

**TMDLS FOR CHLORIDE, SULFATE, AND  
TOTAL DISSOLVED SOLIDS  
FOR SUBSEGMENT 010601 IN THE  
ATCHAFALAYA RIVER BASIN, LOUISIANA**

**MARCH 12, 2010**

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AND TOTAL DISSOLVED SOLIDS  
FOR SUBSEGMENT 010601 IN THE  
ATCHAFALAYA RIVER BASIN, LOUISIANA

Prepared for

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Contract No. EP-C-08-004  
Task Order 10

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March 12, 2010

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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 loads (TMDLs) for those waterbodies. A TMDL is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standards 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 for chloride, sulfate, and total dissolved solids (TDS) for Subsegment 010601 (Crow Bayou, Bayou Blue, and tributaries), which is located in St. Mary Parish in southern Louisiana. This subsegment covers an area of 21.6 square miles that is approximately 75% wetlands and 20% cropland (mostly sugarcane). This subsegment does not receive surface drainage from outside of the subsegment due to man-made levees and natural ridges that form the boundaries of the subsegment. A pumping station that is run by private landowners is used to control flooding and regulate water levels in the subsegment.

Subsegment 010601 was included on the Louisiana Department of Environmental Quality (LDEQ) final 2006 303(d) list as not fully supporting fish and wildlife propagation due to elevated concentrations of chloride, sulfate, and TDS. The Louisiana water quality standards specify numeric criteria of 80 mg/L chloride, 50 mg/L sulfate, and 350 mg/L TDS for this subsegment. LDEQ collected 35 water samples in this subsegment between 2002 and 2008 and the percentages of measured concentrations that exceeded the criteria in the standards were 97% for chloride, 57% for sulfate, and 100% for TDS.

The 303(d) list identified irrigated crop production, non-irrigated crop production, and natural sources as the suspected sources of chloride, sulfate, and TDS in Subsegment 010601. However, LDEQ recently concluded that the discharge from Columbian Chemicals Company is the primary cause of the criteria exceedances for chloride, sulfate, and TDS for Subsegment 010601. Only two other point source discharges were identified in the subsegment; one has been terminated and the other was not considered to have a source of chloride, sulfate, or TDS above background levels. Several other possible sources of chloride, sulfate, and TDS were investigated, but they do not appear to be causing criteria exceedances.

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TMDLs for chloride, sulfate, and TDS were calculated as average annual loading. An estimate of average annual flow was used because it was the closest possible approximation to the harmonic mean flow, which is the critical flow for chloride, sulfate, and TDS according to the Louisiana water quality standards. The average annual flow was estimated using a monthly water budget for south-central Louisiana (including St. Mary Parish) that was obtained from the Louisiana Office of State Climatology. Each TMDL was calculated by simply multiplying the average annual flow by the numeric criterion from the water quality standards (and a unit conversion factor). Ten percent of each TMDL was set aside as an explicit margin of safety (MOS). The wasteload allocation (WLA) was set to the allowable loading for Columbian Chemicals Company because no other point sources were significant contributors of chloride, sulfate, or TDS. The WLA for Columbian Chemicals Company was calculated as the facility flow rate multiplied times the criterion from the water quality standards for each parameter and a unit conversion factor. This will require Columbian Chemicals Company to meet instream criteria “at the end of the pipe,” which is necessary because the effluent is discharged into a small drainage ditch that is assumed to have no dilution water much of the time. Ten percent of the WLA was set aside for the future growth (FG) component. Each load allocation (LA) for nonpoint sources was then set to the remaining portion of the TMDL. The results of the TMDL calculations are presented in Table ES.1.

Table ES.1. TMDLs for chloride, sulfate, and TDS for Subsegment 010601.

<b>Parameter</b>	<b>WLA* (tons/day)</b>	<b>LA (tons/day)</b>	<b>FG (tons/day)</b>	<b>MOS (tons/day)</b>	<b>TMDL (tons/day)</b>	<b>Percent Reduction Needed</b>
Chloride	0.50	9.14	0.05	1.08	10.77	92%
Sulfate	0.31	5.72	0.03	0.67	6.73	66%
TDS	2.19	39.98	0.22	4.71	47.10	83%

\* For Columbian Chemicals Company (LA0004154)

A percent reduction was calculated for each TMDL by reducing the LDEQ-observed data by a certain percentage until no more than 30% of the reduced values exceeded the criterion in the water quality standards. The allowable percentage of exceedances (30%) is the same value

used by LDEQ for considering chloride, sulfate, and TDS concentrations to be “fully supporting” fish and wildlife propagation. The calculations showed that existing concentrations of chloride, sulfate, and TDS in this subsegment need to be reduced by 92%, 66%, and 83%, respectively.

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## LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
cfs	cubic feet per second
EDMS	Electronic Document Management System
EPA	U.S. Environmental Protection Agency
FG	future growth
GIWW	Gulf Intracoastal Waterway
LA	load allocation
LAC	Louisiana Administrative Code
LDEQ	Louisiana Department of Environmental Quality
LOSC	Louisiana Office of State Climatology
LSU	Louisiana State University
mg/L	milligrams per liter
MOS	margin of safety
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
TDS	total dissolved solids
TMDL	total maximum daily load
USGS	United States Geological Survey
WLA	wasteload allocation



## 1.0 INTRODUCTION

This report presents total maximum daily loads (TMDLs) for chloride, sulfate, and total dissolved solids (TDS) for Crow Bayou, Bayou Blue, and tributaries (Subsegment 010601). This subsegment was included on the final 2006 303(d) list for not supporting its designated use of fish and wildlife propagation (Louisiana Department of Environmental Quality [LDEQ] 2008a). Table 1.1 shows the suspected sources and suspected causes for impairment from the 303(d) list, as well as the priority ranking. The 303(d) list also specifies low dissolved oxygen as a suspected cause for impairment for Subsegment 010601, but that impairment is not addressed in this report. The TMDLs in this report were developed in accordance with Section 303(d) of the Federal Clean Water Act and the United States Environmental Protection Agency's (EPA's) regulations at Title 40 of the Code of Federal Regulations (CFR), Part 130.7.

Table 1.1. Summary of 303(d) listings addressed in this TMDL report.

Subsegment Description	Suspected Sources	Suspected Causes	Priority Ranking
Crow Bayou, Bayou Blue, and tributaries (010601)	Irrigated Crop Production, Natural Sources, and Non-Irrigated Crop Production	Chloride, Sulfate, and TDS	Medium

The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant and to establish the load reduction that is necessary to meet the standard in a waterbody. The TMDL is the sum of the wasteload allocation (WLA), the load allocation (LA), future growth (FG), 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. The FG is the portion of the TMDL that allows for future increases in loads to the waterbody.

## **2.0 BACKGROUND INFORMATION**

### **2.1 General Information**

Subsegment 010601 is located in the Atchafalaya River basin in southern Louisiana approximately 10 to 15 miles west of Morgan City (see Figure A.1. in Appendix A). The subsegment is in St. Mary Parish and covers an area of 21.6 square miles.

This subsegment does not receive surface drainage from outside of the subsegment due to man-made levees and natural ridges that form the boundaries of the subsegment. The southern boundary is a levee along the Gulf Intracoastal Waterway (GIWW), the eastern boundary is a levee along the Wax Lake Outlet, the northern boundary is a natural ridge formed by Bayou Teche, and the western boundary is a natural ridge formed by Bayou Sale.

Waterbodies inside this subsegment include Crow Bayou, Bayou Blue, and Big Oaks Bayou. These bayous drain generally to the southern part of the subsegment. The only ways that surface water leaves the subsegment are evaporation and a pumping station along the southern edge of the subsegment that pumps water into the GIWW (see Figure A.1 for the location). This pumping station is run by private landowners who use it to control flooding and to regulate the water level for hunting in the subsegment (LDEQ 2007a).

### **2.2 Land Use**

Land use characteristics for Subsegment 010601 were compiled from the United States Geological Survey (USGS) 2001 National Land Cover Database (USGS 2006). These data were based on satellite imagery from 2001 and represent the most recent land use data available 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 2.1. The two land uses that account for nearly 95% of the subsegment are wetlands and cultivated crops. As shown on Figure A.2, the cropland is concentrated on the natural ridges along the northern and western edges of the subsegment. Sugarcane is the primary crop in St. Mary Parish (Louisiana State University [LSU] 2008) and in this subsegment (Natural Resources Conservation Service [NRCS] 2008a,b).

Table 2.1. Land uses in Subsegment 010601.

<b>Land Use Type</b>	<b>Percent of Total Area</b>
Water	0.4%
Urban/Transportation	3.0%
Barren	0.0%
Forest	0.0%
Shrubland/grassland	0.4%
Pasture/hay	1.3%
Cultivated crops	19.6%
Wetlands	75.3%
<b>TOTAL</b>	<b>100.0%</b>

### 2.3 Water Quality Standards

Water quality standards for Louisiana are included in Title 33 of the Louisiana Administrative Code (LAC) (LDEQ 2009). Designated uses for Subsegment 010601 are primary contact recreation, secondary contact recreation, and fish and wildlife propagation. The numeric criteria for dissolved minerals in this subsegment are 80 mg/L chloride, 50 mg/L sulfate, and 350 mg/L TDS.

The Louisiana water quality standards also include an antidegradation policy (LAC 33: IX.1109.A). This policy states that waters exhibiting high water quality should be maintained at that high level of water quality. If this is not possible, water quality of a level that supports designated uses of the waterbody should be maintained. Changing the designated uses of a waterbody to allow a lower level of water quality can only be achieved through a use attainability study.

### 2.4 Water Quality Data

Chloride, sulfate, and TDS data have been collected by LDEQ in Subsegment 010601 at Station 1209, which is located on the upstream (north) side of the pumping station that pumps water out of the subsegment into the GIWW (see Figure A.1 in Appendix A). A tabular listing of the individual data is presented in Table B.1 in Appendix B and the data are summarized in Table 2.2. These data were downloaded from the LDEQ web site (LDEQ 2008b).

Table 2.2. Summary of LDEQ data for chloride, sulfate, and TDS in Subsegment 010601.

	<b>Chloride</b>	<b>Sulfate</b>	<b>TDS</b>
Period of record	1/08/2002 – 8/12/2008		
Number of values	35	35	35
Minimum	20 mg/L	< 1.3 mg/L	606 mg/L
Average	676 mg/L	99 mg/L	1,553 mg/L
Median	701 mg/L	97 mg/L	1,526 mg/L
Maximum	1,321 mg/L	300 mg/L	2,860 mg/L
Criterion in water quality standards	80 mg/L	50 mg/L	350 mg/L
Number of values above criterion in standards	34	20	35
Percent of values above criterion in standards	97%	57%	100%

Time-series plots of these data are shown on Figures B.1 through B.3 in Appendix B. Most of the data were collected at approximately monthly intervals during 2002, 2004, late 2007, and 2008. For chloride and TDS, the values appear to be slightly lower in 2002 than during the other years. The sulfate data are not consistent from year to year, with 11 out of 12 values during 2004 being less than 7 mg/L while most of the sulfate values in the other years were at least an order of magnitude higher. The reasons for these differences between years are not known.

Seasonal plots of these data are shown on Figures B.4 through B.6 in Appendix B. Elevated concentrations occur during various seasons, such that no seasonal patterns are apparent from the plots. Additional data would be needed to make a definitive characterization of seasonality.

## 2.5 Point Sources

Point source discharges with National Pollutant Discharge Elimination System (NPDES) permits in Subsegment 010601 were identified using information generated by LDEQ from their internal databases and information obtained by searching LDEQ's Electronic Document Management System (EDMS) (LDEQ 2010). The three permitted discharges that were identified are listed in Table 2.3 and their locations are shown on Figure A.1 (Appendix A). The Shadyside Well No. 1 discharge was not included in the TMDL calculations because its permit was recently terminated (the discharge was discontinued in October 2008). The Shadyside Compressor Station

discharge was not included in the TMDL calculations because it does not have monitoring requirements or permit limits for chloride, sulfate, or TDS; therefore it was not considered to have a source of chloride, sulfate, or TDS above background levels. Columbian Chemicals Company was included in the TMDL calculations because its recently issued permit contains monitoring requirements (but not permit limits) for chloride, sulfate, and TDS. LDEQ submitted public comments for these TMDLs, including a comment concerning the Columbian Chemicals Company which stated that “LDEQ has documented that this facility is the primary cause of the criteria exceedances for chloride, sulfate, and TDS for Subsegment 010601” (see Appendix F). The Columbian Chemicals Company facility manufactures carbon black, but it does not discharge any process water.

Table 2.3. Point sources in Subsegment 010601.

Permit and AI Number	Permit Expiration Date	Company Name	Facility Name	Type of Discharge	Receiving Stream	Flow	Included in TMDLs?
LAG33A698 (AI=147849)	Terminated 1/21/2010	Neumin Production Company	Shadyside Co. Ltd. Well No. 1	miscellaneous discharges	unnamed canal into Pipeline Canal	not known	No
LA0119091 (AI=4198)	5/31/2011	Southern Natural Gas Company	Shadyside Compressor Station	groundwater seepage and stormwater	local drainage to Big Oaks Bayou	90 gallons per day	No
LA0004154 (AI=4998)	2/28/2015	Columbian Chemicals Company	North Bend Plant	*see below	unnamed drainage ditch to Bayou Blue	1.5 million gallons per day	Yes

\*Discharge for Columbian Chemicals Outfall 001 includes stormwater runoff, water softener regeneration water, boiler blowdown, equipment and pad wash water, laboratory rinse water, steam condensate, air compressor blowdown, cooling water from ozonators, ozonator scrubber water, reverse osmosis concentrate, and sanitary wastewater.

## 2.6 Nonpoint Sources

The three nonpoint sources that were cited in the Louisiana 303(d) list for this subsegment were irrigated crop production, non-irrigated crop production, and natural sources (see Table 1.1). Information from local sources indicates that there is little or no irrigation in this subsegment because the primary crop is sugarcane, which normally is not irrigated in this area (NRCS 2008a,b; LDEQ 2007a). Non-irrigated cropland should have little impact on dissolved minerals concentrations in nearby waterbodies. Runoff from cropland may have very small

concentrations of agricultural chemicals and various dissolved substances from the soil, but those concentrations would normally be much too low to cause exceedances of water quality standards for chloride, sulfate, and TDS.

It has been suggested that one possible cause of elevated concentrations of dissolved minerals at the LDEQ sampling station in Subsegment 010601 could be leakage in or around the pump station during times when water levels are higher in the GIWW than inside the subsegment (NRCS 2008b). This assumes that 1) there is a pathway for water to be transported from the GIWW into the subsegment, and 2) the dissolved minerals concentrations are higher in the GIWW than inside the subsegment. One possible pathway would be a flap gate that allows water to pass through the structure by gravity flow when the water level is lower on the downstream side (the GIWW side in this situation). When water levels are higher on the downstream side, flap gates will close, but some leakage will occur in the upstream direction because a water-tight seal is not possible. It is not known whether or not this pump station has a flap gate. However, even if this pump station does have a flap gate, the dissolved minerals concentrations in the GIWW are generally lower than in the subsegment. The nearest LDEQ stations with routine monitoring data are the GIWW station about 4 miles east of Wax Lake Outlet (Station 1203) and the Wax Lake Outlet about 1 to 2 miles south of the GIWW (Station 1202). The highest concentrations measured at these two stations were 43 mg/L chloride, 61 mg/L sulfate, and 330 mg/L TDS (LDEQ 2008b; see Tables C.1 and C.2 in Appendix C). These relatively low concentrations of dissolved minerals in the Wax Lake Outlet and the GIWW are probably caused by the large amount of freshwater flowing out of the Atchafalaya Floodway through the Wax Lake Outlet, which has an average flow of over 90,000 cfs (USGS 2008; see Table C.3 in Appendix C). Because the dissolved mineral concentrations in the GIWW and the Wax Lake Outlet are much lower than many of the observed concentrations inside Subsegment 010601, leakage near the pumping station does not appear to be causing exceedances of dissolved minerals inside the subsegment.

Another possible nonpoint source of dissolved minerals in Subsegment 010601 is oil and gas activity (NRCS 2008b). There is one oil well with an NPDES permit, but there may be other oil and gas activity within the subsegment that does not require an NPDES permit. There are no

data to quantify the impacts (if any) that oil and gas activity may be having on dissolved minerals concentrations at the LDEQ sampling location.

Evaporation of water inside the subsegment during extended dry periods has been suggested as a factor that could be causing slight increases in concentrations of dissolved minerals (NRCS 2008b). The increase in concentrations would occur because evaporation reduces the volume of water but leaves the dissolved substances in the remaining water. The effect of evaporation would be greatest during summer when evaporation rates are highest. However, some of the elevated concentrations of dissolved minerals have been observed during winter months when evaporation rates are low.

The residual effect of seawater from hurricanes has also been suggested as a possible influence on dissolved minerals concentrations in Subsegment 010601 (NRCS 2008b). Strong hurricanes can develop storm surges that are high enough to overtop the levees and natural ridges around the edges of the subsegment and deposit seawater that is very high in dissolved minerals concentrations. However, some of the elevated concentrations of dissolved minerals have been observed during spring months and in years when there were no strong hurricanes in Louisiana.

## **2.7 Previous Studies**

There are no known water quality studies for Subsegment 010601. LDEQ planned a field study to identify sources of dissolved minerals in this subsegment, but the field study was not carried out because excessive vegetation prevented flat-bottom boats from accessing most of the subsegment (LDEQ 2007b).

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## 3.0 TMDL DEVELOPMENT

### 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 Federal Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards.

According to LAC 33:IX.1115.B, Louisiana water quality standards "shall apply during all flow conditions greater than the critical flows defined in LAC 33:IX.1115.C." This regulation also states the following at LAC 33:IX.1115.C.8:

"For chloride, sulfate, and total dissolved solids, criteria are to be met below the point of discharge after complete mixing. Because criteria are developed over a long-term period, harmonic mean flow will be applied for mixing" (LDEQ 2009).

