	8/13/2013	13:45:40	28.75	24.16	9.76	8.23		SLRL-3	8/13/2013	14:45:42	28.75	19.12	8.42	14
SLRL-1	8/13/2013	14:00:40	29	24.53	9.7	8.24		SLRL-3	8/13/2013	15:00:42	29	19.16	8.4	14
SLRL-1	8/13/2013	14:15:40	29.25	24.72	9.59	8.24		SLRL-3	8/13/2013	15:15:42	29.25	19.2	8.39	14
SLRL-1	8/13/2013	14:30:40	29.5	24.79	9.39	8.23		SLRL-3	8/13/2013	15:30:42	29.5	19.25	8.38	14
SLRL-1	8/13/2013	14:45:40	29.75	25.01	9.31	8.24		SLRL-3	8/13/2013	15:45:42	29.75	19.28	8.37	14
SLRL-1	8/13/2013	15:00:40	30	25.17	9.24	8.23		SLRL-3	8/13/2013	16:00:42	30	19.29	8.35	14
SLRL-1	8/13/2013	15:15:40	30.25	25.21	9.11	8.22		SLRL-3	8/13/2013	16:15:42	30.25	19.31	8.34	14
SLRL-1	8/13/2013	15:30:40	30.5	25.16	8.94	8.19		SLRL-3	8/13/2013	16:30:42	30.5	19.32	8.33	14
SLRL-1	8/13/2013	15:45:40	30.75	25.23	8.96	8.19		SLRL-3	8/13/2013	16:45:42	30.75	19.34	8.33	14
SLRL-1	8/13/2013	16:00:40	31	25.18	8.85	8.18		SLRL-3	8/13/2013	17:00:42	31	19.38	8.32	14

Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH		Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH
SLRL-1	8/13/2013	16:15:40	31.25	25.02	8.73	8.15		SLRL-3	8/13/2013	17:15:42	31.25	19.41	8.31	14
SLRL-1	8/13/2013	16:30:40	31.5	24.84	8.55	8.1		SLRL-3	8/13/2013	17:30:42	31.5	19.41	8.29	14
SLRL-1	8/13/2013	16:45:40	31.75	24.81	8.67	8.1		SLRL-3	8/13/2013	17:45:42	31.75	19.39	8.29	14
SLRL-1	8/13/2013	17:00:40	32	24.79	8.58	8.1		SLRL-3	8/13/2013	18:00:42	32	19.38	8.28	14
SLRL-1	8/13/2013	17:15:40	32.25	24.73	8.42	8.07		SLRL-3	8/13/2013	18:15:42	32.25	19.38	8.27	14
SLRL-1	8/13/2013	17:30:40	32.5	24.65	8.28	8.04		SLRL-3	8/13/2013	18:30:42	32.5	19.37	8.27	14
SLRL-1	8/13/2013	17:45:40	32.75	24.55	8.11	7.99		SLRL-3	8/13/2013	18:45:42	32.75	19.36	8.27	14
SLRL-1	8/13/2013	18:00:40	33	24.45	8	7.95		SLRL-3	8/13/2013	19:00:42	33	19.34	8.26	14
SLRL-1	8/13/2013	18:15:40	33.25	24.36	7.91	7.92		SLRL-3	8/13/2013	19:15:42	33.25	19.32	8.26	14
SLRL-1	8/13/2013	18:30:40	33.5	24.27	7.82	7.89		SLRL-3	8/13/2013	19:30:42	33.5	19.3	8.27	14
SLRL-1	8/13/2013	18:45:40	33.75	24.19	7.74	7.86		SLRL-3	8/13/2013	19:45:42	33.75	19.27	8.27	14
SLRL-1	8/13/2013	19:00:40	34	24.11	7.7	7.84		SLRL-3	8/13/2013	20:00:42	34	19.25	8.28	14
SLRL-1	8/13/2013	19:15:40	34.25	24.02	7.65	7.81		SLRL-3	8/13/2013	20:15:42	34.25	19.22	8.28	14
SLRL-1	8/13/2013	19:30:40	34.5	23.92	7.57	7.79		SLRL-3	8/13/2013	20:30:42	34.5	19.18	8.29	14
SLRL-1	8/13/2013	19:45:40	34.75	23.83	7.52	7.76		SLRL-3	8/13/2013	20:45:42	34.75	19.16	8.3	14
SLRL-1	8/13/2013	20:00:40	35	23.72	7.5	7.76		SLRL-3	8/13/2013	21:00:42	35	19.13	8.31	14
SLRL-1	8/13/2013	20:15:40	35.25	23.62	7.46	7.74		SLRL-3	8/13/2013	21:15:42	35.25	19.09	8.32	14
SLRL-1	8/13/2013	20:30:40	35.5	23.52	7.45	7.72		SLRL-3	8/13/2013	21:30:42	35.5	19.06	8.33	14
SLRL-1	8/13/2013	20:45:40	35.75	23.42	7.46	7.71		SLRL-3	8/13/2013	21:45:42	35.75	19.03	8.34	14
SLRL-1	8/13/2013	21:00:40	36	23.31	7.47	7.7		SLRL-3	8/13/2013	22:00:42	36	19	8.34	14
SLRL-1	8/13/2013	21:15:40	36.25	23.21	7.48	7.69		SLRL-3	8/13/2013	22:15:42	36.25	18.97	8.35	14
SLRL-1	8/13/2013	21:30:40	36.5	23.11	7.48	7.68		SLRL-3	8/13/2013	22:30:42	36.5	18.95	8.36	14
SLRL-1	8/13/2013	21:45:40	36.75	23.01	7.51	7.68		SLRL-3	8/13/2013	22:45:42	36.75	18.92	8.37	14
SLRL-1	8/13/2013	22:00:40	37	22.91	7.51	7.68		SLRL-3	8/13/2013	23:00:42	37	18.89	8.37	14
SLRL-1	8/13/2013	22:15:40	37.25	22.82	7.54	7.67		SLRL-3	8/13/2013	23:15:42	37.25	18.86	8.38	14
SLRL-1	8/13/2013	22:30:40	37.5	22.74	7.55	7.67		SLRL-3	8/13/2013	23:30:42	37.5	18.83	8.38	14
SLRL-1	8/13/2013	22:45:40	37.75	22.67	7.58	7.67		SLRL-3	8/13/2013	23:45:42	37.75	18.81	8.39	14
SLRL-1	8/13/2013	23:00:40	38	22.58	7.58	7.67		SLRL-3	8/14/2013	0:00:42	38	18.78	8.4	14
SLRL-1	8/13/2013	23:15:40	38.25	22.49	7.6	7.67		SLRL-3	8/14/2013	0:15:42	38.25	18.75	8.4	14
SLRL-1	8/13/2013	23:30:40	38.5	22.41	7.64	7.68		SLRL-3	8/14/2013	0:30:42	38.5	18.73	8.41	14
SLRL-1	8/13/2013	23:45:40	38.75	22.34	7.65	7.68		SLRL-3	8/14/2013	0:45:42	38.75	18.71	8.41	14