These excerpts from the Louisiana water quality standards establish the harmonic mean flow as the critical flow for chloride, sulfate, and TDS for permitting purposes. However, a harmonic mean can not be established for Subsegment 010601 because it is not a free flowing stream and there are no available flow data. The average water yield was considered to be the closest approximation of the harmonic mean flow that would be possible using available data. Therefore, these TMDLs were calculated using an estimate of average flow from the subsegment.

Seasonality was also considered in the development of these TMDLs. The water quality standards for dissolved minerals do not include seasonal variations and no seasonal patterns were visually apparent for the water quality data for Subsegment 010601 (Figures B.4 through B.6). Therefore, these TMDLs were developed on an annual basis instead of a seasonal basis.

### 3.2 TMDL Calculations

Each TMDL in this report was calculated as simply the average annual flow multiplied by the appropriate numeric criterion in the water quality standards (80 mg/L chloride, 50 mg/L sulfate, or 350 mg/L TDS) and a unit conversion factor. The average annual flow was estimated



using runoff estimates from a monthly water budget developed by the Louisiana Office of State Climatology (LOSC) for region 8 (south-central Louisiana), which includes St. Mary Parish (LOSC 2007). The monthly water budget includes precipitation, evapotranspiration, soil moisture storage, and runoff. The monthly runoff values were averaged and converted to an annual runoff value of 31.4 inches per year or 2.31 cubic feet per second per square mile. This value was slightly higher than values that were published for areas farther inland (USGS 1986), but average runoff can vary significantly from one area to another. The annual runoff was then multiplied by the area of Subsegment 010601 (21.6 square miles) to get an average annual flow of 49.9 cubic feet per second. The LOSC water budget and the calculations for average annual flow are shown in Appendix D.

### **3.3 MOS and FG**

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 lack of knowledge concerning the relationship between pollutant loadings and water quality. The MOS may be expressed explicitly as unallocated loading or implicitly through conservative assumptions used in establishing the TMDL. For each TMDL in this report, 10% of the TMDL was set aside as an explicit MOS. Also, 10% of the WLA was set aside for the FG component to allow for future increases in point source loads.

### **3.4 WLA and LA**

The only point source discharge that was included in these TMDLs was the Columbian Chemicals Company. As mentioned in Section 2.5, the Shadyside Well No. 1 discharge was terminated and the Shadyside Compressor Station discharge was not considered to have a source of chloride, sulfate, or TDS above background levels. The WLA for Columbian Chemicals Company was calculated as the facility flow rate (1.5 million gallons per day; see Table 2.3) multiplied times the criterion from the water quality standards (80 mg/L chloride, 50 mg/L sulfate, or 350 mg/L TDS) and a unit conversion factor. This will require Columbian Chemicals Company to meet instream criteria “at the end of the pipe.” This requirement is necessary

because the effluent is discharged into a small drainage ditch that is assumed to have no dilution water much of the time. If LDEQ or Columbian Chemicals Company can document the presence of dilution water in the receiving stream such that higher effluent concentrations would not cause violations of water quality standards in the receiving stream, then Columbian Chemicals Company should be allowed to discharge at higher effluent concentrations and their WLA should be increased by taking unused nonpoint source loading from the LA and shifting it to the WLA. The Shadyside Compressor Station does not need permit limits for chloride, sulfate, or TDS.

The LA for nonpoint source loads was set to the TMDL minus the sum of the MOS, FG, and WLA. The calculations for the TMDLs are shown in Appendix E and the results are summarized in Table 3.1.

Table 3.1. TMDLs for chloride, sulfate, and TDS for Subsegment 010601.

<b>Parameter</b>	<b>WLA* (tons/day)</b>	<b>LA (tons/day)</b>	<b>FG (tons/day)</b>	<b>MOS (tons/day)</b>	<b>TMDL (tons/day)</b>	<b>Percent Reduction Needed</b>
Chloride	0.50	9.14	0.05	1.08	10.77	92%
Sulfate	0.31	5.72	0.03	0.67	6.73	66%
TDS	2.19	39.98	0.22	4.71	47.10	83%

\* For Columbian Chemicals Company (LA0004154)

### 3.5 Percent Reductions

According to the Louisiana Integrated Report (LDEQ 2008a), a subsegment is assessed as fully supporting aquatic life if no more than 30% of the observed values within the assessment time period exceed the water quality criterion for chloride, sulfate, or TDS. A percent reduction was calculated for each of the TMDLs in this report to indicate how much the existing concentrations would need to be reduced in order for the subsegment to be assessed as fully supporting aquatic life. For each of the three parameters (chloride, sulfate and TDS), this calculation was performed iteratively by reducing all the observed values by a certain percentage until no more than 30% of them exceeded the criterion in the water quality standards. These calculations are shown in Appendix E and the results are summarized in Table 3.1.

## **4.0 PUBLIC PARTICIPATION**

When EPA establishes a TMDL, federal regulations require EPA to publish a public notice and seek comment concerning the TMDL. The TMDLs in this report were prepared under contract to EPA. EPA held a public review period seeking comments or information from the public and other interested parties concerning the draft version of these TMDLs. The notice for the public review period was published in the Federal Register on August 20, 2009, and the review period closed on September 21, 2009.

The only comments or information that EPA received during the public review period were comments from LDEQ. These comments, along with EPA's responses, are shown in Appendix F. The responses mention revisions that have been made to these TMDLs to address the comments.

EPA will transmit the final version of these TMDLs to LDEQ for implementation and for incorporation into LDEQ's current water quality management plan.

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# **APPENDIX A**

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**Maps**

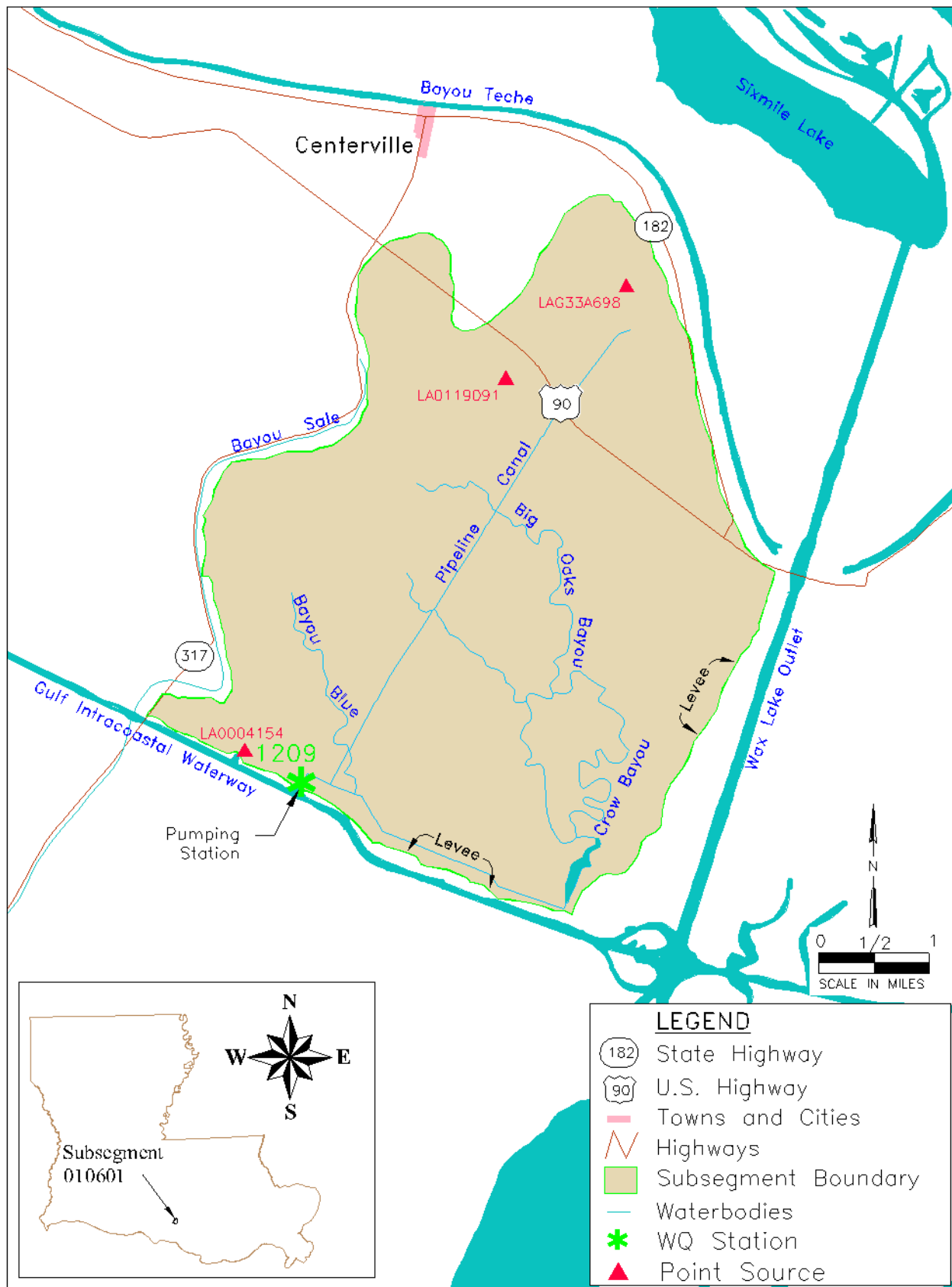


Figure A.1. General watershed map for Subsegment 010601.

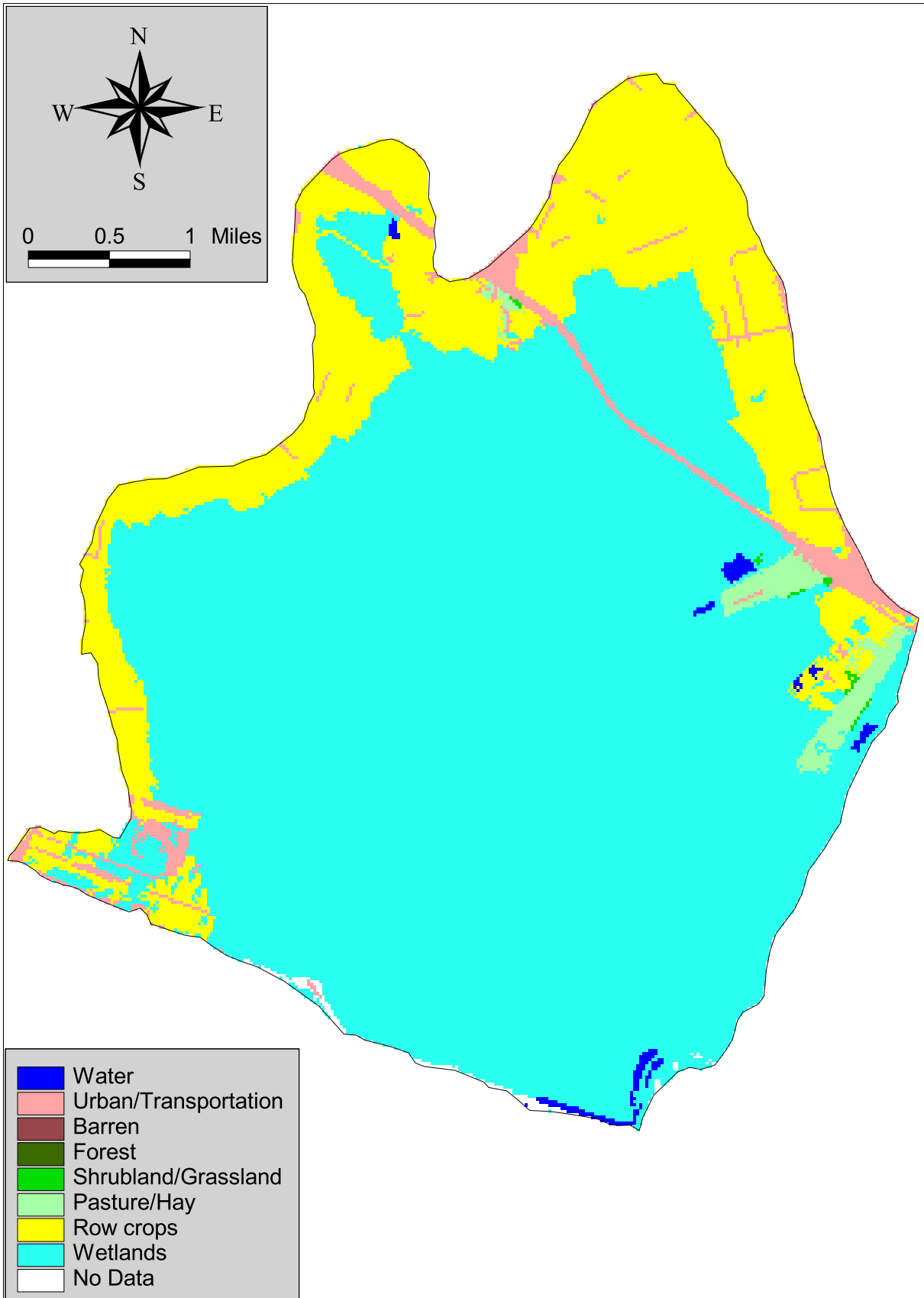


Figure A.2. Land use / land cover for subsegment 010601.

# **APPENDIX B**

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**LDEQ Water Quality Data for Subsegment 010601**



TABLE B.1. CHLORIDE, SULFATE, AND TDS DATA FOR STATION 1209  
(BAYOU BLUE AT NORTH BEND PUMPING STATION)

Downloaded from LDEQ web site on 11-05-08

Date	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
01/08/02	260	176.0	940
02/07/02	265	300.0	970
03/07/02	20	41.3	650
04/02/02	171	264.0	968
05/07/02	283	290.0	1,046
06/12/02	600	171.0	1,526
07/09/02	276	264.0	1,020
08/20/02	103	212.0	690
09/10/02	113	174.0	766
10/17/02	817	3.0	1,588
11/06/02	366	8.3	776
12/03/02	960	8.3	1,928
01/13/04	296	73.1	764
02/17/04	824	4.5	1,738
03/16/04	1,243	< 1.3	2,512
04/13/04	1,213	< 1.3	2,464
05/11/04	1,103	< 1.3	2,258
06/08/04	943	2.5	1,954
07/06/04	884	2.7	1,808
08/03/04	1,305	< 1.3	2,660
08/31/04	701	2.2	1,498
10/05/04	1,320	< 1.3	2,860
10/26/04	1,321	3.8	2,490
11/30/04	1,045	6.2	2,042
10/22/07	405	141.0	1,088
11/13/07	1,028	139.0	2,094
12/11/07	1,144	132.0	2,384
01/08/08	150	161.0	622
02/19/08	158	147.0	606
03/04/08	203	107.0	667
04/08/08	905	146.0	2,008
05/14/08	615	171.0	1,414
06/12/08	1,234	133.0	2,660
07/15/08	986	96.5	1,896
08/12/08	387	87.4	1,004

35	35	35	= Number of values
20	< 1.3	606	= Minimum
676	99	1,553	= Average
701	97	1,526	= Median
1,321	300	2,860	= Maximum
80	50	350	= Criterion in WQ standards
34	20	35	= Number of values above criterion
97%	57%	100%	= Percent of values above criterion

Figure B.1. Time series plot of chloride for Bayou Blue at pumping station (LDEQ 1209)

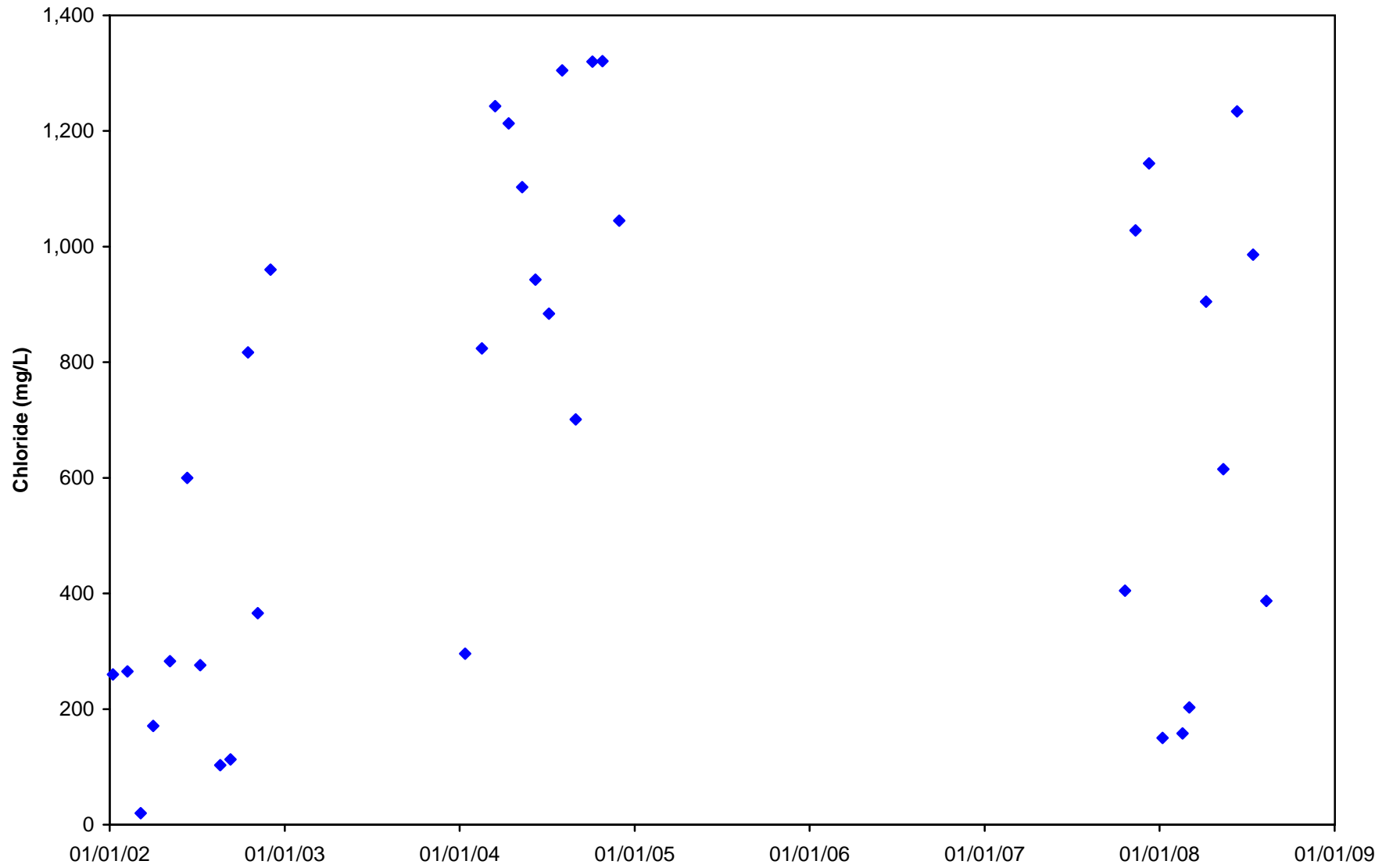


Figure B.2. Time series plot of sulfate for Bayou Blue at pumping station (LDEQ 1209)