SLRL-1	8/14/2013	0:00:40	39	22.27	7.65	7.68		SLRL-3	8/14/2013	1:00:42	39	18.69	8.42	14
SLRL-1	8/14/2013	0:15:40	39.25	22.21	7.67	7.68		SLRL-3	8/14/2013	1:15:42	39.25	18.68	8.43	14
SLRL-1	8/14/2013	0:30:40	39.5	22.15	7.68	7.68		SLRL-3	8/14/2013	1:30:42	39.5	18.66	8.43	14
SLRL-1	8/14/2013	0:45:40	39.75	22.08	7.7	7.68		SLRL-3	8/14/2013	1:45:42	39.75	18.63	8.43	14
SLRL-1	8/14/2013	1:00:40	40	22.03	7.71	7.68		SLRL-3	8/14/2013	2:00:42	40	18.61	8.44	14
SLRL-1	8/14/2013	1:15:40	40.25	21.97	7.74	7.68		SLRL-3	8/14/2013	2:15:42	40.25	18.6	8.44	14
SLRL-1	8/14/2013	1:30:40	40.5	21.92	7.75	7.68		SLRL-3	8/14/2013	2:30:42	40.5	18.58	8.44	14
SLRL-1	8/14/2013	1:45:40	40.75	21.87	7.74	7.68		SLRL-3	8/14/2013	2:45:42	40.75	18.57	8.45	14
SLRL-1	8/14/2013	2:00:40	41	21.82	7.77	7.68		SLRL-3	8/14/2013	3:00:42	41	18.55	8.45	14
SLRL-1	8/14/2013	2:15:40	41.25	21.78	7.78	7.68		SLRL-3	8/14/2013	3:15:42	41.25	18.53	8.46	14
SLRL-1	8/14/2013	2:30:40	41.5	21.73	7.8	7.68		SLRL-3	8/14/2013	3:30:42	41.5	18.51	8.46	14
SLRL-1	8/14/2013	2:45:40	41.75	21.68	7.81	7.69		SLRL-3	8/14/2013	3:45:42	41.75	18.5	8.47	14
SLRL-1	8/14/2013	3:00:40	42	21.62	7.83	7.69		SLRL-3	8/14/2013	4:00:42	42	18.48	8.47	14
SLRL-1	8/14/2013	3:15:40	42.25	21.57	7.84	7.69		SLRL-3	8/14/2013	4:15:42	42.25	18.47	8.47	14
SLRL-1	8/14/2013	3:30:40	42.5	21.52	7.85	7.69		SLRL-3	8/14/2013	4:30:42	42.5	18.46	8.48	14
SLRL-1	8/14/2013	3:45:40	42.75	21.48	7.87	7.69		SLRL-3	8/14/2013	4:45:42	42.75	18.45	8.48	14
SLRL-1	8/14/2013	4:00:40	43	21.43	7.87	7.69		SLRL-3	8/14/2013	5:00:42	43	18.44	8.49	14
SLRL-1	8/14/2013	4:15:40	43.25	21.39	7.87	7.69		SLRL-3	8/14/2013	5:15:42	43.25	18.42	8.49	14
SLRL-1	8/14/2013	4:30:40	43.5	21.36	7.87	7.69		SLRL-3	8/14/2013	5:30:42	43.5	18.4	8.5	14
SLRL-1	8/14/2013	4:45:40	43.75	21.31	7.89	7.69		SLRL-3	8/14/2013	5:45:42	43.75	18.38	8.5	14
SLRL-1	8/14/2013	5:00:40	44	21.27	7.9	7.69		SLRL-3	8/14/2013	6:00:42	44	18.36	8.5	14
SLRL-1	8/14/2013	5:15:40	44.25	21.22	7.91	7.69		SLRL-3	8/14/2013	6:15:42	44.25	18.34	8.5	14
SLRL-1	8/14/2013	5:30:40	44.5	21.17	7.91	7.69		SLRL-3	8/14/2013	6:30:42	44.5	18.32	8.51	14
SLRL-1	8/14/2013	5:45:40	44.75	21.11	7.93	7.69		SLRL-3	8/14/2013	6:45:42	44.75	18.3	8.52	14
SLRL-1	8/14/2013	6:00:40	45	21.05	7.94	7.69		SLRL-3	8/14/2013	7:00:42	45	18.28	8.53	14
SLRL-1	8/14/2013	6:15:40	45.25	20.99	7.95	7.68		SLRL-3	8/14/2013	7:15:42	45.25	18.26	8.54	14
SLRL-1	8/14/2013	6:30:40	45.5	20.94	7.98	7.69		SLRL-3	8/14/2013	7:30:42	45.5	18.24	8.54	14
SLRL-1	8/14/2013	6:45:40	45.75	20.88	8.07	7.7		SLRL-3	8/14/2013	7:45:42	45.75	18.23	8.55	14
SLRL-1	8/14/2013	7:00:40	46	20.83	8.14	7.71		SLRL-3	8/14/2013	8:00:42	46	18.22	8.56	14
SLRL-1	8/14/2013	7:15:40	46.25	20.8	8.27	7.73		SLRL-3	8/14/2013	8:15:42	46.25	18.22	8.57	14
SLRL-1	8/14/2013	7:30:40	46.5	20.78	8.42	7.75		SLRL-3	8/14/2013	8:30:42	46.5	18.21	8.57	14
SLRL-1	8/14/2013	7:45:40	46.75	20.77	8.48	7.76		SLRL-3	8/14/2013	8:45:42	46.75	18.21	8.57	14

Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH		Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH
SLRL-1	8/14/2013	8:00:40	47	20.77	8.63	7.78		SLRL-3	8/14/2013	9:00:42	47	18.2	8.58	14
SLRL-1	8/14/2013	8:15:40	47.25	20.79	8.79	7.81		SLRL-3	8/14/2013	9:15:42	47.25	18.21	8.57	14
SLRL-1	8/14/2013	8:30:40	47.5	20.84	8.92	7.84		SLRL-3	8/14/2013	9:30:42	47.5	18.21	8.58	14
SLRL-1	8/14/2013	8:45:40	47.75	20.89	8.99	7.87		SLRL-3	8/14/2013	9:45:42	47.75	18.23	8.57	14
SLRL-1	8/14/2013	9:00:40	48	20.95	9.06	7.89		SLRL-3	8/14/2013	10:00:42	48	18.25	8.57	14
SLRL-1	8/14/2013	9:15:40	48.25	21.05	9.12	7.91		SLRL-3	8/14/2013	10:15:42	48.25	18.27	8.57	14
SLRL-1	8/14/2013	9:30:40	48.5	21.17	9.2	7.94		SLRL-3	8/14/2013	10:30:42	48.5	18.3	8.57	14
SLRL-1	8/14/2013	9:45:40	48.75	21.36	9.27	7.96		SLRL-3	8/14/2013	10:45:42	48.75	18.33	8.56	14
SLRL-1	8/14/2013	10:00:40	49	21.49	9.34	7.99		SLRL-3	8/14/2013	11:00:42	49	18.36	8.57	14
SLRL-1	8/14/2013	10:15:40	49.25	21.69	9.4	8.01		SLRL-3	8/14/2013	11:15:42	49.25	18.41	8.57	14
SLRL-1	8/14/2013	10:30:40	49.5	21.92	9.44	8.03		SLRL-3	8/14/2013	11:30:42	49.5	18.45	8.55	14
SLRL-1	8/14/2013	10:45:40	49.75	22.13	9.56	8.07		SLRL-3	8/14/2013	11:45:42	49.75	18.49	8.55	14
SLRL-1	8/14/2013	11:00:40	50	22.34	9.63	8.09		SLRL-3	8/14/2013	12:00:42	50	18.53	8.55	14
SLRL-1	8/14/2013	11:15:40	50.25	22.59	9.73	8.13		SLRL-3	8/14/2013	12:15:42	50.25	18.58	8.54	14
SLRL-1	8/14/2013	11:30:40	50.5	22.73	9.73	8.16		SLRL-3	8/14/2013	12:30:42	50.5	18.62	8.53	14
SLRL-1	8/14/2013	11:45:40	50.75	23.09	9.72	8.19		SLRL-3	8/14/2013	12:45:42	50.75	18.66	8.52	14
SLRL-1	8/14/2013	12:00:40	51	23.56	9.77	8.23		SLRL-3	8/14/2013	13:00:42	51	18.71	8.52	14
SLRL-1	8/14/2013	12:15:40	51.25	23.91	9.74	8.23		SLRL-3	8/14/2013	13:15:42	51.25	18.76	8.52	14
SLRL-1	8/14/2013	12:30:40	51.5	24.24	9.72	8.24		SLRL-3	8/14/2013	13:30:42	51.5	18.82	8.51	14
SLRL-1	8/14/2013	12:45:40	51.75	24.58	9.71	8.26		SLRL-3	8/14/2013	13:45:42	51.75	18.88	8.51	14
SLRL-1	8/14/2013	13:00:40	52	24.86	9.66	8.26		SLRL-3	8/14/2013	14:00:42	52	18.94	8.51	14
SLRL-1	8/14/2013	13:15:40	52.25	25.13	9.63	8.28		SLRL-3	8/14/2013	14:15:42	52.25	18.95	8.48	14
SLRL-1	8/14/2013	13:30:40	52.5	25.34	9.6	8.29		SLRL-3	8/14/2013	14:30:42	52.5	19	8.48	14
SLRL-1	8/14/2013	13:45:40	52.75	25.45	9.52	8.28		SLRL-3	8/14/2013	14:45:42	52.75	19.07	8.47	14
SLRL-1	8/14/2013	14:00:40	53	25.48	9.37	8.28		SLRL-3	8/14/2013	15:00:42	53	19.11	8.46	14
SLRL-1	8/14/2013	14:15:40	53.25	25.56	9.25	8.28		SLRL-3	8/14/2013	15:15:42	53.25	19.11	8.44	14
SLRL-1	8/14/2013	14:30:40	53.5	25.64	9.2	8.29		SLRL-3	8/14/2013	15:30:42	53.5	19.11	8.43	14
SLRL-1	8/14/2013	14:45:40	53.75	25.66	9.08	8.28		SLRL-3	8/14/2013	15:45:42	53.75	19.11	8.42	14
SLRL-1	8/14/2013	15:00:40	54	25.52	8.89	8.26		SLRL-3	8/14/2013	16:00:42	54	19.12	8.41	14
SLRL-1	8/14/2013	15:15:40	54.25	25.46	8.93	8.25		SLRL-3	8/14/2013	16:15:42	54.25	19.14	8.41	14
SLRL-1	8/14/2013	15:30:40	54.5	25.41	8.9	8.26		SLRL-3	8/14/2013	16:30:42	54.5	19.14	8.4	14
SLRL-1	8/14/2013	15:45:40	54.75	25.29	8.87	8.24		SLRL-3	8/14/2013	16:45:42	54.75	19.14	8.39	14
SLRL-1	8/14/2013	16:00:40	55	25.12	8.76	8.23		SLRL-3	8/14/2013	17:00:42	55	19.16	8.4	14
SLRL-1	8/14/2013	16:15:40	55.25	24.93	8.68	8.2		SLRL-3	8/14/2013	17:15:42	55.25	19.17	8.4	14
SLRL-1	8/14/2013	16:30:40	55.5	24.67	8.53	8.17		SLRL-3	8/14/2013	17:30:42	55.5	19.17	8.4	14
SLRL-1	8/14/2013	16:45:40	55.75	24.46	8.48	8.14		SLRL-3	8/14/2013	17:45:42	55.75	19.17	8.4	14
SLRL-1	8/14/2013	17:00:40	56	24.28	8.42	8.11		SLRL-3	8/14/2013	18:00:42	56	19.15	8.39	14
SLRL-1	8/14/2013	17:15:40	56.25	24.08	8.31	8.09		SLRL-3	8/14/2013	18:15:42	56.25	19.13	8.38	14
SLRL-1	8/14/2013	17:30:40	56.5	23.88	8.19	8.05		SLRL-3	8/14/2013	18:30:42	56.5	19.1	8.36	14
SLRL-1	8/14/2013	17:45:40	56.75	23.69	8.09	8.02		SLRL-3	8/14/2013	18:45:42	56.75	19.07	8.36	14
SLRL-1	8/14/2013	18:00:40	57	23.53	8	7.99		SLRL-3	8/14/2013	19:00:42	57	19.05	8.36	14
SLRL-1	8/14/2013	18:15:40	57.25	23.38	7.94	7.96		SLRL-3	8/14/2013	19:15:42	57.25	19.02	8.36	14
SLRL-1	8/14/2013	18:30:40	57.5	23.25	7.88	7.94		SLRL-3	8/14/2013	19:30:42	57.5	18.98	8.37	14
SLRL-1	8/14/2013	18:45:40	57.75	23.11	7.92	7.92		SLRL-3	8/14/2013	19:45:42	57.75	18.94	8.38	14
SLRL-1	8/14/2013	19:00:40	58	22.98	7.88	7.9		SLRL-3	8/14/2013	20:00:42	58	18.89	8.39	14
SLRL-1	8/14/2013	19:15:40	58.25	22.84	7.82	7.88		SLRL-3	8/14/2013	20:15:42	58.25	18.84	8.4	14
SLRL-1	8/14/2013	19:30:40	58.5	22.7	7.79	7.86		SLRL-3	8/14/2013	20:30:42	58.5	18.79	8.41	14
SLRL-1	8/14/2013	19:45:40	58.75	22.56	7.74	7.84		SLRL-3	8/14/2013	20:45:42	58.75	18.73	8.43	14
SLRL-1	8/14/2013	20:00:40	59	22.42	7.71	7.82		SLRL-3	8/14/2013	21:00:42	59	18.67	8.44	14
SLRL-1	8/14/2013	20:15:40	59.25	22.28	7.7	7.8		SLRL-3	8/14/2013	21:15:42	59.25	18.61	8.46	14
SLRL-1	8/14/2013	20:30:40	59.5	22.15	7.71	7.79		SLRL-3	8/14/2013	21:30:42	59.5	18.56	8.47	14
SLRL-1	8/14/2013	20:45:40	59.75	22	7.71	7.77		SLRL-3	8/14/2013	21:45:42	59.75	18.5	8.49	14
SLRL-1	8/14/2013	21:00:40	60	21.85	7.73	7.76		SLRL-3	8/14/2013	22:00:42	60	18.45	8.5	14
SLRL-1	8/14/2013	21:15:40	60.25	21.71	7.76	7.75		SLRL-3	8/14/2013	22:15:42	60.25	18.39	8.51	14
SLRL-1	8/14/2013	21:30:40	60.5	21.56	7.77	7.74		SLRL-3	8/14/2013	22:30:42	60.5	18.34	8.52	14
SLRL-1	8/14/2013	21:45:40	60.75	21.42	7.79	7.73		SLRL-3	8/14/2013	22:45:42	60.75	18.29	8.54	14
SLRL-1	8/14/2013	22:00:40	61	21.28	7.82	7.73		SLRL-3	8/14/2013	23:00:42	61	18.24	8.55	14
SLRL-1	8/14/2013	22:15:40	61.25	21.15	7.84	7.72		SLRL-3	8/14/2013	23:15:42	61.25	18.19	8.56	14
SLRL-1	8/14/2013	22:30:40	61.5	21.02	7.87	7.72		SLRL-3	8/14/2013	23:30:42	61.5	18.15	8.57	14
SLRL-1	8/14/2013	22:45:40	61.75	20.9	7.9	7.71		SLRL-3	8/14/2013	23:45:42	61.75	18.1	8.58	14
SLRL-1	8/14/2013	23:00:40	62	20.78	7.94	7.71		SLRL-3	8/15/2013	0:00:42	62	18.06	8.59	14
SLRL-1	8/14/2013	23:15:40	62.25	20.67	7.97	7.71		SLRL-3	8/15/2013	0:15:42	62.25	18.01	8.6	14
SLRL-1	8/14/2013	23:30:40	62.5	20.56	7.98	7.71		SLRL-3	8/15/2013	0:30:42	62.5	17.97	8.61	14

Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH		Station ID	Date (m/d/y)	Time (hh:mm:ss)	Elapsed Time (hrs)	Temp C	DO (mg/L)	pH
SLRL-1	8/14/2013	23:45:40	62.75	20.47	8.01	7.71		SLRL-3	8/15/2013	0:45:42	62.75	17.92	8.62	14
SLRL-1	8/15/2013	0:00:40	63	20.36	8.03	7.7		SLRL-3	8/15/2013	1:00:42	63	17.88	8.63	14
SLRL-1	8/15/2013	0:15:40	63.25	20.27	8.07	7.7		SLRL-3	8/15/2013	1:15:42	63.25	17.84	8.64	14
SLRL-1	8/15/2013	0:30:40	63.5	20.17	8.08	7.7		SLRL-3	8/15/2013	1:30:42	63.5	17.81	8.65	14
SLRL-1	8/15/2013	0:45:40	63.75	20.08	8.12	7.7		SLRL-3	8/15/2013	1:45:42	63.75	17.77	8.66	14
SLRL-1	8/15/2013	1:00:40	64	19.99	8.15	7.7		SLRL-3	8/15/2013	2:00:42	64	17.73	8.67	14
SLRL-1	8/15/2013	1:15:40	64.25	19.91	8.15	7.7		SLRL-3	8/15/2013	2:15:42	64.25	17.69	8.67	14
SLRL-1	8/15/2013	1:30:40	64.5	19.82	8.18	7.7		SLRL-3	8/15/2013	2:30:42	64.5	17.65	8.68	14
SLRL-1	8/15/2013	1:45:40	64.75	19.74	8.18	7.69		SLRL-3	8/15/2013	2:45:42	64.75	17.62	8.69	14
SLRL-1	8/15/2013	2:00:40	65	19.66	8.22	7.7		SLRL-3	8/15/2013	3:00:42	65	17.58	8.7	14
SLRL-1	8/15/2013	2:15:40	65.25	19.59	8.24	7.69		SLRL-3	8/15/2013	3:15:42	65.25	17.55	8.71	14
SLRL-1	8/15/2013	2:30:40	65.5	19.51	8.25	7.69		SLRL-3	8/15/2013	3:30:42	65.5	17.52	8.72	14
SLRL-1	8/15/2013	2:45:40	65.75	19.43	8.28	7.69		SLRL-3	8/15/2013	3:45:42	65.75	17.48	8.72	14
SLRL-1	8/15/2013	3:00:40	66	19.35	8.3	7.69		SLRL-3	8/15/2013	4:00:42	66	17.45	8.73	14
SLRL-1	8/15/2013	3:15:40	66.25	19.28	8.32	7.69		SLRL-3	8/15/2013	4:15:42	66.25	17.42	8.74	14
SLRL-1	8/15/2013	3:30:40	66.5	19.21	8.34	7.69		SLRL-3	8/15/2013	4:30:42	66.5	17.39	8.75	14
SLRL-1	8/15/2013	3:45:40	66.75	19.14	8.36	7.69		SLRL-3	8/15/2013	4:45:42	66.75	17.36	8.75	14
SLRL-1	8/15/2013	4:00:40	67	19.07	8.37	7.69		SLRL-3	8/15/2013	5:00:42	67	17.33	8.76	14
SLRL-1	8/15/2013	4:15:40	67.25	19	8.39	7.69		SLRL-3	8/15/2013	5:15:42	67.25	17.31	8.77	14
SLRL-1	8/15/2013	4:30:40	67.5	18.94	8.38	7.69		SLRL-3	8/15/2013	5:30:42	67.5	17.28	8.78	14
SLRL-1	8/15/2013	4:45:40	67.75	18.87	8.4	7.69		SLRL-3	8/15/2013	5:45:42	67.75	17.26	8.78	14
SLRL-1	8/15/2013	5:00:40	68	18.8	8.42	7.69		SLRL-3	8/15/2013	6:00:42	68	17.24	8.79	14
SLRL-1	8/15/2013	5:15:40	68.25	18.73	8.46	7.69		SLRL-3	8/15/2013	6:15:42	68.25	17.22	8.79	14
SLRL-1	8/15/2013	5:30:40	68.5	18.67	8.46	7.69		SLRL-3	8/15/2013	6:30:42	68.5	17.2	8.8	14
SLRL-1	8/15/2013	5:45:40	68.75	18.62	8.48	7.69		SLRL-3	8/15/2013	6:45:42	68.75	17.18	8.81	14
SLRL-1	8/15/2013	6:00:40	69	18.56	8.51	7.69		SLRL-3	8/15/2013	7:00:42	69	17.17	8.82	14
SLRL-1	8/15/2013	6:15:40	69.25	18.5	8.51	7.68		SLRL-3	8/15/2013	7:15:42	69.25	17.16	8.83	14
SLRL-1	8/15/2013	6:30:40	69.5	18.45	8.56	7.69		SLRL-3	8/15/2013	7:30:42	69.5	17.15	8.83	14
SLRL-1	8/15/2013	6:45:40	69.75	18.4	8.61	7.69		SLRL-3	8/15/2013	7:45:42	69.75	17.15	8.84	14
SLRL-1	8/15/2013	7:00:40	70	18.37	8.69	7.7		SLRL-3	8/15/2013	8:00:42	70	17.15	8.84	14
SLRL-1	8/15/2013	7:15:40	70.25	18.35	8.76	7.71		SLRL-3	8/15/2013	8:15:42	70.25	17.17	8.85	14
SLRL-1	8/15/2013	7:30:40	70.5	18.35	8.85	7.72		SLRL-3	8/15/2013	8:30:42	70.5	17.19	8.85	14
SLRL-1	8/15/2013	7:45:40	70.75	18.36	8.93	7.73		SLRL-3	8/15/2013	8:45:42	70.75	17.21	8.85	14
SLRL-1	8/15/2013	8:00:40	71	18.39	9.05	7.75		SLRL-3	8/15/2013	9:00:42	71	17.23	8.84	14
SLRL-1	8/15/2013	8:15:40	71.25	18.44	9.21	7.77		SLRL-3	8/15/2013	9:15:42	71.25	17.25	8.84	14
SLRL-1	8/15/2013	8:30:40	71.5	18.52	9.34	7.8		SLRL-3	8/15/2013	9:30:42	71.5	17.29	8.84	14
SLRL-1	8/15/2013	8:45:40	71.75	18.6	9.45	7.82		SLRL-3	8/15/2013	9:45:42	71.75	17.33	8.83	14
SLRL-1	8/15/2013	9:00:40	72	18.72	9.56	7.85		SLRL-3	8/15/2013	10:00:42	72	17.38	8.83	14
SLRL-1	8/15/2013	9:15:40	72.25	18.84	9.65	7.87		Note: pH probe failed post calibration at station SLRL-3						