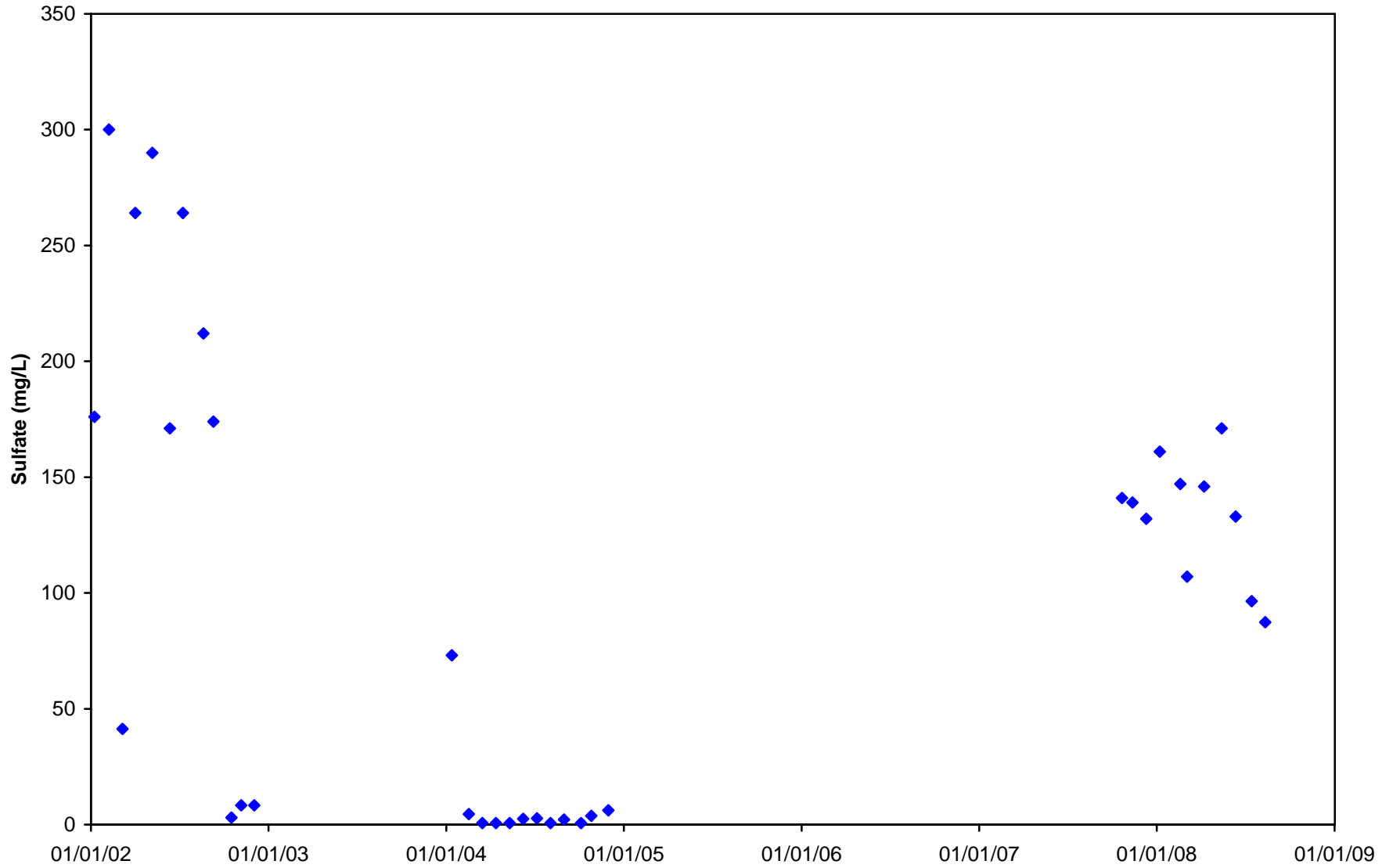


Figure B.3. Time series plot of TDS for Bayou Blue at pumping station (LDEQ 1209)

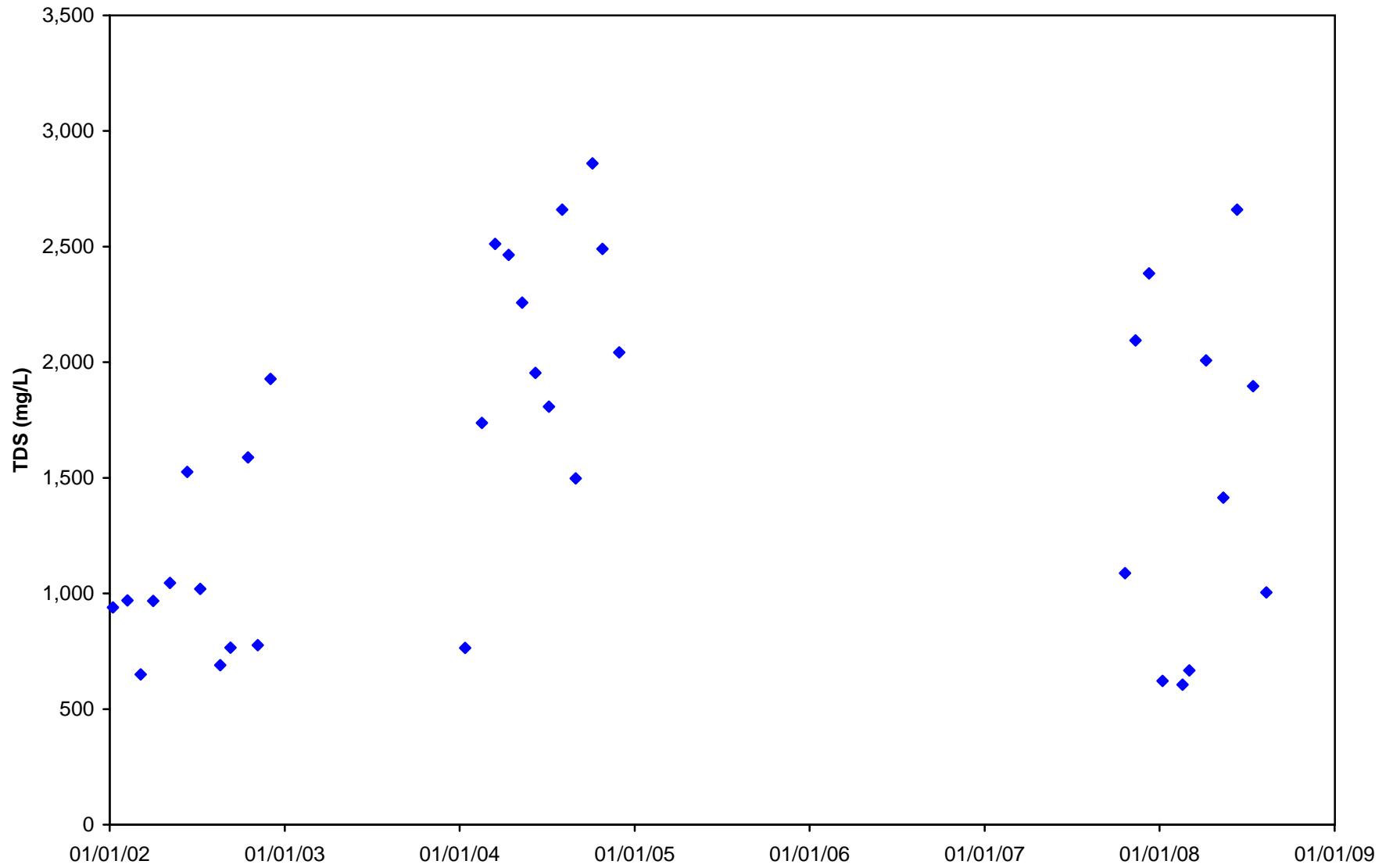


Figure B.4. Seasonal plot of chloride for Bayou Blue at pumping station (LDEQ 1209)

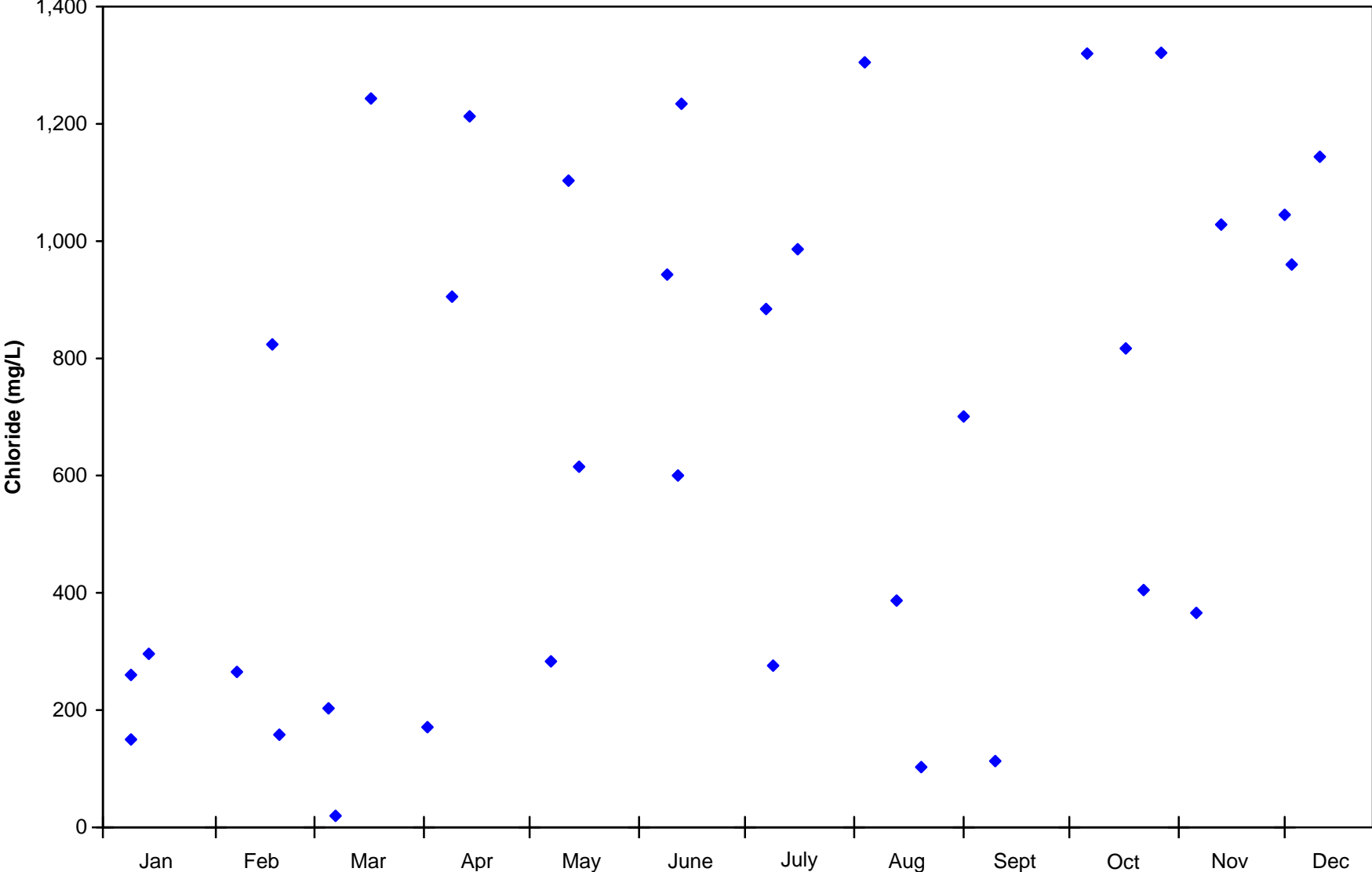


Figure B.5. Seasonal plot of sulfate for Bayou Blue at pumping station (LDEQ 1209)

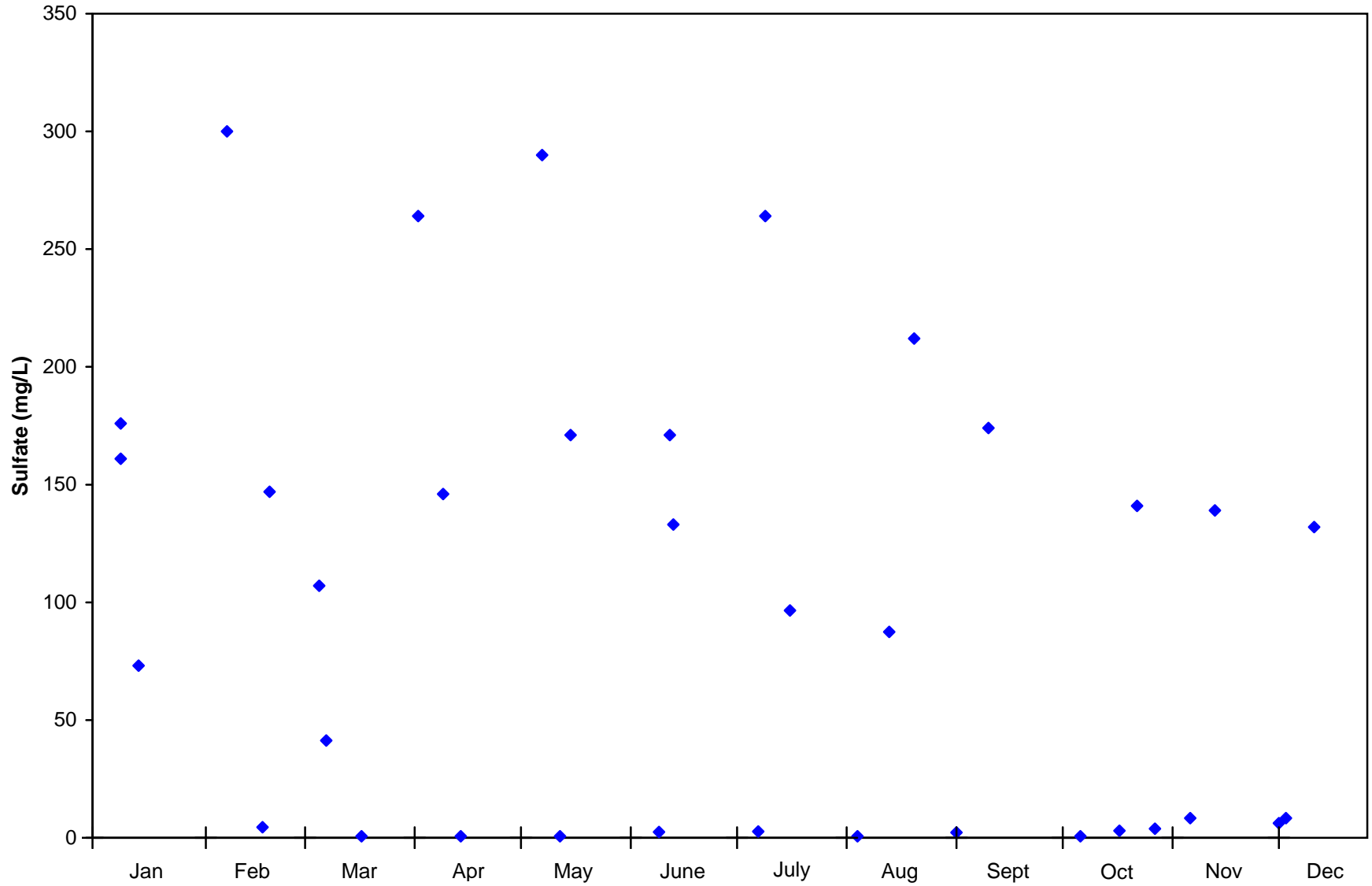
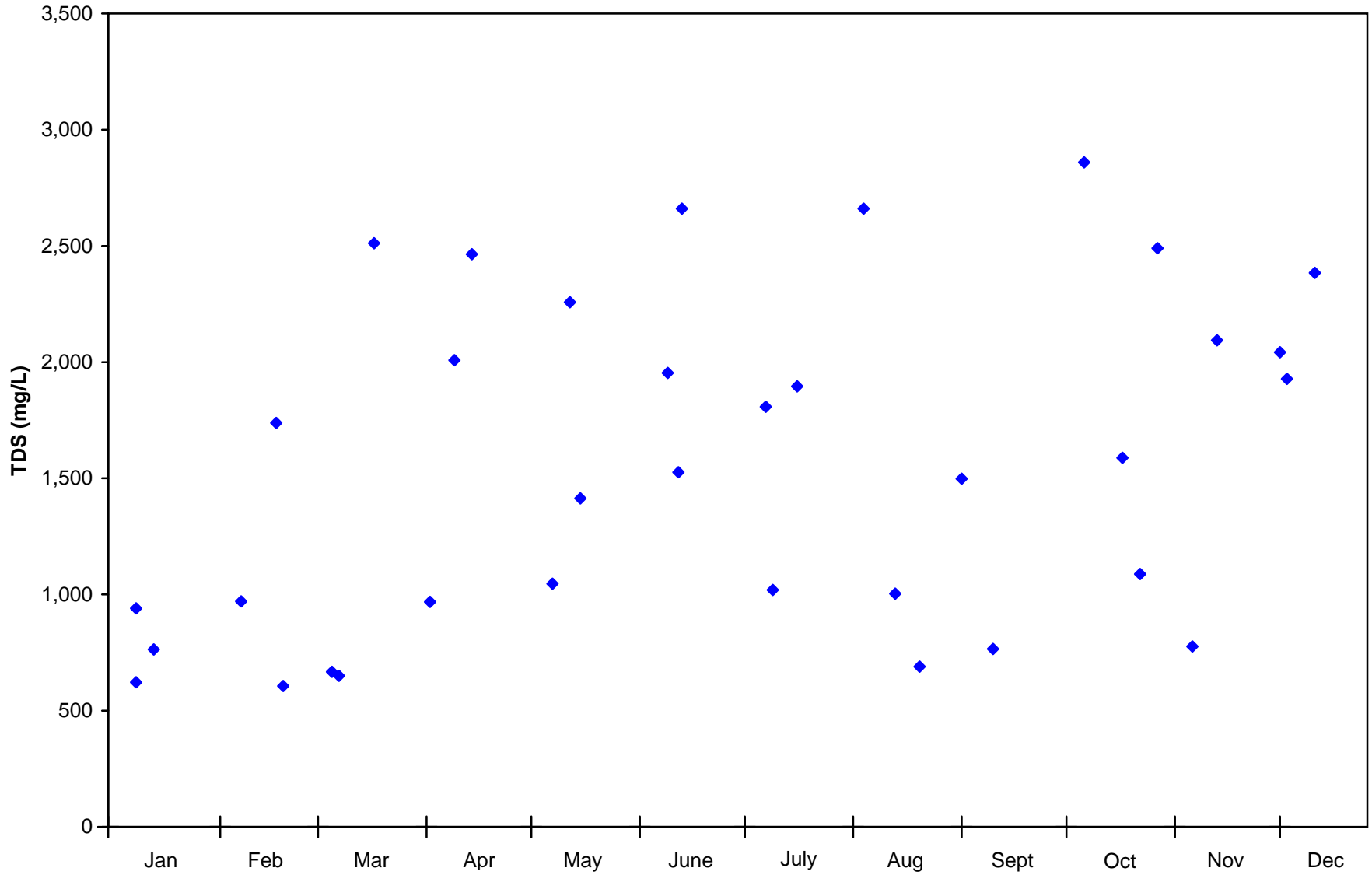


Figure B.6. Seasonal plot of TDS for Bayou Blue at pumping station (LDEQ 1209)



# **APPENDIX C**

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## **LDEQ and USGS Data for Other Subsegments**



TABLE C.1. CHLORIDE, SULFATE, AND TDS DATA FOR LDEQ STATION 1203  
(Gulf Intracoastal Waterway south of Patterson)

Date	Chloride (mg/L)	Date	Sulfate (mg/L)	Date	TDS (mg/L)
01/08/02	11.4	01/08/02	19.3	01/08/02	131
02/07/02	16.1	02/07/02	28.1	02/07/02	169
03/07/02	18.2	03/07/02	35.8	03/07/02	161
04/02/02	14.0	04/02/02	22.5	04/02/02	172
05/07/02	20.9	05/07/02	29.4	05/07/02	204
06/12/02	13.1	06/12/02	28.2	06/12/02	178
07/09/02	18.8	07/09/02	31.7	07/09/02	199
08/20/02	31.0	08/20/02	53.2	08/20/02	260
09/10/02	26.7	09/10/02	51.0	09/10/02	248
10/17/02	25.6	10/17/02	40.4	10/17/02	197
11/06/02	26.0	11/06/02	38.4	11/06/02	211
12/03/02	19.8	12/03/02	41.6	12/03/02	204
01/13/04	21.5	01/13/04	36.8	01/13/04	192
02/16/04	17.7	02/16/04	28.9	02/16/04	190
03/18/04	29.2	03/18/04	34.9	03/18/04	200
04/14/04	21.9	04/14/04	33.3	04/14/04	188
05/25/04	14.9	05/25/04	22.2	05/25/04	168
06/08/04	20.5	06/08/04	35.7	06/08/04	220
07/06/04	16.6	07/06/04	23.2	07/06/04	167
08/03/04	20.3	08/03/04	30.6	08/03/04	197
08/31/04	32.1	08/31/04	43.1	08/31/04	284
10/05/04	16.6	10/05/04	43.4	10/05/04	217
10/26/04	40.7	10/26/04	46.6	10/26/04	242
11/30/04	16.8	11/30/04	24.8	11/30/04	184
10/24/07	37.9	10/24/07	58.5	10/24/07	320
11/14/07	31.8	11/14/07	55.0	11/14/07	302
12/12/07	33.0	12/12/07	53.2	12/12/07	300
01/09/08	25.8	01/09/08	39.1	01/09/08	213
02/20/08	28.1	02/20/08	43.2	02/20/08	252
03/05/08	21.6	03/05/08	28.0	03/05/08	216
04/09/08	17.6	04/09/08	25.5	04/09/08	158
05/13/08	18.5	05/13/08	27.5	05/13/08	189
06/10/08	19.9	06/10/08	30.8	06/10/08	214
07/16/08	19.3	07/16/08	31.2	07/16/08	227
08/13/08	18.8	08/13/08	36.2	08/13/08	232
Max	40.7	Max	58.5	Max	320
75th %tile	26.4	75th %tile	42.4	75th %tile	230
Median	20.3	Median	34.9	Median	204
25th %tile	17.7	25th %tile	28.2	25th %tile	186
Min.	11.4	Min.	19.3	Min.	131

TABLE C.2. CHLORIDE, SULFATE, AND TDS DATA FOR LDEQ STATION 1202  
(Wax Lake Outlet southwest of Patterson)

Date	Chloride (mg/L)	Date	Sulfate (mg/L)	Date	TDS (mg/L)
01/08/02	10.8	01/08/02	17.8	01/08/02	141
02/07/02	15.9	02/07/02	27.8	02/07/02	108
03/07/02	15.4	03/07/02	24.2	03/07/02	160
04/02/02	13.5	04/02/02	23.7	04/02/02	173
05/07/02	20.8	05/07/02	31.9	05/07/02	203
06/12/02	12.9	06/12/02	28.7	06/12/02	175
07/09/02	18.4	07/09/02	33.6	07/09/02	201
08/20/02	27.4	08/20/02	48.0	08/20/02	246
09/10/02	27.3	09/10/02	50.4	09/10/02	248
10/17/02	25.7	10/17/02	40.7	10/17/02	200
11/06/02	37.3	11/06/02	45.5	11/06/02	232
12/03/02	19.0	12/03/02	40.9	12/03/02	203
01/13/04	21.3	01/13/04	36.3	01/13/04	201
02/16/04	16.7	02/16/04	24.1	02/16/04	169
03/18/04	27.6	03/18/04	33.9	03/18/04	235
04/14/04	21.8	04/14/04	33.7	04/14/04	213
05/25/04	14.3	05/25/04	22.6	05/25/04	165
06/08/04	20.5	06/08/04	34.7	06/08/04	224
07/06/04	14.4	07/06/04	23.0	07/06/04	163
08/03/04	20.8	08/03/04	31.8	08/03/04	203
08/31/04	31.3	08/31/04	44.9	08/31/04	268
10/05/04	17.5	10/05/04	42.5	10/05/04	199
10/26/04	38.3	10/26/04	46.2	10/26/04	244
11/30/04	16.8	11/30/04	24.5	11/30/04	184
10/24/07	42.5	10/24/07	60.6	10/24/07	330
11/14/07	31.1	11/14/07	53.4	11/14/07	300
12/12/07	30.5	12/12/07	53.2	12/12/07	286
01/09/08	24.6	01/09/08	37.6	01/09/08	215
02/20/08	27.8	02/20/08	42.7	02/20/08	254
03/05/08	20.6	03/05/08	27.1	03/05/08	200
04/09/08	17.1	04/09/08	25.7	04/09/08	168
05/13/08	18.4	05/13/08	27.8	05/13/08	180
06/10/08	20.0	06/10/08	31.9	06/10/08	216
07/16/08	24.9	07/16/08	31.5	07/16/08	235
08/13/08	18.6	08/13/08	36.8	08/13/08	244
Max	42.5	Max	60.6	Max	330
75th %tile	27.4	75th %tile	42.6	75th %tile	240
Median	20.6	Median	33.7	Median	203
25th %tile	17.0	25th %tile	27.5	25th %tile	178
Min.	10.8	Min.	17.8	Min.	108

TABLE C.3. USGS DAILY FLOW STATISTICS FOR  
07381590 WAX LAKE OUTLET AT CALUMET, LA

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
1	1	1996	2000	3	60800
1	2	1998	2000	2	50300
1	3	1998	2000	2	45500
1	4	1998	2000	2	58500
1	5	1998	2000	2	51800
1	6	1998	2000	2	50800
1	7	1998	2000	3	68500
1	8	1998	2000	3	69500
1	9	1998	2000	3	75100
1	10	1996	2000	5	87600
1	11	1996	2000	5	89400
1	12	1997	2000	4	98000
1	13	1997	2000	4	99900
1	14	1996	2000	5	91900
1	15	1996	2000	5	92900
1	16	1996	2000	5	94800
1	17	1996	2000	5	94800
1	18	1997	2000	4	103000
1	19	1997	2000	4	104000
1	20	1997	2000	4	105000
1	21	1997	2000	4	103000
1	22	1997	2000	3	84200
1	23	1997	2000	4	103000
1	24	1997	2000	4	103000
1	25	1997	2000	4	103000
1	26	1997	2000	4	102000
1	27	1997	2000	4	101000
1	28	1997	2000	4	103000
1	29	1997	2000	4	103000
1	30	1997	2000	4	106000
1	31	1997	2000	4	105000
2	1	1997	2000	4	105000
2	2	1997	2000	4	106000
2	3	1997	2000	4	107000
2	4	1997	2000	4	111000
2	5	1997	2000	4	116000
2	6	1998	2000	3	107000
2	7	1998	2000	3	107000
2	8	1997	2000	4	118000
2	9	1997	2000	4	117000
2	10	1997	2000	4	117000
2	11	1997	2000	4	117000
2	12	1997	2000	4	119000
2	13	1997	2000	4	118000
2	14	1997	2000	4	123000
2	15	1997	2000	4	120000
2	16	1997	2000	4	121000
2	17	1997	2000	4	123000
2	18	1997	2000	4	124000
2	19	1997	2000	4	127000
2	20	1997	2000	4	126000

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
2	21	1997	2000	4	124000
2	22	1997	2000	4	124000
2	23	1997	2000	4	124000
2	24	1997	2000	4	121000
2	25	1997	2000	4	120000
2	26	1997	2000	4	122000
2	27	1997	2000	4	131000
2	28	1997	2000	4	130000
2	29	2000	2000	1	76100
3	1	1997	2000	4	132000
3	2	1997	2000	4	132000
3	3	1997	2000	4	132000
3	4	1997	2000	4	133000
3	5	1997	2000	4	132000
3	6	1997	2000	4	134000
3	7	1997	2000	4	134000
3	8	1997	2000	4	134000
3	9	1997	2000	4	137000
3	10	1997	2000	4	137000
3	11	1997	2000	4	138000
3	12	1997	2000	4	138000
3	13	1997	2000	4	139000
3	14	1997	2000	4	142000
3	15	1997	2000	4	142000
3	16	1997	2000	4	140000
3	17	1997	2000	4	141000
3	18	1997	2000	4	142000
3	19	1997	2000	4	141000
3	20	1997	2000	4	141000
3	21	1996	2000	5	132000
3	22	1996	2000	5	134000
3	23	1996	2000	5	138000
3	24	1996	2000	5	140000
3	25	1996	2000	5	143000
3	26	1996	2000	5	147000
3	27	1996	2000	4	139000
3	28	1996	2000	4	132000
3	29	1996	2000	4	130000
3	30	1997	2000	3	155000
3	31	1997	2000	3	155000
4	1	1997	2000	3	154000
4	2	1997	2000	3	158000
4	3	1996	2000	4	145000
4	4	1996	2000	4	149000
4	5	1996	2000	4	149000
4	6	1996	2000	4	149000
4	7	1996	2000	4	148000
4	8	1996	2000	4	146000
4	9	1996	2000	4	144000
4	10	1996	2000	5	146000
4	11	1996	2000	5	145000
4	12	1996	2000	5	145000
4	13	1996	2000	5	145000
4	14	1996	2000	4	148000

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
4	15	1996	2000	4	148000
4	16	1996	2000	4	146000
4	17	1996	2000	4	148000
4	18	1996	2000	4	148000
4	19	1996	2000	4	145000
4	20	1996	2000	4	141000
4	21	1996	2000	4	139000
4	22	1996	2000	4	136000
4	23	1996	2000	4	135000
4	24	1996	2000	4	134000
4	25	1996	2000	4	131000
4	26	1996	2000	4	127000
4	27	1996	2000	4	125000
4	28	1996	2000	4	122000
4	29	1996	2000	4	124000
4	30	1996	2000	4	125000
5	1	1996	2000	4	122000
5	2	1996	2000	4	123000
5	3	1996	2000	4	124000
5	4	1996	2000	4	127000
5	5	1996	2000	5	127000
5	6	1996	2000	5	129000
5	7	1996	2000	5	135000
5	8	1996	2000	5	138000
5	9	1996	2000	5	136000
5	10	1996	2000	5	141000
5	11	1996	2000	5	138000
5	12	1996	2000	5	140000
5	13	1996	2000	5	141000
5	14	1996	2000	5	141000
5	15	1996	2000	5	138000
5	16	1996	2000	5	139000
5	17	1996	2000	5	140000
5	18	1996	2000	5	140000
5	19	1996	2000	5	140000
5	20	1996	2000	5	138000
5	21	1996	2000	5	138000
5	22	1996	2000	5	136000
5	23	1996	2000	5	133000
5	24	1996	2000	5	131000
5	25	1996	2000	5	128000
5	26	1996	2000	5	126000
5	27	1996	2000	5	126000
5	28	1996	2000	5	127000
5	29	1996	2000	5	124000
5	30	1996	2000	5	125000
5	31	1996	2000	5	123000
6	1	1996	2000	5	123000
6	2	1996	2000	5	124000
6	3	1996	2000	5	126000
6	4	1996	2000	5	123000
6	5	1996	2000	5	120000
6	6	1996	2000	5	125000
6	7	1996	2000	5	124000

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
6	8	1996	2000	5	123000
6	9	1996	2000	5	121000
6	10	1996	2000	5	121000
6	11	1996	2000	5	121000
6	12	1996	2000	4	117000
6	13	1996	2000	4	116000
6	14	1996	2000	5	118000
6	15	1996	2000	5	120000
6	16	1996	2000	5	117000
6	17	1996	2000	5	117000
6	18	1996	2000	5	118000
6	19	1996	2000	5	117000
6	20	1996	2000	5	115000
6	21	1996	2000	5	117000
6	22	1996	2000	5	117000
6	23	1996	2000	5	116000
6	24	1996	2000	5	115000
6	25	1996	2000	5	118000
6	26	1996	2000	5	119000
6	27	1996	2000	5	123000
6	28	1996	2000	5	126000
6	29	1996	2000	5	126000
6	30	1996	2000	5	124000
7	1	1996	2000	5	123000
7	2	1996	2000	5	126000
7	3	1996	2000	5	126000
7	4	1996	2000	5	125000
7	5	1996	2000	5	122000
7	6	1996	2000	5	119000
7	7	1996	2000	5	116000
7	8	1996	2000	5	113000
7	9	1996	2000	5	112000
7	10	1996	2000	5	110000
7	11	1996	2000	5	107000
7	12	1996	2000	5	104000
7	13	1996	2000	5	101000
7	14	1996	2000	5	101000
7	15	1996	2000	5	101000
7	16	1996	2000	5	99100
7	17	1996	2000	4	95200
7	18	1996	2000	4	92400
7	19	1996	2000	4	91200
7	20	1998	2000	3	95600
7	21	1998	2000	3	91600
7	22	1998	2000	3	90500
7	23	1997	2000	4	87200
7	24	1996	2000	5	80000
7	25	1996	2000	5	75800
7	26	1996	2000	5	73100
7	27	1996	2000	5	69500
7	28	1996	2000	5	72500
7	29	1996	2000	5	68200
7	30	1996	2000	5	67200
7	31	1996	2000	5	67600

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
8	1	1996	2000	4	60700
8	2	1996	2000	4	59000
8	3	1996	2000	4	58400
8	4	1996	2000	4	56600
8	5	1996	2000	4	53800
8	6	1996	2000	4	50400
8	7	1996	2000	4	48700
8	8	1996	2000	4	49300
8	9	1996	2000	4	49300
8	10	1996	2000	4	51000
8	11	1996	2000	4	49000
8	12	1996	2000	3	48600
8	13	1996	2000	3	50400
8	14	1996	2000	4	49900
8	15	1996	2000	4	46600
8	16	1996	2000	4	43600
8	17	1996	2000	4	43200
8	18	1996	2000	4	43600
8	19	1996	2000	5	49500
8	20	1996	2000	5	48200
8	21	1996	2000	5	47700
8	22	1996	2000	5	47600
8	23	1996	2000	5	47700
8	24	1996	2000	5	47500
8	25	1996	2000	5	45900
8	26	1996	2000	5	45200
8	27	1996	2000	5	46500
8	28	1996	2000	5	47600
8	29	1996	2000	5	49100
8	30	1996	2000	5	47200
8	31	1996	2000	4	48600
9	1	1996	2000	4	48400
9	2	1996	2000	4	48600
9	3	1996	2000	4	48000
9	4	1996	2000	4	47200
9	5	1996	2000	4	47200
9	6	1996	2000	4	45400
9	7	1996	2000	5	42100
9	8	1996	2000	5	42900
9	9	1996	2000	5	41900
9	10	1996	2000	5	42500
9	11	1996	2000	5	41600
9	12	1996	2000	5	40200
9	13	1996	2000	5	40400
9	14	1996	2000	5	40100
9	15	1996	2000	5	37500
9	16	1996	2000	5	36800
9	17	1996	2000	5	37500
9	18	1996	2000	5	35500
9	19	1996	2000	5	35500
9	20	1996	2000	5	36400
9	21	1996	2000	5	37000
9	22	1996	2000	5	36300
9	23	1996	1999	4	37700

Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
9	24	1996	2000	5	35600
9	25	1996	2000	5	35600
9	26	1996	2000	5	35000
9	27	1996	2000	5	36000
9	28	1996	2000	5	38100
9	29	1996	2000	5	41300
9	30	1996	2000	5	37700
10	1	1996	2000	5	38900
10	2	1996	2000	5	39900
10	3	1996	2000	5	43900
10	4	1996	2000	5	43300
10	5	1996	2000	5	42400
10	6	1996	2000	5	42500
10	7	1996	2000	5	41000
10	8	1996	2000	4	36100
10	9	1996	2000	4	44700
10	10	1996	2000	5	48100
10	11	1996	2000	5	49000
10	12	1996	2000	5	48600
10	13	1996	2000	5	48800
10	14	1996	2000	5	51700
10	15	1996	2000	5	49600
10	16	1996	2000	5	50300
10	17	1996	2000	5	51200
10	18	1996	2000	5	52100
10	19	1996	2000	5	48200
10	20	1996	2000	5	50000
10	21	1996	2000	5	48600
10	22	1996	2000	5	47500
10	23	1996	2000	5	46900
10	24	1996	2000	5	46800
10	25	1996	2000	5	44600
10	26	1996	2000	5	47000
10	27	1996	2000	5	49700
10	28	1996	2000	5	51800
10	29	1996	2000	5	51300
10	30	1996	2000	5	51500
10	31	1996	2000	5	51800
11	1	1996	2000	5	51200
11	2	1996	2000	5	53400
11	3	1996	2000	5	49900
11	4	1996	2000	5	49600
11	5	1996	2000	5	49100
11	6	1996	2000	5	48700
11	7	1996	2000	5	49700
11	8	1996	2000	5	50300
11	9	1996	2000	5	47600
11	10	1996	2000	5	50300
11	11	1996	2000	5	54300
11	12	1996	2000	5	53300
11	13	1996	2000	5	53000
11	14	1996	2000	5	59400
11	15	1996	2000	5	60500
11	16	1996	2000	5	61000



Month	Day	Begin year for daily statistics	End year for daily statistics	No. of values for this day of year	Mean flow (cfs) for this day of year
11	17	1996	2000	5	62100
11	18	1996	2000	5	62700
11	19	1996	2000	5	65000
11	20	1996	2000	5	65500
11	21	1996	2000	5	66000
11	22	1996	2000	5	67700
11	23	1996	2000	5	67800
11	24	1996	2000	5	68700
11	25	1996	2000	5	68000
11	26	1996	2000	5	67200
11	27	1996	2000	5	64700
11	28	1996	2000	5	64600
11	29	1996	2000	5	63700
11	30	1996	2000	5	61700
12	1	1996	2000	5	63200
12	2	1996	2000	5	60200
12	3	1996	2000	5	60800
12	4	1996	2000	5	63000
12	5	1996	2000	5	65500
12	6	1996	2000	5	62700
12	7	1996	2000	5	61900
12	8	1996	2000	5	62600
12	9	1997	2000	4	65600
12	10	1997	2000	4	71100
12	11	1997	2000	4	69600
12	12	1996	2000	5	66400
12	13	1996	2000	5	71800
12	14	1996	2000	5	68400
12	15	1996	2000	5	71400
12	16	1996	2000	5	69900
12	17	1996	2000	4	72000
12	18	1996	2000	4	76000
12	19	1997	2000	3	85700
12	20	1997	2000	4	88900
12	21	1997	2000	3	85300
12	22	1997	2000	3	88700
12	23	1997	2000	3	89300
12	24	1997	2000	3	92700
12	25	1997	2000	3	95200
12	26	1997	2000	3	96200
12	27	1998	2000	2	67900
12	28	1998	2000	2	64300
12	29	1998	2000	2	62800
12	30	1996	2000	3	62900
12	31	1996	2000	3	61900

Mean flow (cfs) for all 366 days = **91746**

# **APPENDIX D**

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## **LOSC Monthly Water Budget**

LOUISIANA OFFICE OF STATE CLIMATOLOGY MONTHLY WATER BUDGET FOR REGION 8 (SOUTH CENTRAL LA)

All values below are in millimeters

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1895	33.1	110.0	77.9	152.4	33.1	0.0	0.0	75.5	50.5
02-1895	24.9	132.6	107.6	152.4	24.9	0.0	0.0	107.6	79.0
03-1895	47.0	120.1	73.1	152.4	47.0	0.0	0.0	73.1	76.1
04-1895	54.7	70.9	16.1	152.4	54.7	0.0	0.0	16.1	46.1
05-1895	69.2	136.7	67.5	152.4	69.2	0.0	0.0	67.5	56.8
06-1895	85.9	213.4	127.4	152.4	85.9	0.0	0.0	127.4	92.1
07-1895	91.4	195.8	104.4	152.4	91.4	0.0	0.0	104.4	98.3
08-1895	90.8	182.4	91.6	152.4	90.8	0.0	0.0	91.6	94.9
09-1895	81.3	73.2	-8.2	144.2	81.3	0.0	0.0	0.0	47.5
10-1895	53.4	74.4	21.0	152.4	53.4	0.0	0.0	12.8	30.2
11-1895	41.4	83.6	42.2	152.4	41.4	0.0	0.0	42.2	36.2
12-1895	33.9	96.5	62.6	152.4	33.9	0.0	0.0	62.6	49.4
01-1896	31.3	46.0	15.7	152.4	31.3	0.0	0.0	15.7	32.5
02-1896	35.3	81.8	46.5	152.4	35.3	0.0	0.0	46.5	39.5
03-1896	42.7	106.7	63.0	152.4	42.7	0.0	0.0	63.0	51.7
04-1896	61.9	88.6	26.7	152.4	61.9	0.0	0.0	26.7	39.2
05-1896	78.6	56.4	-22.2	130.2	78.6	0.0	0.0	0.0	19.6
06-1896	86.8	219.5	132.6	152.4	86.8	0.0	0.0	110.5	65.0
07-1896	94.6	99.8	5.2	152.4	94.6	0.0	0.0	5.2	35.1
08-1896	94.3	106.4	12.1	152.4	94.3	0.0	0.0	12.1	23.6
09-1896	77.2	116.1	38.9	152.4	77.2	0.0	0.0	38.9	31.2
10-1896	58.8	120.7	61.8	152.4	58.8	0.0	0.0	61.8	46.5
11-1896	48.3	157.0	109.7	152.4	48.3	0.0	0.0	109.7	78.1
12-1896	34.1	67.6	33.4	152.4	34.1	0.0	0.0	33.4	55.8
01-1897	29.6	144.5	114.9	152.4	29.6	0.0	0.0	114.9	85.3
02-1897	37.0	123.4	85.5	152.4	37.0	0.0	0.0	85.5	85.4
03-1897	55.9	85.9	29.0	152.4	55.9	0.0	0.0	29.0	57.7
04-1897	56.6	118.9	62.2	152.4	56.6	0.0	0.0	62.2	59.0
05-1897	67.7	51.1	-16.7	135.7	67.7	0.0	0.0	0.0	29.0
06-1897	88.3	91.2	2.9	138.6	88.3	0.0	0.0	0.0	14.0
07-1897	93.6	152.4	58.8	152.4	93.6	0.0	0.0	44.9	29.0
08-1897	89.5	201.7	112.1	152.4	89.5	0.0	0.0	112.1	71.0
09-1897	78.8	95.8	16.9	152.4	78.8	0.0	0.0	16.9	43.0
10-1897	64.1	77.0	13.9	152.4	64.1	0.0	0.0	13.9	28.9
11-1897	46.1	100.3	54.3	152.4	46.1	0.0	0.0	54.3	41.6
12-1897	36.3	150.4	114.1	152.4	36.3	0.0	0.0	114.1	77.8
01-1898	39.4	149.6	110.2	152.4	39.4	0.0	0.0	110.2	93.0
02-1898	37.6	170.9	133.4	152.4	37.6	0.0	0.0	133.4	113.7
03-1898	48.5	40.1	-8.4	144.0	48.5	0.0	0.0	0.0	56.8
04-1898	49.3	74.2	24.8	152.4	49.3	0.0	0.0	16.5	36.6
05-1898	72.6	4.6	-68.0	84.4	72.6	0.0	0.0	0.0	18.3
06-1898	85.6	198.1	112.5	152.4	85.6	0.0	0.0	44.5	31.4
07-1898	88.9	190.8	101.8	152.4	88.9	0.0	0.0	101.8	66.6
08-1898	88.9	204.0	116.0	152.4	88.9	0.0	0.0	116.0	91.3
09-1898	81.6	339.6	258.0	152.4	81.6	0.0	0.0	258.0	174.7
10-1898	53.8	101.1	47.3	152.4	53.8	0.0	0.0	47.3	110.0
11-1898	36.7	206.8	170.1	152.4	36.7	0.0	0.0	170.1	140.5
12-1898	30.8	81.8	51.0	152.4	30.8	0.0	0.0	51.0	95.8
01-1899	32.6	138.7	106.0	152.4	32.6	0.0	0.0	106.0	100.9
02-1899	27.9	75.4	47.6	152.4	27.9	0.0	0.0	47.6	74.2
03-1899	47.7	55.1	7.4	152.4	47.7	0.0	0.0	7.4	40.8
04-1899	52.5	75.4	22.9	152.4	52.5	0.0	0.0	22.9	31.9
05-1899	81.6	17.3	-64.3	88.1	81.6	0.0	0.0	0.0	15.9
06-1899	85.6	143.3	57.6	145.7	85.6	0.0	0.0	0.0	7.0
07-1899	95.3	130.6	35.3	152.4	95.3	0.0	0.0	28.6	18.3
08-1899	94.3	161.5	67.3	152.4	94.3	0.0	0.0	67.3	42.8
09-1899	71.3	72.1	0.8	152.4	71.3	0.0	0.0	0.8	21.8
10-1899	61.9	44.0	-16.0	135.4	61.9	0.0	0.0	0.0	10.9
11-1899	44.8	33.5	-11.3	125.4	43.6	1.3	0.0	0.0	5.4
12-1899	33.9	135.4	101.5	152.4	33.9	0.0	0.0	74.5	39.0

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1900	31.6	129.3	97.6	152.4	31.6	0.0	0.0	97.6	68.8
02-1900	32.4	167.6	135.2	152.4	32.4	0.0	0.0	135.2	102.0
03-1900	44.8	167.6	122.8	152.4	44.8	0.0	0.0	122.8	112.4
04-1900	57.0	258.8	201.8	152.4	57.0	0.0	0.0	201.8	157.1
05-1900	71.8	93.2	21.4	152.4	71.8	0.0	0.0	21.4	89.3
06-1900	85.3	303.5	218.2	152.4	85.3	0.0	0.0	218.2	153.7
07-1900	87.7	143.3	55.5	152.4	87.7	0.0	0.0	55.5	104.6
08-1900	90.2	159.0	68.8	152.4	90.2	0.0	0.0	68.8	86.7
09-1900	89.9	72.6	-17.2	135.2	89.9	0.0	0.0	0.0	43.4
10-1900	65.2	117.9	52.6	152.4	65.2	0.0	0.0	35.4	39.4
11-1900	45.4	60.7	15.3	152.4	45.4	0.0	0.0	15.3	27.3
12-1900	34.8	196.3	161.5	152.4	34.8	0.0	0.0	161.5	94.4
01-1901	35.2	88.9	53.7	152.4	35.2	0.0	0.0	53.7	74.1
02-1901	32.3	142.7	110.4	152.4	32.3	0.0	0.0	110.4	92.2
03-1901	42.1	87.6	45.5	152.4	42.1	0.0	0.0	45.5	68.9
04-1901	50.4	137.2	86.8	152.4	50.4	0.0	0.0	86.8	77.8
05-1901	67.0	60.0	-7.0	145.4	67.0	0.0	0.0	0.0	38.9
06-1901	90.2	110.2	20.1	152.4	90.2	0.0	0.0	13.1	25.0
07-1901	93.0	213.1	120.1	152.4	93.0	0.0	0.0	120.1	73.0
08-1901	90.5	183.1	92.7	152.4	90.5	0.0	0.0	92.7	82.9
09-1901	76.2	114.6	38.4	152.4	76.2	0.0	0.0	38.4	60.6
10-1901	55.5	53.6	-1.9	150.5	55.5	0.0	0.0	0.0	30.3
11-1901	39.3	56.6	17.3	152.4	39.3	0.0	0.0	15.4	22.9
12-1901	31.3	144.3	112.0	152.4	31.3	0.0	0.0	112.0	67.9
01-1902	30.0	42.9	11.9	152.4	30.0	0.0	0.0	11.9	39.9
02-1902	29.8	101.3	71.5	152.4	29.8	0.0	0.0	71.5	55.7
03-1902	45.9	86.1	40.2	152.4	45.9	0.0	0.0	40.2	47.0
04-1902	57.8	94.5	36.7	152.4	57.8	0.0	0.0	36.7	42.3
05-1902	77.8	77.0	0.2	152.4	77.8	0.0	0.0	0.2	21.3
06-1902	91.1	14.2	-76.9	75.5	91.1	0.0	0.0	0.0	10.6
07-1902	92.4	61.0	-30.4	60.5	77.0	15.3	0.0	0.0	5.3
08-1902	97.9	117.6	19.7	80.1	97.9	0.0	0.0	0.0	2.7
09-1902	79.6	185.2	105.5	152.4	79.6	0.0	0.0	33.3	17.0
10-1902	57.2	72.1	14.9	152.4	57.2	0.0	0.0	14.9	16.4
11-1902	50.9	67.3	16.4	152.4	50.9	0.0	0.0	16.4	16.4
12-1902	34.3	122.4	88.2	152.4	34.3	0.0	0.0	88.2	52.3
01-1903	30.9	119.9	88.0	152.4	30.9	0.0	0.0	88.0	70.6
02-1903	35.3	159.0	123.7	152.4	35.3	0.0	0.0	123.7	97.2
03-1903	47.5	242.3	194.8	152.4	47.5	0.0	0.0	194.8	145.0
04-1903	54.3	26.2	-28.2	124.2	54.3	0.0	0.0	0.0	72.0
05-1903	67.5	80.0	12.5	136.7	67.5	0.0	0.0	0.0	36.5
06-1903	78.0	142.7	64.7	152.4	78.0	0.0	0.0	49.1	42.8
07-1903	88.6	113.0	24.4	152.4	88.6	0.0	0.0	24.4	33.6
08-1903	92.0	146.3	54.3	152.4	92.0	0.0	0.0	54.3	43.9
09-1903	75.6	64.3	-11.4	141.0	75.6	0.0	0.0	0.0	21.0
10-1903	55.3	41.7	-13.6	128.4	54.3	1.0	0.0	0.0	10.0
11-1903	39.4	1.8	-37.7	96.7	33.5	5.9	0.0	0.0	5.5
12-1903	30.3	106.2	75.9	152.4	30.3	0.0	0.0	20.2	12.8
01-1904	30.2	97.0	66.9	152.4	30.2	0.0	0.0	66.9	39.9
02-1904	41.4	47.8	6.4	152.4	41.4	0.0	0.0	6.4	23.1
03-1904	51.6	76.0	25.4	152.4	51.6	0.0	0.0	25.4	24.2
04-1904	54.5	72.6	18.1	152.4	54.5	0.0	0.0	18.1	21.2
05-1904	67.0	75.4	7.5	152.4	67.0	0.0	0.0	7.5	14.3
06-1904	88.0	59.9	-28.1	124.3	88.0	0.0	0.0	0.0	7.2
07-1904	87.1	202.9	115.8	152.4	87.1	0.0	0.0	87.8	47.5
08-1904	87.7	181.1	93.4	152.4	87.7	0.0	0.0	93.4	70.4
09-1904	85.6	133.6	47.0	152.4	85.6	0.0	0.0	47.0	59.2
10-1904	63.9	21.6	-42.3	110.1	63.9	0.0	0.0	0.0	29.6
11-1904	40.4	44.2	3.8	113.9	40.4	0.0	0.0	0.0	14.8
12-1904	34.0	150.4	116.4	152.4	34.0	0.0	0.0	77.8	46.3
01-1905	28.4	146.8	118.4	152.4	28.4	0.0	0.0	118.4	82.3
02-1905	26.5	177.0	150.6	152.4	26.5	0.0	0.0	150.6	116.5
03-1905	49.3	165.6	116.3	152.4	49.3	0.0	0.0	116.3	116.4
04-1905	58.8	230.4	171.6	152.4	58.8	0.0	0.0	171.6	143.0