7.3 Habitat and Macroinvertebrate Assessments

Figure 8: Habitat Assessment SLRL-1

Table 3. Results of the habitat assessment conducted on Sulphur Ck at SLRL-1, June 3, 2013.

Habitat Assessment	%Maximum Score	Rating
Instream Habitat Quality	79	Optimal >70
Sediment Deposition	80	Optimal >70
Sinuosity	88	Optimal >84
Bank and Vegetative Stability	84	Optimal >74
Riparian Buffer	83	Sub-optimal (70-89)
Habitat Assessment Score	**189**	
% Maximum Score	**79**	Optimal >70

Figure 9: Macroinvertebrate Assessment SLRL-1

Table 4. Results of the macroinvertebrate bioassessment conducted in Sulphur Creek at SLRL-1, June 3, 2013.

Macroinvertebrate Assessment		
	Results	**Scores**
Taxa richness and diversity measures		**(0-100)**
# EPT taxa	15	48
Shannon Diversity	3.84	53
Taxonomic composition measures		
% EPT minus Baetidae and Hydropsychidae	4	8
% Non-insect taxa	16	35
Functional feeding group		
% Predator Individuals	3	3
Community tolerance		
% Tolerant taxa	26	66
WMB-I Assessment Score	---	**35**
WMB-I Assessment Rating		**Fair (29-43)**

7.4 Ecoregional Reference Guidelines

Figure 10: Ecoregional Map of Alabama

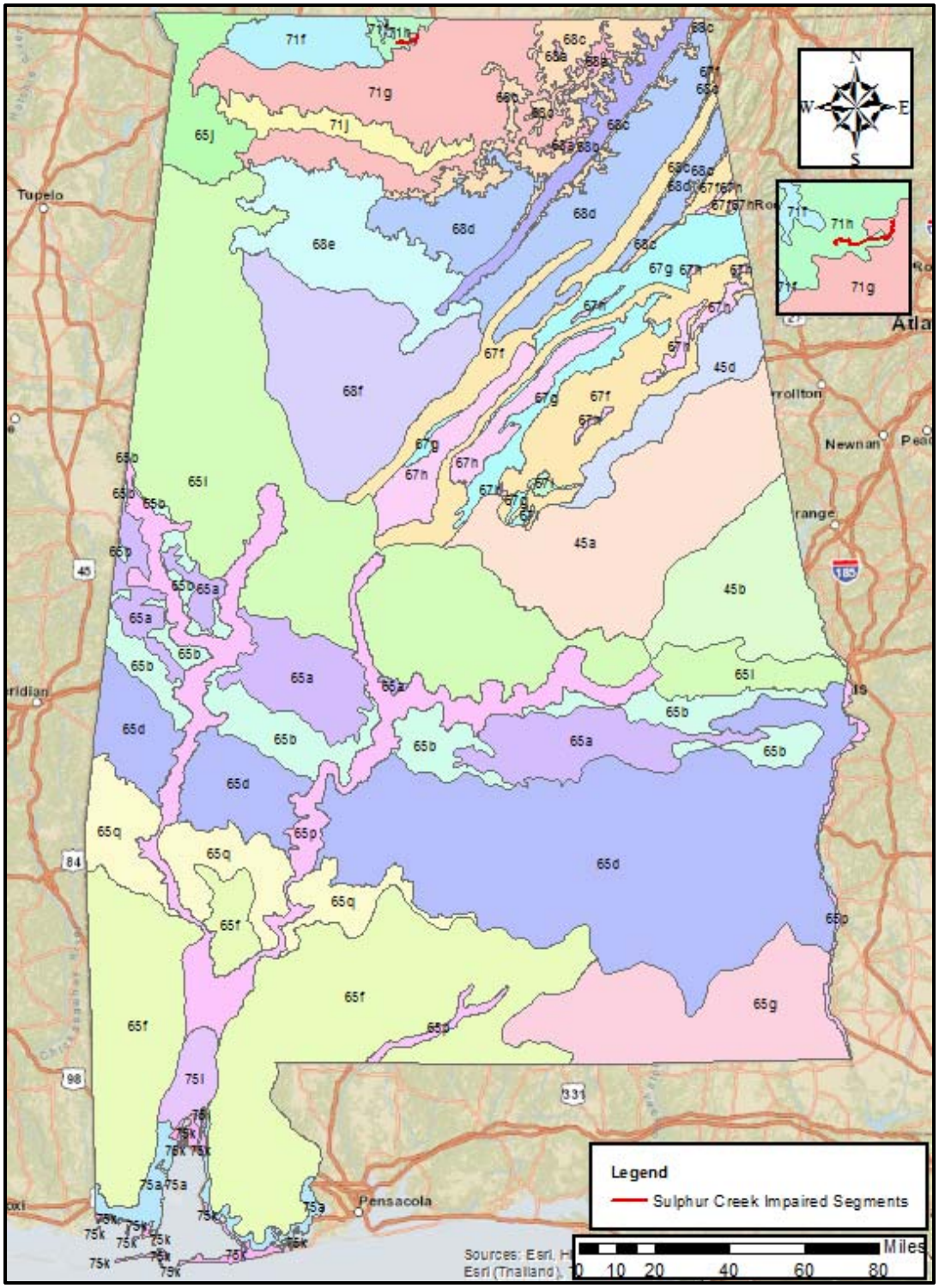


Figure 11: Ecoregional Reference Guidelines

			Level 4	Level 4	Level 3	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	Level 4	Level 3	Level 4	Level 4	Level 3	Level 4	Level 3
Parameters	Basis of comparison	Result to compare	45a	45d	45	65a/b	65f	65g	65i	65j	65q	67f	67h	67	68d	68e	68	71f	71
Physical																			
Temperature (°C)	90th %ile	Median	24.656	25	25	27	24.6	27	25	24	27	24	26	25.7	25	23.48	24	22.12	22.586
Turbidity (NTU)	90th %ile	INDIVIDUAL	21.7	6.823	15	49.56	9.7	13.05	26.21	10.73	42.3	6.622	10.787	8.824	9.667	9.025	10.1	3.693	11.1
Total Dissolved Solids (mg/L)	90th %ile	Median	67.9	85.4	80	162.8	53.4	97.4	63.3	167.6	103.4	165	79.4	151.2	118	84.8	97.2	79.6	150.5
Total Suspended Solids (mg/L)	90th %ile	Median	16	12	15	45	13.2	16.3	27.5	26.9	104.6	11.3	12.7	12.4	27	10	14	9.6	8.9
Specific Conductance (µmhos)	Median	Median	40.1	37	39.05	129.7	20.4	53.4	25.8	70	72.5	207	34.35	86	49.5	37	39.15	96	109
Hardness (mg/L)	Median	Median	10.65	11.1	11	56	14	14.2	6.52	82.1	34.6	94.05	8.56	42.3	16.2	10	12.15	47.2	56
Alkalinity (mg/L)	90th %ile	Median	21.8	23.5	23.01	84.41	11.8	21.85	21.05	130.6	36.36	121.73	16.54	117.72	21	44.2	42.2	57.492	109.4
Stream Flow (cfs)																			
Chemical																			
Dissolved Oxygen (mg/L)	10th %ile	Median	7.665	7.6	7.6	5.1	6.94	4.484	6.692	7.64	6.8	7.44	7	7	5.609	7.51	6.79	8.113	7.61
pH (su)	10th %ile	Median	6.5	6.787	6.64	6.758	4.436	5.69	5.82	6.31	6.6	6.938	6.69	6.768	6.482	6.522	6.5	7.162	7.345
pH (su)	90th %ile	Median	7.68	7.679	7.7	8.052	6.55	6.815	7.18	8.1	7.74	8.294	8	8.278	7.352	7.852	7.84	8.35	8.34
Ammonia Nitrogen (mg/L)	90th %ile	Median	0.0078	0.0105	0.0105	0.048	0.046	0.02	0.091	0.093	0.074	0.0228	0.031	0.0346	0.119	0.095	0.1007	0.023	0.023
Nitrate+Nitrite Nitrogen (mg/L)	90th %ile	Median	0.1241	0.0718	0.0974	0.286	0.3258	0.243	0.276	0.344	0.0634	0.261	0.0888	0.2403	1.202	0.456	0.6191	0.6895	1.42
Total Kjeldahl Nitrogen (mg/L)	90th %ile	Median	0.4048	0.2598	0.2845	0.887	0.4176	0.583	0.678	0.486	0.6346	0.431	0.5107	0.5826	1.46	0.66	0.733	0.624	0.466
Total Nitrogen (mg/L)	90th %ile	Median	0.5311	0.3224	0.4002	1.163	0.6396	0.773	0.851	0.806	0.6921	0.6836	0.6937	0.7109	2.269	0.919	1.4169	1.295	1.57
Dissolved Reactive Phosphorus (mg/L)	90th %ile	Median	0.0214	0.027	0.0243	0.062	0.0264	0.024	0.023	0.017	0.0193	0.0174	0.0162	0.017	0.0109	0.019	0.0182	0.017	0.0155
Total Phosphorus (mg/L)	90th %ile	Median	0.0663	0.0537	0.0599	0.201	0.04	0.07	0.068	0.058	0.064	0.0514	0.0429	0.0566	0.0491	0.05	0.05	0.1059	0.0497
CBOD-5 (mg/L)	90th %ile	Median	2.57	2.37	2.4	3.2	1.96	2.65	2	2.53	2.3	1.78	2.58	2.3	1.86	1.9	1.9	1.1	1.1