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1905	81.3	123.7	42.4	152.4	81.3	0.0	0.0	42.4	93.2
06-1905	89.9	188.5	98.6	152.4	89.9	0.0	0.0	98.6	95.9
07-1905	88.6	231.1	142.5	152.4	88.6	0.0	0.0	142.5	119.2
08-1905	93.6	158.2	64.6	152.4	93.6	0.0	0.0	64.6	91.9
09-1905	84.7	186.2	101.4	152.4	84.7	0.0	0.0	101.4	96.7
10-1905	60.0	111.8	51.7	152.4	60.0	0.0	0.0	51.7	74.2
11-1905	47.7	134.1	86.4	152.4	47.7	0.0	0.0	86.4	80.3
12-1905	30.2	147.6	117.4	152.4	30.2	0.0	0.0	117.4	98.9
01-1906	33.2	86.1	52.9	152.4	33.2	0.0	0.0	52.9	75.9
02-1906	32.2	86.6	54.4	152.4	32.2	0.0	0.0	54.4	65.2
03-1906	41.4	166.9	125.5	152.4	41.4	0.0	0.0	125.5	95.3
04-1906	58.8	76.7	17.9	152.4	58.8	0.0	0.0	17.9	56.6
05-1906	73.1	47.5	-25.6	126.8	73.1	0.0	0.0	0.0	28.3
06-1906	93.6	88.4	-5.3	122.5	92.8	0.9	0.0	0.0	14.2
07-1906	92.7	220.2	127.5	152.4	92.7	0.0	0.0	97.6	55.9
08-1906	93.0	80.0	-13.0	138.4	93.0	0.0	0.0	0.0	27.9
09-1906	86.8	75.7	-11.1	128.3	85.8	1.0	0.0	0.0	13.0
10-1906	52.9	109.2	56.4	152.4	52.9	0.0	0.0	32.3	23.1
11-1906	48.8	59.7	10.9	152.4	48.8	0.0	0.0	10.9	16.0
12-1906	40.3	89.2	48.9	152.4	40.3	0.0	0.0	48.9	32.9
01-1907	47.7	59.7	12.0	152.4	47.7	0.0	0.0	12.0	22.5
02-1907	39.4	64.5	25.1	152.4	39.4	0.0	0.0	25.1	23.8
03-1907	61.7	34.8	-26.9	125.5	61.7	0.0	0.0	0.0	11.9
04-1907	53.8	153.4	99.6	152.4	53.8	0.0	0.0	72.7	42.3
05-1907	67.7	322.8	255.1	152.4	67.7	0.0	0.0	255.1	148.7
06-1907	86.2	40.1	-46.1	106.3	86.2	0.0	0.0	0.0	74.3
07-1907	94.9	123.0	29.0	135.3	94.9	0.0	0.0	0.0	37.2
08-1907	93.0	158.5	65.5	152.4	93.0	0.0	0.0	48.4	42.8
09-1907	82.2	110.7	28.6	152.4	82.2	0.0	0.0	28.6	35.7
10-1907	60.9	90.9	30.0	152.4	60.9	0.0	0.0	30.0	32.9
11-1907	38.9	106.2	67.3	152.4	38.9	0.0	0.0	67.3	50.1
12-1907	34.8	142.2	107.4	152.4	34.8	0.0	0.0	107.4	78.7
01-1908	32.8	94.7	61.0	152.4	32.8	0.0	0.0	61.0	70.4
02-1908	35.3	78.5	43.2	152.4	35.3	0.0	0.0	43.2	56.8
03-1908	56.4	60.7	4.3	152.4	56.4	0.0	0.0	4.3	30.5
04-1908	68.2	87.6	19.4	152.4	68.2	0.0	0.0	19.4	24.0
05-1908	73.1	157.2	84.1	152.4	73.1	0.0	0.0	84.1	54.6
06-1908	89.9	109.5	19.6	152.4	89.9	0.0	0.0	19.6	37.1
07-1908	89.5	308.9	219.3	152.4	89.5	0.0	0.0	219.3	128.2
08-1908	90.2	209.6	119.4	152.4	90.2	0.0	0.0	119.4	123.8
09-1908	79.4	254.5	175.1	152.4	79.4	0.0	0.0	175.1	149.5
10-1908	50.4	23.6	-26.8	125.6	50.4	0.0	0.0	0.0	74.7
11-1908	45.9	48.3	2.4	128.0	45.9	0.0	0.0	0.0	37.4
12-1908	39.0	74.7	35.6	152.4	39.0	0.0	0.0	11.2	24.3
01-1909	38.6	66.5	27.9	152.4	38.6	0.0	0.0	27.9	26.1
02-1909	36.8	85.6	48.8	152.4	36.8	0.0	0.0	48.8	37.4
03-1909	46.9	76.5	29.6	152.4	46.9	0.0	0.0	29.6	33.5
04-1909	56.2	127.8	71.5	152.4	56.2	0.0	0.0	71.5	52.5
05-1909	69.2	102.4	33.2	152.4	69.2	0.0	0.0	33.2	42.9
06-1909	87.7	234.7	146.0	152.4	87.7	0.0	0.0	146.0	94.9
07-1909	94.9	132.8	37.9	152.4	94.9	0.0	0.0	37.9	66.4
08-1909	92.7	227.6	134.9	152.4	92.7	0.0	0.0	134.9	100.7
09-1909	79.9	160.5	80.6	152.4	79.9	0.0	0.0	80.6	90.6
10-1909	60.3	50.0	-10.2	142.2	60.3	0.0	0.0	0.0	45.3
11-1909	51.3	18.8	-32.5	111.9	49.1	2.2	0.0	0.0	22.7
12-1909	29.7	180.8	151.1	152.4	29.7	0.0	0.0	110.6	66.6
01-1910	34.6	80.3	45.7	152.4	34.6	0.0	0.0	45.7	56.1
02-1910	32.4	98.6	66.1	152.4	32.4	0.0	0.0	66.1	61.1
03-1910	50.5	29.5	-21.1	131.3	50.5	0.0	0.0	0.0	30.6
04-1910	55.3	36.3	-18.0	114.0	52.7	2.6	0.0	0.0	15.3
05-1910	70.1	118.1	47.0	152.4	70.1	0.0	0.0	10.6	12.9
06-1910	82.7	247.9	165.2	152.4	82.7	0.0	0.0	165.2	89.1
07-1910	88.9	268.0	180.1	152.4	88.9	0.0	0.0	180.1	134.6
08-1910	93.0	143.8	49.8	152.4	93.0	0.0	0.0	49.8	92.2

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1910	83.6	117.6	34.0	152.4	83.6	0.0	0.0	34.0	63.1
10-1910	61.5	80.5	19.0	152.4	61.5	0.0	0.0	19.0	41.1
11-1910	44.5	82.3	37.8	152.4	44.5	0.0	0.0	37.8	39.4
12-1910	34.1	117.1	82.0	152.4	34.1	0.0	0.0	82.0	61.2
01-1911	44.3	73.7	29.3	152.4	44.3	0.0	0.0	29.3	45.3
02-1911	47.8	0.0	-47.8	104.6	47.8	0.0	0.0	0.0	22.6
03-1911	52.7	69.3	16.7	121.2	52.7	0.0	0.0	0.0	11.3
04-1911	64.1	167.6	103.5	152.4	64.1	0.0	0.0	72.3	41.8
05-1911	72.8	73.9	1.1	152.4	72.8	0.0	0.0	1.1	21.5
06-1911	93.0	162.6	69.6	152.4	93.0	0.0	0.0	69.6	45.5
07-1911	86.5	256.0	169.5	152.4	86.5	0.0	0.0	169.5	107.5
08-1911	91.1	238.5	147.4	152.4	91.1	0.0	0.0	147.4	127.5
09-1911	91.7	104.4	12.7	152.4	91.7	0.0	0.0	12.7	70.1
10-1911	63.7	78.0	15.3	152.4	63.7	0.0	0.0	15.3	42.7
11-1911	39.2	103.4	64.2	152.4	39.2	0.0	0.0	64.2	53.4
12-1911	38.1	238.8	200.6	152.4	38.1	0.0	0.0	200.6	127.0
01-1912	29.5	154.2	124.6	152.4	29.5	0.0	0.0	124.6	125.8
02-1912	30.3	87.9	57.6	152.4	30.3	0.0	0.0	57.6	91.7
03-1912	41.4	267.2	225.8	152.4	41.4	0.0	0.0	225.8	158.8
04-1912	60.5	155.0	95.5	152.4	60.5	0.0	0.0	95.5	127.1
05-1912	72.3	154.2	81.9	152.4	72.3	0.0	0.0	81.9	104.5
06-1912	81.6	157.5	75.9	152.4	81.6	0.0	0.0	75.9	90.2
07-1912	91.4	233.7	142.3	152.4	91.4	0.0	0.0	142.3	116.2
08-1912	90.2	198.4	108.2	152.4	90.2	0.0	0.0	108.2	112.2
09-1912	83.0	77.2	-5.8	146.6	83.0	0.0	0.0	0.0	56.1
10-1912	61.5	53.6	-7.9	138.0	61.2	0.3	0.0	0.0	28.1
11-1912	38.6	23.1	-15.5	124.8	37.3	1.4	0.0	0.0	14.0
12-1912	34.7	365.5	330.8	152.4	34.7	0.0	0.0	303.2	158.6
01-1913	40.4	119.9	79.5	152.4	40.4	0.0	0.0	79.5	119.0
02-1913	34.0	70.6	36.6	152.4	34.0	0.0	0.0	36.6	77.8
03-1913	42.8	109.2	66.4	152.4	42.8	0.0	0.0	66.4	72.1
04-1913	52.9	144.0	91.2	152.4	52.9	0.0	0.0	91.2	81.6
05-1913	68.9	103.4	34.5	152.4	68.9	0.0	0.0	34.5	58.0
06-1913	82.2	124.5	42.3	152.4	82.2	0.0	0.0	42.3	50.2
07-1913	89.9	247.1	157.3	152.4	89.9	0.0	0.0	157.3	103.7
08-1913	89.5	164.6	75.0	152.4	89.5	0.0	0.0	75.0	89.4
09-1913	76.7	425.0	349.3	152.4	76.7	0.0	0.0	349.3	219.3
10-1913	54.9	109.5	54.6	152.4	54.9	0.0	0.0	54.6	136.9
11-1913	51.3	42.7	-8.6	143.8	51.3	0.0	0.0	0.0	68.5
12-1913	34.6	31.8	-2.9	141.1	34.4	0.2	0.0	0.0	34.2
01-1914	36.3	47.5	11.2	152.3	36.3	0.0	0.0	0.0	17.1
02-1914	32.5	137.4	104.9	152.4	32.5	0.0	0.0	104.8	60.0
03-1914	38.5	170.9	132.4	152.4	38.5	0.0	0.0	132.4	96.7
04-1914	57.0	155.4	98.4	152.4	57.0	0.0	0.0	98.4	97.6
05-1914	72.8	51.1	-21.8	130.6	72.8	0.0	0.0	0.0	48.8
06-1914	94.6	97.5	2.9	133.5	94.6	0.0	0.0	0.0	24.4
07-1914	93.0	241.8	147.8	152.4	93.0	0.0	0.0	128.0	76.7
08-1914	89.2	224.3	135.0	152.4	89.2	0.0	0.0	135.0	105.9
09-1914	79.4	60.7	-18.7	133.7	79.4	0.0	0.0	0.0	52.9
10-1914	60.3	56.1	-4.1	130.1	59.8	0.5	0.0	0.0	26.5
11-1914	42.3	132.8	90.6	152.4	42.3	0.0	0.0	68.3	47.4
12-1914	30.7	92.5	61.8	152.4	30.7	0.0	0.0	61.8	54.6
01-1915	30.3	182.9	152.6	152.4	30.3	0.0	0.0	152.6	103.6
02-1915	35.3	129.5	94.2	152.4	35.3	0.0	0.0	94.2	98.9
03-1915	32.5	61.0	29.4	152.4	32.5	0.0	0.0	29.4	64.2
04-1915	56.4	32.3	-24.2	128.2	56.4	0.0	0.0	0.0	32.1
05-1915	75.6	123.0	48.3	152.4	75.6	0.0	0.0	24.1	28.1
06-1915	93.0	81.8	-12.2	140.2	93.0	0.0	0.0	0.0	14.1
07-1915	93.0	199.1	105.2	152.4	93.0	0.0	0.0	92.0	53.5
08-1915	91.7	179.6	87.8	152.4	91.7	0.0	0.0	87.8	70.7
09-1915	84.5	93.0	9.5	152.4	84.5	0.0	0.0	9.5	40.1
10-1915	64.6	114.3	49.7	152.4	64.6	0.0	0.0	49.7	44.9
11-1915	49.5	53.3	3.8	152.4	49.5	0.0	0.0	3.8	24.4
12-1915	35.5	85.3	49.9	152.4	35.5	0.0	0.0	49.9	37.1

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1916	42.0	179.6	136.6	152.4	42.0	0.0	0.0	136.6	86.9
02-1916	36.3	18.5	-17.8	134.6	36.3	0.0	0.0	0.0	43.4
03-1916	46.5	8.9	-37.6	101.4	42.1	4.4	0.0	0.0	21.7
04-1916	53.6	86.4	32.8	134.1	53.6	0.0	0.0	0.0	10.9
05-1916	75.6	159.5	83.9	152.4	75.6	0.0	0.0	65.6	38.2
06-1916	89.5	99.8	10.3	152.4	89.5	0.0	0.0	10.3	24.3
07-1916	92.0	299.5	207.4	152.4	92.0	0.0	0.0	207.4	115.8
08-1916	90.8	152.9	62.1	152.4	90.8	0.0	0.0	62.1	88.0
09-1916	78.0	89.9	11.9	152.4	78.0	0.0	11.9	11.9	50.4
10-1916	58.2	81.0	22.8	152.4	58.2	0.0	0.0	22.8	36.6
11-1916	42.1	1.8	-40.3	112.1	42.1	0.0	0.0	0.0	18.3
12-1916	36.8	160.3	123.5	152.4	36.8	0.0	0.0	83.1	50.7
01-1917	38.8	166.9	128.1	152.4	38.8	0.0	0.0	128.1	89.4
02-1917	38.9	87.1	48.2	152.4	38.9	0.0	0.0	48.2	68.8
03-1917	48.2	58.9	10.8	152.4	48.2	0.0	0.0	10.8	39.8
04-1917	53.8	100.8	47.1	152.4	53.8	0.0	0.0	47.1	43.4
05-1917	63.9	36.8	-27.1	125.3	63.9	0.0	0.0	0.0	21.7
06-1917	86.2	32.3	-53.0	80.0	76.6	9.6	0.0	0.0	10.9
07-1917	93.0	191.0	98.0	152.4	93.0	0.0	0.0	26.6	18.7
08-1917	90.2	190.2	100.1	152.4	90.2	0.0	0.0	100.1	59.4
09-1917	75.6	91.4	15.8	152.4	75.6	0.0	0.0	15.8	37.6
10-1917	50.0	36.6	-13.5	138.9	50.0	0.0	0.0	0.0	18.8
11-1917	36.4	24.1	-12.3	127.7	35.4	1.1	0.0	0.0	9.4
12-1917	30.0	88.6	57.7	152.4	30.0	0.0	0.0	32.0	21.2
01-1918	27.3	119.1	91.8	152.4	27.3	0.0	0.0	91.8	56.5
02-1918	44.7	37.6	-7.1	145.3	44.7	0.0	0.0	0.0	28.3
03-1918	55.3	64.5	9.2	152.4	55.3	0.0	0.0	2.2	15.2
04-1918	56.6	163.8	107.2	152.4	56.6	0.0	0.0	107.2	61.2
05-1918	73.1	54.6	-18.5	133.9	73.1	0.0	0.0	0.0	30.6
06-1918	93.0	119.4	25.4	152.4	93.0	0.0	0.0	6.9	18.8
07-1918	93.6	140.0	47.3	152.4	93.6	0.0	0.0	47.3	33.0
08-1918	89.9	227.1	137.2	152.4	89.9	0.0	0.0	137.2	85.1
09-1918	73.3	61.7	-11.6	140.8	73.3	0.0	0.0	0.0	42.6
10-1918	67.0	240.8	173.7	152.4	67.0	0.0	0.0	162.1	102.4
11-1918	40.8	119.9	79.1	152.4	40.8	0.0	0.0	79.1	90.7
12-1918	38.5	177.0	138.5	152.4	38.5	0.0	0.0	138.5	114.6
01-1919	30.6	154.7	124.1	152.4	30.6	0.0	0.0	124.1	119.4
02-1919	37.3	150.9	113.5	152.4	37.3	0.0	0.0	113.5	116.5
03-1919	47.7	86.6	38.9	152.4	47.7	0.0	0.0	38.9	77.7
04-1919	55.7	147.1	91.4	152.4	55.7	0.0	0.0	91.4	84.5
05-1919	68.4	173.7	105.3	152.4	68.4	0.0	0.0	105.3	94.9
06-1919	81.9	168.4	86.5	152.4	81.9	0.0	0.0	86.5	90.7
07-1919	91.7	166.1	74.4	152.4	91.7	0.0	0.0	74.4	82.6
08-1919	93.6	160.0	66.4	152.4	93.6	0.0	0.0	66.4	74.5
09-1919	81.9	91.2	9.3	152.4	81.9	0.0	0.0	9.3	41.9
10-1919	79.4	182.1	102.7	152.4	79.4	0.0	0.0	102.7	72.3
11-1919	50.2	181.6	131.4	152.4	50.2	0.0	0.0	131.4	101.9
12-1919	37.7	48.3	10.5	152.4	37.7	0.0	0.0	10.5	56.2
01-1920	37.1	149.4	112.3	152.4	37.1	0.0	0.0	112.3	84.2
02-1920	37.2	89.2	51.0	152.4	37.2	0.0	0.0	51.0	68.1
03-1920	41.7	49.3	7.6	152.4	41.7	0.0	0.0	7.6	37.8
04-1920	57.2	106.9	49.7	152.4	57.2	0.0	0.0	49.7	43.8
05-1920	78.8	90.7	11.8	152.4	78.8	0.0	0.0	11.8	27.8
06-1920	84.7	162.1	77.3	152.4	84.7	0.0	0.0	77.3	52.6
07-1920	90.5	244.3	153.9	152.4	90.5	0.0	0.0	153.9	103.2
08-1920	89.2	219.5	130.2	152.4	89.2	0.0	0.0	130.2	116.7
09-1920	87.1	129.8	42.7	152.4	87.1	0.0	0.0	42.7	79.7
10-1920	59.4	59.2	-0.3	152.1	59.4	0.0	0.0	0.0	39.9
11-1920	36.8	100.3	63.5	152.4	36.8	0.0	0.0	63.5	51.6
12-1920	33.6	265.2	231.6	152.4	33.6	0.0	0.0	231.6	141.6
01-1921	40.8	75.2	34.4	152.4	40.8	0.0	0.0	34.4	87.0
02-1921	40.7	0.3	-40.4	111.0	40.7	0.0	0.0	0.0	43.0
03-1921	59.8	109.2	49.4	152.4	59.8	0.0	0.0	8.9	26.5
04-1921	54.7	157.2	102.5	152.4	54.7	0.0	0.0	102.5	64.5

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1921	69.9	65.0	-4.9	147.5	69.9	0.0	0.0	0.0	32.2
06-1921	86.2	103.4	17.2	152.4	86.2	0.0	0.0	12.3	22.3
07-1921	92.4	212.6	120.2	152.4	92.4	0.0	0.0	120.2	71.3
08-1921	94.9	91.9	-2.0	149.4	94.9	0.0	0.0	0.0	35.6
09-1921	89.2	87.4	-1.9	147.6	89.2	0.0	0.0	0.0	17.8
10-1921	57.4	49.5	-7.9	139.9	57.2	0.2	0.0	0.0	8.9
11-1921	51.6	43.2	-8.4	132.2	50.9	0.7	0.0	0.0	4.5
12-1921	41.5	140.2	98.7	152.4	41.5	0.0	0.0	78.5	41.5
01-1922	34.5	132.8	98.4	152.4	34.5	0.0	0.0	98.4	69.9
02-1922	44.5	103.1	58.6	152.4	44.5	0.0	0.0	58.6	64.3
03-1922	44.8	249.7	204.9	152.4	44.8	0.0	0.0	204.9	134.6
04-1922	64.8	99.6	34.8	152.4	64.8	0.0	0.0	34.8	84.7
05-1922	74.3	169.7	95.3	152.4	74.3	0.0	0.0	95.3	90.0
06-1922	87.7	171.0	84.2	152.4	87.7	0.0	0.0	84.2	87.1
07-1922	89.9	196.8	106.0	152.4	89.9	0.0	0.0	106.0	97.1
08-1922	88.9	190.8	101.8	152.4	88.9	0.0	0.0	101.8	99.4
09-1922	81.9	118.4	36.5	152.4	81.9	0.0	0.0	36.5	67.0
10-1922	58.8	66.5	7.7	152.4	58.8	0.0	0.0	7.7	37.8
11-1922	50.4	117.9	67.5	152.4	50.4	0.0	0.0	67.5	52.7
12-1922	45.1	198.9	153.8	152.4	45.1	0.0	0.0	153.8	103.2
01-1923	42.6	110.5	67.9	152.4	42.6	0.0	0.0	67.9	85.6
02-1923	37.0	96.0	58.0	152.4	37.0	0.0	0.0	58.0	71.8
03-1923	43.4	153.2	109.7	152.4	43.4	0.0	0.0	109.7	90.8
04-1923	59.8	150.6	90.8	152.4	59.8	0.0	0.0	90.8	90.8
05-1923	68.9	181.4	112.4	152.4	68.9	0.0	0.0	112.4	101.6
06-1923	85.3	181.4	96.0	152.4	85.3	0.0	0.0	96.0	98.8
07-1923	86.2	229.1	142.9	152.4	86.2	0.0	0.0	142.9	120.9
08-1923	88.9	193.3	104.4	152.4	88.9	0.0	0.0	104.4	112.6
09-1923	81.6	179.8	98.2	152.4	81.6	0.0	0.0	98.2	105.4
10-1923	57.8	96.5	38.7	152.4	57.8	0.0	0.0	38.7	72.1
11-1923	39.4	174.2	134.8	152.4	39.4	0.0	0.0	134.8	103.4
12-1923	43.7	137.4	93.7	152.4	43.7	0.0	0.0	93.7	98.6
01-1924	29.3	163.1	133.7	152.4	29.3	0.0	0.0	133.7	116.1
02-1924	35.2	115.3	80.1	152.4	35.2	0.0	0.0	80.1	98.1
03-1924	39.7	77.5	37.8	152.4	39.7	0.0	0.0	37.8	67.9
04-1924	57.6	102.9	45.3	152.4	57.6	0.0	0.0	45.3	56.6
05-1924	66.6	107.7	41.1	152.4	66.6	0.0	0.0	41.1	48.9
06-1924	93.6	113.5	19.9	152.4	93.6	0.0	0.0	19.9	34.4
07-1924	93.0	101.3	8.3	152.4	93.0	0.0	0.0	8.3	21.4
08-1924	97.6	80.5	-17.1	135.3	97.6	0.0	0.0	0.0	10.7
09-1924	81.0	33.0	-48.0	92.7	75.7	5.4	0.0	0.0	5.3
10-1924	59.8	12.0	-46.9	64.2	41.5	18.4	0.0	0.0	2.7
11-1924	47.3	18.8	-28.6	52.1	30.8	16.5	0.0	0.0	1.3
12-1924	36.2	140.2	104.0	152.4	36.2	0.0	0.0	3.8	2.6
01-1925	33.9	186.7	152.8	152.4	33.9	0.0	0.0	152.8	77.7
02-1925	42.7	23.1	-19.6	132.8	42.7	0.0	0.0	0.0	38.8
03-1925	48.0	49.0	1.0	133.8	48.0	0.0	0.0	0.0	19.4
04-1925	63.5	20.3	-43.1	95.0	58.2	5.3	0.0	0.0	9.7
05-1925	68.2	45.5	-22.7	81.6	59.8	8.4	0.0	0.0	4.9
06-1925	87.7	132.6	44.9	126.5	87.7	0.0	0.0	0.0	2.4
07-1925	93.3	184.2	90.8	152.4	93.3	0.0	0.0	64.9	33.7
08-1925	92.0	114.8	22.8	152.4	92.0	0.0	0.0	22.8	28.2
09-1925	91.1	184.9	93.8	152.4	91.1	0.0	0.0	93.8	61.0
10-1925	64.8	203.2	138.4	152.4	64.8	0.0	0.0	138.4	99.7
11-1925	42.1	136.7	94.5	152.4	42.1	0.0	0.0	94.5	97.1
12-1925	32.3	115.6	83.3	152.4	32.3	0.0	0.0	83.3	90.2
01-1926	31.6	165.9	134.2	152.4	31.6	0.0	0.0	134.2	112.2
02-1926	38.8	62.2	23.5	152.4	38.8	0.0	0.0	23.5	67.8
03-1926	39.2	350.3	311.1	152.4	39.2	0.0	0.0	311.1	189.5
04-1926	52.3	179.6	127.3	152.4	52.3	0.0	0.0	127.3	158.4
05-1926	67.0	117.1	49.1	152.4	67.0	0.0	0.0	49.1	103.7
06-1926	87.4	126.5	39.1	152.4	87.4	0.0	0.0	39.1	71.4
07-1926	91.1	135.6	44.5	152.4	91.1	0.0	0.0	44.5	57.0
08-1926	92.7	263.1	170.5	152.4	92.7	0.0	0.0	170.5	114.2



Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1926	89.2	98.6	9.3	152.4	89.2	0.0	0.0	9.3	61.8
10-1926	67.0	88.6	21.6	152.4	67.0	0.0	0.0	21.6	41.7
11-1926	37.5	89.4	51.9	152.4	37.5	0.0	0.0	51.9	46.8
12-1926	41.8	21.1	-20.7	131.7	41.8	0.0	0.0	0.0	23.4
01-1927	40.0	64.8	23.8	152.4	40.0	0.0	0.0	3.1	13.2
02-1927	49.5	148.3	98.8	152.4	49.5	0.0	0.0	98.8	56.0
03-1927	46.7	170.7	123.0	152.4	46.7	0.0	0.0	123.0	90.0
04-1927	65.2	132.8	67.6	152.4	65.2	0.0	0.0	67.6	78.8
05-1927	76.2	98.6	22.4	152.4	76.2	0.0	0.0	22.4	50.6
06-1927	88.0	152.9	64.9	152.4	88.0	0.0	0.0	64.9	57.7
07-1927	92.4	155.4	63.1	152.4	92.4	0.0	0.0	63.1	60.4
08-1927	90.5	130.0	39.6	152.4	90.5	0.0	0.0	39.6	49.0
09-1927	83.0	86.9	3.9	152.4	83.0	0.0	0.0	3.9	26.9
10-1927	63.2	70.1	6.9	152.4	63.2	0.0	0.0	6.9	16.9
11-1927	53.6	100.3	46.7	152.4	53.6	0.0	0.0	46.7	31.8
12-1927	34.7	190.5	155.8	152.4	34.7	0.0	0.0	155.8	93.8
01-1928	32.6	27.7	-4.0	147.4	32.6	0.0	0.0	0.0	46.9
02-1928	35.3	147.8	112.5	152.4	35.3	0.0	0.0	107.5	77.2
03-1928	49.2	116.3	67.2	152.4	49.2	0.0	0.0	67.2	72.2
04-1928	49.9	149.9	100.0	152.4	49.9	0.0	0.0	100.0	86.1
05-1928	68.9	87.4	18.5	152.4	68.9	0.0	0.0	18.5	52.3
06-1928	86.2	302.8	216.6	152.4	86.2	0.0	0.0	216.6	134.4
07-1928	91.1	193.3	102.2	152.4	91.1	0.0	0.0	102.2	118.3
08-1928	95.3	128.5	33.3	152.4	95.3	0.0	0.0	33.3	75.8
09-1928	77.5	160.5	83.0	152.4	77.5	0.0	0.0	83.0	79.4
10-1928	66.8	58.4	-8.4	144.0	66.8	0.0	0.0	0.0	39.7
11-1928	42.4	71.9	29.5	152.4	42.4	0.0	0.0	21.1	30.4
12-1928	34.0	121.4	87.4	152.4	34.0	0.0	0.0	87.4	58.9
01-1929	37.8	191.8	153.9	152.4	37.8	0.0	0.0	153.9	106.4
02-1929	33.1	189.2	156.1	152.4	33.1	0.0	0.0	156.1	131.3
03-1929	50.2	159.8	109.6	152.4	50.2	0.0	0.0	109.6	120.4
04-1929	65.7	65.5	-0.1	152.3	65.7	0.0	0.0	0.0	60.2
05-1929	72.6	154.4	81.9	152.4	72.6	0.0	0.0	81.7	70.0
06-1929	86.8	127.8	40.0	152.4	86.8	0.0	0.0	40.0	55.0
07-1929	90.2	173.5	83.3	152.4	90.2	0.0	0.0	83.3	69.6
08-1929	91.4	123.2	31.8	152.4	91.4	0.0	0.0	31.8	50.7
09-1929	81.0	125.5	44.4	152.4	81.0	0.0	0.0	44.4	47.6
10-1929	60.0	105.7	45.6	152.4	60.0	0.0	0.0	45.6	46.6
11-1929	37.0	280.4	242.4	152.4	37.0	0.0	0.0	242.4	144.5
12-1929	32.0	123.0	90.0	152.4	32.0	0.0	0.0	90.0	117.7
01-1930	33.4	259.1	225.6	152.4	33.4	0.0	0.0	225.6	171.7
02-1930	42.0	78.5	35.5	152.4	42.0	0.0	0.0	35.5	103.6
03-1930	39.7	97.8	58.1	152.4	39.7	0.0	0.0	58.1	80.8
04-1930	60.9	38.1	-22.8	129.6	60.9	0.0	0.0	0.0	40.4
05-1930	73.6	75.2	1.6	131.2	73.6	0.0	0.0	0.0	20.2
06-1930	84.5	30.5	-53.0	84.7	76.0	7.5	0.0	0.0	10.1
07-1930	93.0	160.5	66.6	151.3	93.0	0.0	0.0	0.0	5.1
08-1930	89.9	162.6	72.7	152.4	89.9	0.0	0.0	71.6	38.3
09-1930	80.5	233.9	153.5	152.4	80.5	0.0	0.0	153.5	95.9
10-1930	59.0	102.1	43.1	152.4	59.0	0.0	0.0	43.1	69.5
11-1930	43.1	144.5	101.4	152.4	43.1	0.0	0.0	101.4	85.4
12-1930	31.4	101.9	70.4	152.4	31.4	0.0	0.0	70.4	77.9
01-1931	31.9	142.2	110.4	152.4	31.9	0.0	0.0	110.4	94.2
02-1931	39.7	104.6	64.9	152.4	39.7	0.0	0.0	64.9	79.5
03-1931	36.7	108.2	71.5	152.4	36.7	0.0	0.0	71.5	75.5
04-1931	49.9	37.1	-12.8	139.6	49.9	0.0	0.0	0.0	37.8
05-1931	63.2	83.8	20.6	152.4	63.2	0.0	0.0	7.8	22.8
06-1931	84.2	66.0	-18.1	134.3	84.2	0.0	0.0	0.0	11.4
07-1931	94.6	171.7	77.1	152.4	94.6	0.0	0.0	58.0	35.2
08-1931	84.2	122.4	38.3	152.4	84.2	0.0	0.0	38.3	36.7
09-1931	86.5	74.9	-11.6	140.8	86.5	0.0	0.0	0.0	18.4
10-1931	67.0	124.0	57.9	152.4	67.0	0.0	0.0	46.3	32.4
11-1931	53.0	110.0	57.0	152.4	53.0	0.0	0.0	57.0	45.2
12-1931	43.9	200.7	156.8	152.4	43.9	0.0	0.0	156.8	100.0

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1932	41.8	215.1	173.3	152.4	41.8	0.0	0.0	173.3	137.1
02-1932	51.8	79.2	27.5	152.4	51.8	0.0	0.0	27.5	82.3
03-1932	39.3	99.3	60.0	152.4	39.3	0.0	0.0	60.0	71.2
04-1932	57.6	103.6	46.0	152.4	57.6	0.0	0.0	46.0	58.6
05-1932	67.0	129.5	61.6	152.4	67.0	0.0	0.0	61.6	60.1
06-1932	88.3	107.2	18.9	152.4	88.3	0.0	0.0	18.9	39.5
07-1932	96.9	161.3	64.4	152.4	96.9	0.0	0.0	64.4	51.9
08-1932	92.4	195.6	103.2	152.4	92.4	0.0	0.0	103.2	77.6
09-1932	79.6	159.0	79.4	152.4	79.6	0.0	0.0	79.4	78.5
10-1932	54.3	185.2	130.8	152.4	54.3	0.0	0.0	130.8	104.6
11-1932	35.6	107.0	72.4	152.4	35.6	0.0	0.0	72.4	88.5
12-1932	36.7	191.8	155.1	152.4	36.7	0.0	0.0	155.1	121.8
01-1933	40.0	91.4	50.5	152.4	40.0	0.0	0.0	50.5	86.1
02-1933	38.9	129.3	90.4	152.4	38.9	0.0	0.0	90.4	88.3
03-1933	47.5	178.3	130.8	152.4	47.5	0.0	0.0	130.8	109.5
04-1933	58.0	116.6	58.6	152.4	58.0	0.0	0.0	58.6	84.0
05-1933	81.6	102.1	20.5	152.4	81.6	0.0	0.0	20.5	52.3
06-1933	81.3	78.5	-2.8	149.6	81.3	0.0	0.0	0.0	26.1
07-1933	89.5	203.5	113.9	152.4	89.5	0.0	0.0	111.1	68.6
08-1933	92.0	112.0	19.0	152.4	92.0	0.0	0.0	19.0	44.3
09-1933	91.7	62.5	-29.2	123.2	91.7	0.0	0.0	0.0	22.1
10-1933	63.0	49.8	-13.2	112.5	60.5	2.5	0.0	0.0	11.1
11-1933	46.2	66.0	19.8	132.3	46.2	0.0	0.0	0.0	5.5
12-1933	47.7	166.9	119.2	152.4	47.7	0.0	0.0	99.1	52.3
01-1934	37.0	177.0	139.1	152.4	37.0	0.0	0.0	139.1	95.7
02-1934	36.7	128.5	91.8	152.4	36.7	0.0	0.0	91.8	93.8
03-1934	43.4	95.5	52.1	152.4	43.4	0.0	0.0	52.1	72.9
04-1934	59.0	62.5	3.5	152.4	59.0	0.0	0.0	3.5	38.2
05-1934	71.1	101.1	30.0	152.4	71.1	0.0	0.0	30.0	34.1
06-1934	89.5	291.3	201.8	152.4	89.5	0.0	0.0	201.8	117.9
07-1934	90.8	218.9	128.2	152.4	90.8	0.0	0.0	128.2	123.1
08-1934	91.7	260.6	168.9	152.4	91.7	0.0	0.0	168.9	145.0
09-1934	79.1	136.4	57.3	152.4	79.1	0.0	0.0	57.3	101.6
10-1934	67.3	45.7	-21.6	130.8	67.3	0.0	0.0	0.0	50.8
11-1934	47.7	221.5	173.8	152.4	47.7	0.0	0.0	152.3	101.5
12-1934	35.9	76.7	40.8	152.4	35.9	0.0	0.0	40.8	71.1
01-1935	37.0	81.5	43.6	152.4	37.0	0.0	0.0	43.6	57.4
02-1935	38.6	151.9	113.3	152.4	38.6	0.0	0.0	113.3	85.3
03-1935	54.3	129.8	75.5	152.4	54.3	0.0	0.0	75.5	80.4
04-1935	59.6	147.8	88.2	152.4	59.6	0.0	0.0	88.2	84.3
05-1935	75.6	102.6	26.0	152.4	75.6	0.0	0.0	26.0	55.6
06-1935	86.8	151.9	65.1	152.4	86.8	0.0	0.0	65.1	60.4
07-1935	94.6	163.3	68.7	152.4	94.6	0.0	0.0	68.7	64.5
08-1935	95.9	180.6	84.7	152.4	95.9	0.0	0.0	84.7	74.6
09-1935	78.0	154.7	76.7	152.4	78.0	0.0	0.0	76.7	75.6
10-1935	65.4	21.8	-43.6	108.8	65.4	0.0	0.0	0.0	37.8
11-1935	42.8	42.9	0.1	108.9	42.8	0.0	0.0	0.0	18.9
12-1935	30.0	164.3	133.3	152.4	30.0	0.0	0.0	89.8	54.4
01-1936	32.3	112.3	79.0	152.4	32.3	0.0	0.0	79.0	67.2
02-1936	33.8	115.6	81.8	152.4	33.8	0.0	0.0	81.8	74.5
03-1936	49.7	48.5	-1.2	151.2	49.7	0.0	0.0	0.0	37.2
04-1936	53.4	157.5	104.1	152.4	53.4	0.0	0.0	102.9	70.1
05-1936	72.1	145.5	73.5	152.4	72.1	0.0	0.0	73.5	71.8
06-1936	91.7	30.2	-61.5	90.9	91.7	0.0	0.0	0.0	35.9
07-1936	93.0	209.8	116.8	152.4	93.0	0.0	0.0	55.3	45.6
08-1936	92.0	148.8	56.8	152.4	92.0	0.0	0.0	56.8	51.2
09-1936	88.0	73.2	-14.9	137.5	88.0	0.0	0.0	0.0	25.6
10-1936	60.0	35.1	-24.0	114.0	57.6	2.4	0.0	0.0	12.8
11-1936	40.1	106.9	66.8	152.4	40.1	0.0	0.0	29.4	21.1
12-1936	36.1	105.2	69.1	152.4	36.1	0.0	0.0	69.1	45.1
01-1937	48.7	182.4	133.7	152.4	48.7	0.0	0.0	133.7	89.4
02-1937	37.1	53.8	16.8	152.4	37.1	0.0	0.0	16.8	53.1
03-1937	39.6	138.9	99.4	152.4	39.6	0.0	0.0	99.4	76.2
04-1937	54.9	81.8	26.9	152.4	54.9	0.0	0.0	26.9	51.6