Chlorides (mg/L)	90th %ile	Median	4.778	4.029	4.495	12.03	6.692	6.066	4.285	5.247	5.95	4.266	3.61	3.89	9.118	1.051	6.37	2.4112	2.622
Total Metals																			
Aluminum (mg/L)	90th %ile	Median	0.2437	0.1558	0.1954	1.181	0.4886	0.273	0.801	0.405	1.561	0.2104	0.356	0.4114	0.155	0.265	0.3055	0.1954	0.127
Iron (mg/L)	90th %ile	Median	1.094	0.5648	0.8722	2.362	1.352	3.976	3.548	0.839	2.13	0.893	0.733	0.9803	0.6855	1.047	1.046	0.4085	0.4294
Manganese (mg/L)	90th %ile	Median	0.0554	0.0647	0.057	0.215	0.0436	0.737	0.809	0.081	0.113	0.067	0.052	0.0628	0.184	0.056	0.1553	0.025	0.025
Dissolved Metals																			
Aluminum (mg/L)	90th %ile	Median	0.0549	0.0545	0.0545	0.137	0.2242	0.055	0.1	0.11	0.193	0.1	0.1	0.1	0.1	0.1	0.1	0.03	0.03
Antimony (µg/L)	90th %ile	Median	1	1	1	1	3.75	1	5	5	3.75	5	1	5		14	14	5	5
Arsenic (µg/L)	90th %ile	Median	5	5	5	5	5	5	5	5	5	9.2	5	5		5	5	12.1	12
Cadmium (mg/L)	90th %ile	Median	0.0435	0.0435	0.0435	0.044	0.0394	0.044	0.044	0.044	0.0435	0.0435	0.0435	0.0435		0.045	0.0442	0.0075	0.0075
Chromium (mg/L)	90th %ile	Median	0.0395	0.0395	0.0395	0.04	0.0321	0.04	0.04	0.04	0.0395	0.0395	0.0395	0.0395		0.042	0.0406	0.025	0.025
Copper (mg/L)	90th %ile	Median	0.043	0.043	0.043	0.043	0.0349	0.043	0.043	0.075	0.043	0.043	0.043	0.043	0.0298	0.043	0.043	0.1	0.1
Iron (mg/L)	90th %ile	Median	0.292	0.2248	0.256	0.503	0.6132	0.804	0.539	0.245	1.255	0.1218	0.1885	0.2428	0.1552	0.588	0.588	0.025	0.0579
Lead (µg/L)	90th %ile	Median	1	1	1	1	2.5	1	5	5	2.5	5	1	5	1	5	5	5	5
Manganese (mg/L)	90th %ile	Median	0.0267	0.0235	0.0253	0.122	0.0328	0.789	0.822	0.025	0.1084	0.025	0.0235	0.025		0.05	0.05	0.025	0.025
Mercury (µg/L)	90th %ile	Median	0.15	0.15	0.15	0.15	0.25	0.15	0.25	0.2	0.25	0.2	0.2	0.2	0.18	0.2	0.2	0.15	0.15
Nickel (mg/L)	90th %ile	Median	0.114	0.114	0.114	0.114	0.0936	0.114	0.05	0.114	0.114	0.0884	0.114	0.114		0.114	0.114	0.025	0.025
Selenium (µg/L)	90th %ile	Median	5	5	5	5	5	5	25	23	5	23	5	5		50	50	15	25
Silver (mg/L)	90th %ile	Median	0.058	0.058	0.058	0.058	0.0467	0.058	0.05	0.058	0.058	0.0548	0.058	0.058		0.058	0.058	0.025	0.025
Thallium (µg/L)	90th %ile	Median	0.5	0.5	0.5	0.5	4.5	0.5	5	5	4.5	5	0.5	5		18.5	18.5	5	5
Zinc (mg/L)	90th %ile	Median	0.0345	0.0345	0.0345	0.035	0.0294	0.035	0.035	0.035	0.0345	0.0345	0.0345	0.0345	0.0267	0.044	0.0345	0.03	0.0285
Biological																			
Chlorophyll a (µg/L)	90th %ile	Median	5.019	2.14	2.67	5.181	1.755	1.282	4.732	3.31	3.949	2.562	2.086	2.322	1.392	2.458	2.67	3.044	4.255
Fecal Coliform (col/100 mL)	90th %ile	Median	332	116	201.2	1564	400	234	620	582	1025	141.6	152.2	197	829	252	320	200	435

7.5 Pictures of Stations

Figure 12: Upstream picture at station SLRL-1 (6/3/13)

Figure 13: Downstream picture at station SLRL-1 (6/3/13)

Figure 14: Upstream picture at station SLRL-3 (6/12/13)

Figure 15: Downstream picture at station SLRL-3 (6/12/13)