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1937	72.3	100.1	27.8	152.4	72.3	0.0	0.0	27.8	39.7
06-1937	89.2	105.4	16.2	152.4	89.2	0.0	0.0	16.2	27.9
07-1937	93.6	151.1	57.5	152.4	93.6	0.0	0.0	57.5	42.7
08-1937	91.7	184.4	92.7	152.4	91.7	0.0	0.0	92.7	67.7
09-1937	78.6	132.3	53.8	152.4	78.6	0.0	0.0	53.8	60.7
10-1937	56.6	172.5	115.8	152.4	56.6	0.0	0.0	115.8	88.3
11-1937	38.5	48.0	9.5	152.4	38.5	0.0	0.0	9.5	48.9
12-1937	34.5	122.2	87.7	152.4	34.5	0.0	0.0	87.7	68.3
01-1938	35.7	139.0	104.3	152.4	35.7	0.0	0.0	104.3	86.3
02-1938	44.5	92.5	47.0	152.4	44.5	0.0	0.0	47.0	67.1
03-1938	58.6	47.5	-11.1	141.3	58.6	0.0	0.0	0.0	33.6
04-1938	56.4	95.3	38.8	152.4	56.4	0.0	0.0	27.7	30.6
05-1938	71.8	62.2	-9.6	142.8	71.8	0.0	0.0	0.0	15.3
06-1938	87.1	136.7	49.5	152.4	87.1	0.0	0.0	39.9	27.6
07-1938	91.1	192.5	101.4	152.4	91.1	0.0	0.0	101.4	64.5
08-1938	92.7	120.9	28.2	152.4	92.7	0.0	0.0	28.2	46.4
09-1938	77.2	72.4	-4.8	147.6	77.2	0.0	0.0	0.0	23.2
10-1938	60.7	53.8	-6.8	140.0	60.5	0.2	0.0	0.0	11.6
11-1938	40.0	90.7	49.7	152.4	40.0	0.0	0.0	38.3	24.9
12-1938	35.2	87.9	52.7	152.4	35.2	0.0	0.0	52.7	38.8
01-1939	38.9	66.0	27.1	152.4	38.9	0.0	0.0	27.1	32.0
02-1939	40.1	117.9	77.7	152.4	40.1	0.0	0.0	77.7	55.3
03-1939	48.5	19.3	-29.2	123.2	48.5	0.0	0.0	0.0	27.7
04-1939	54.5	58.4	3.9	127.1	54.5	0.0	0.0	0.0	13.8
05-1939	68.7	185.2	116.5	152.4	68.7	0.0	0.0	91.2	52.5
06-1939	87.7	137.7	49.0	152.4	87.7	0.0	0.0	49.0	51.2
07-1939	93.0	202.4	109.4	152.4	93.0	0.0	0.0	109.4	80.3
08-1939	90.2	175.5	85.4	152.4	90.2	0.0	0.0	85.4	82.8
09-1939	84.5	127.8	43.3	152.4	84.5	0.0	0.0	43.3	63.1
10-1939	61.7	30.7	-30.0	121.4	61.7	0.0	0.0	0.0	31.5
11-1939	39.4	103.4	63.9	152.4	39.4	0.0	0.0	32.9	32.2
12-1939	38.2	66.0	27.8	152.4	38.2	0.0	0.0	27.8	30.0
01-1940	22.4	87.1	64.7	152.4	22.4	0.0	0.0	64.7	47.4
02-1940	32.4	229.1	196.7	152.4	32.4	0.0	0.0	196.7	122.0
03-1940	44.0	112.0	67.1	152.4	44.0	0.0	0.0	67.1	94.5
04-1940	53.0	197.9	143.9	152.4	53.0	0.0	0.0	143.9	119.2
05-1940	66.6	16.3	-50.3	102.1	66.6	0.0	0.0	0.0	59.6
06-1940	83.6	318.5	234.9	152.4	83.6	0.0	0.0	184.6	122.1
07-1940	89.2	179.1	89.8	152.4	89.2	0.0	0.0	89.8	105.0
08-1940	87.1	504.4	417.3	152.4	87.1	0.0	0.0	417.3	261.7
09-1940	73.3	105.7	32.3	152.4	73.3	0.0	0.0	32.3	146.0
10-1940	59.0	4.3	-54.7	97.7	59.0	0.0	0.0	0.0	73.5
11-1940	42.6	149.6	107.1	152.4	42.6	0.0	0.0	52.3	62.9
12-1940	39.4	247.4	207.9	152.4	39.4	0.0	0.0	207.9	135.4
01-1941	35.3	99.1	63.7	152.4	35.3	0.0	0.0	63.7	99.6
02-1941	31.4	70.1	38.7	152.4	31.4	0.0	0.0	38.7	69.1
03-1941	36.6	150.1	113.5	152.4	36.6	0.0	0.0	113.5	91.3
04-1941	60.5	99.8	39.4	152.4	60.5	0.0	0.0	39.4	65.3
05-1941	71.3	187.7	116.4	152.4	71.3	0.0	0.0	116.4	90.9
06-1941	86.5	188.7	102.2	152.4	86.5	0.0	0.0	102.2	96.5
07-1941	91.7	258.3	166.6	152.4	91.7	0.0	0.0	166.6	131.6
08-1941	96.6	86.6	-9.0	142.4	96.6	0.0	0.0	0.0	65.8
09-1941	85.9	188.5	102.6	152.4	85.9	0.0	0.0	92.6	79.2
10-1941	75.1	129.8	54.7	152.4	75.1	0.0	0.0	54.7	66.9
11-1941	38.1	58.4	20.3	152.4	38.1	0.0	0.0	20.3	43.6
12-1941	37.8	102.9	65.0	152.4	37.8	0.0	0.0	65.0	54.3
01-1942	28.8	38.1	9.3	152.4	28.8	0.0	0.0	9.3	31.8
02-1942	31.5	175.3	143.7	152.4	31.5	0.0	0.0	143.7	87.8
03-1942	40.0	122.2	81.2	152.4	40.0	0.0	0.0	81.2	84.5
04-1942	54.7	133.6	78.9	152.4	54.7	0.0	0.0	78.9	81.7
05-1942	71.1	121.2	50.1	152.4	71.1	0.0	0.0	50.1	65.9
06-1942	87.4	323.3	235.9	152.4	87.4	0.0	0.0	235.9	150.9
07-1942	91.4	162.3	70.9	152.4	91.4	0.0	0.0	70.9	110.9
08-1942	91.4	151.1	59.7	152.4	91.4	0.0	0.0	59.7	85.3

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1942	74.9	265.9	191.1	152.4	74.9	0.0	0.0	191.1	138.2
10-1942	61.5	129.3	67.8	152.4	61.5	0.0	0.0	67.8	102.0
11-1942	46.7	8.4	-38.3	114.1	46.7	0.0	0.0	0.0	51.5
12-1942	36.7	92.7	56.0	152.4	36.7	0.0	0.0	17.7	34.6
01-1943	33.7	70.9	37.2	152.4	33.7	0.0	0.0	37.2	35.9
02-1943	38.2	58.2	19.9	152.4	38.2	0.0	0.0	19.9	27.9
03-1943	41.8	243.6	201.8	152.4	41.8	0.0	0.0	201.8	114.8
04-1943	58.8	61.0	3.2	152.4	58.8	0.0	0.0	3.2	58.0
05-1943	79.6	81.8	2.1	152.4	79.6	0.0	0.0	2.1	30.6
06-1943	91.4	129.0	37.6	152.4	91.4	0.0	0.0	37.6	34.1
07-1943	93.6	104.1	10.5	152.4	93.6	0.0	0.0	10.5	22.3
08-1943	94.6	131.3	36.7	152.4	94.6	0.0	0.0	36.7	29.5
09-1943	74.6	472.9	398.3	152.4	74.6	0.0	0.0	398.3	213.9
10-1943	53.2	26.4	-26.8	125.6	53.2	0.0	0.0	0.0	106.0
11-1943	38.2	81.5	43.3	152.4	38.2	0.0	0.0	16.5	61.7
12-1943	34.0	140.2	105.2	152.4	34.0	0.0	0.0	105.2	83.5
01-1944	33.8	198.6	164.8	152.4	33.8	0.0	0.0	164.8	124.2
02-1944	46.9	130.8	83.9	152.4	46.9	0.0	0.0	83.9	104.1
03-1944	46.5	99.8	53.3	152.4	46.5	0.0	0.0	53.3	78.7
04-1944	56.8	89.9	33.1	152.4	56.8	0.0	0.0	33.1	55.9
05-1944	71.8	157.2	85.4	152.4	71.8	0.0	0.0	85.4	70.6
06-1944	93.0	118.6	25.6	152.4	93.0	0.0	0.0	25.6	48.1
07-1944	95.6	147.8	52.2	152.4	95.6	0.0	0.0	52.2	50.2
08-1944	93.0	180.8	86.9	152.4	93.0	0.0	0.0	86.9	68.5
09-1944	84.5	175.3	90.8	152.4	84.5	0.0	0.0	90.8	79.7
10-1944	55.7	34.8	-20.9	131.5	55.7	0.0	0.0	0.0	39.8
11-1944	44.5	266.7	222.2	152.4	44.5	0.0	0.0	201.3	120.6
12-1944	33.8	84.1	50.3	152.4	33.8	0.0	0.0	50.3	85.4
01-1945	33.1	162.3	129.2	152.4	33.1	0.0	0.0	129.2	107.3
02-1945	42.8	150.1	107.3	152.4	42.8	0.0	0.0	107.3	107.3
03-1945	55.5	97.5	42.1	152.4	55.5	0.0	0.0	42.1	74.7
04-1945	60.7	104.4	43.7	152.4	60.7	0.0	0.0	43.7	59.2
05-1945	67.0	110.7	42.8	152.4	67.0	0.0	0.0	42.8	50.0
06-1945	87.7	73.7	-14.1	138.3	87.7	0.0	0.0	0.0	25.5
07-1945	89.9	162.1	72.2	152.4	89.9	0.0	0.0	58.1	41.8
08-1945	90.2	244.1	153.9	152.4	90.2	0.0	0.0	153.9	97.9
09-1945	84.7	122.2	37.4	152.4	84.7	0.0	0.0	37.4	67.7
10-1945	56.4	97.8	41.4	152.4	56.4	0.0	0.0	41.4	54.5
11-1945	47.2	43.7	-3.5	148.9	47.2	0.0	0.0	0.0	27.3
12-1945	30.7	134.1	103.4	152.4	30.7	0.0	0.0	99.9	63.6
01-1946	32.0	177.3	144.3	152.4	32.0	0.0	0.0	144.3	103.0
02-1946	36.9	118.9	81.9	152.4	36.9	0.0	0.0	81.9	92.9
03-1946	48.3	222.3	173.9	152.4	48.3	0.0	0.0	173.9	133.4
04-1946	60.5	115.3	54.9	152.4	60.5	0.0	0.0	54.9	94.1
05-1946	72.1	343.7	271.6	152.4	72.1	0.0	0.0	271.6	182.9
06-1946	82.2	246.1	163.0	152.4	82.2	0.0	0.0	163.0	173.4
07-1946	90.2	443.5	353.3	152.4	90.2	0.0	0.0	353.3	263.4
08-1946	92.0	103.6	11.6	152.4	92.0	0.0	0.0	11.6	137.5
09-1946	80.8	171.4	90.7	152.4	80.8	0.0	0.0	90.7	114.1
10-1946	62.2	66.5	4.4	152.4	62.2	0.0	0.0	4.4	59.2
11-1946	49.9	185.9	136.1	152.4	49.9	0.0	0.0	136.1	97.7
12-1946	40.1	111.8	71.6	152.4	40.1	0.0	0.0	71.6	84.6
01-1947	33.9	160.0	126.1	152.4	33.9	0.0	0.0	126.1	105.4
02-1947	28.8	46.2	17.4	152.4	28.8	0.0	0.0	17.4	61.4
03-1947	36.8	263.1	226.3	152.4	36.8	0.0	0.0	226.3	143.9
04-1947	60.5	154.7	94.2	152.4	60.5	0.0	0.0	94.2	119.0
05-1947	72.1	160.3	88.2	152.4	72.1	0.0	0.0	88.2	103.6
06-1947	89.9	93.2	3.4	152.4	89.9	0.0	0.0	3.4	53.5
07-1947	89.2	86.9	-2.4	150.0	89.2	0.0	0.0	0.0	26.7
08-1947	92.7	161.8	69.1	152.4	92.7	0.0	0.0	66.7	46.7
09-1947	83.3	90.2	6.9	152.4	83.3	0.0	0.0	6.9	26.8
10-1947	69.9	31.2	-38.6	113.8	69.9	0.0	0.0	0.0	13.4
11-1947	40.8	273.1	232.2	152.4	40.8	0.0	0.0	193.6	103.5
12-1947	35.3	196.8	161.5	152.4	35.3	0.0	0.0	161.5	132.5

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1948	25.9	120.9	94.0	152.4	25.9	0.0	0.0	94.0	113.7
02-1948	38.2	87.4	49.1	152.4	38.2	0.0	0.0	49.1	81.4
03-1948	48.7	221.2	172.6	152.4	48.7	0.0	0.0	172.6	127.0
04-1948	63.9	92.2	28.3	152.4	63.9	0.0	0.0	28.3	77.7
05-1948	75.4	47.2	-28.1	124.3	75.4	0.0	0.0	0.0	38.8
06-1948	91.7	49.8	-41.9	90.1	83.0	7.7	0.0	0.0	19.4
07-1948	98.3	97.8	-0.5	89.8	98.1	0.2	0.0	0.0	9.7
08-1948	93.6	135.9	42.2	132.0	93.6	0.0	0.0	0.0	4.9
09-1948	75.6	197.9	122.2	152.4	75.6	0.0	0.0	101.9	53.4
10-1948	56.6	33.0	-23.6	128.8	56.6	0.0	0.0	0.0	26.7
11-1948	45.7	248.4	202.7	152.4	45.7	0.0	0.0	179.1	102.9
12-1948	40.4	165.4	124.9	152.4	40.4	0.0	0.0	124.9	113.9
01-1949	39.0	92.2	53.2	152.4	39.0	0.0	0.0	53.2	83.5
02-1949	42.0	65.8	22.8	152.4	42.0	0.0	0.0	22.8	53.2
03-1949	42.1	217.7	175.6	152.4	42.1	0.0	0.0	175.6	114.4
04-1949	53.8	146.8	93.0	152.4	53.8	0.0	0.0	93.0	103.7
05-1949	76.2	69.8	-6.3	146.1	76.2	0.0	0.0	0.0	51.8
06-1949	90.2	161.5	71.4	152.4	90.2	0.0	0.0	65.1	58.5
07-1949	92.0	282.0	190.9	152.4	92.0	0.0	0.0	190.9	124.7
08-1949	91.1	129.3	38.2	152.4	91.1	0.0	0.0	38.2	81.4
09-1949	80.8	86.9	6.1	152.4	80.8	0.0	0.0	6.1	43.8
10-1949	69.4	200.2	130.8	152.4	69.4	0.0	0.0	130.8	87.3
11-1949	42.3	12.4	-29.8	122.6	42.3	0.0	0.0	0.0	43.6
12-1949	40.8	113.8	72.0	152.4	40.8	0.0	0.0	43.1	43.4
01-1950	53.2	140.2	86.0	152.4	53.2	0.0	0.0	86.0	65.2
02-1950	44.7	100.8	56.2	152.4	44.7	0.0	0.0	56.2	60.7
03-1950	41.7	124.7	83.0	152.4	41.7	0.0	0.0	83.0	71.9
04-1950	51.4	159.3	107.8	152.4	51.4	0.0	0.0	107.8	89.8
05-1950	75.4	127.0	51.6	152.4	75.4	0.0	0.0	51.6	70.7
06-1950	84.7	212.6	127.9	152.4	84.7	0.0	0.0	127.9	99.3
07-1950	86.5	198.4	111.9	152.4	86.5	0.0	0.0	111.9	105.6
08-1950	89.5	74.2	-15.4	137.0	89.5	0.0	0.0	0.0	52.8
09-1950	80.8	46.2	-34.5	105.0	77.3	3.5	0.0	0.0	26.4
10-1950	63.0	20.8	-42.2	76.6	50.2	12.8	0.0	0.0	13.2
11-1950	39.0	38.9	-1.1	76.1	39.4	0.6	0.0	0.0	6.6
12-1950	33.2	211.1	177.9	152.4	33.2	0.0	0.0	101.5	54.1
01-1951	35.6	151.1	115.6	152.4	35.6	0.0	0.0	115.6	84.8
02-1951	37.6	51.8	14.2	152.4	37.6	0.0	0.0	14.2	49.5
03-1951	46.5	153.2	106.6	152.4	46.5	0.0	0.0	106.6	78.1
04-1951	52.3	68.1	15.8	152.4	52.3	0.0	0.0	15.8	46.9
05-1951	71.3	52.1	-19.3	133.1	71.3	0.0	0.0	0.0	23.5
06-1951	89.5	101.1	11.5	144.7	89.5	0.0	0.0	0.0	11.7
07-1951	92.7	256.8	164.1	152.4	92.7	0.0	0.0	156.4	84.1
08-1951	99.6	62.2	-37.4	114.0	99.6	0.0	0.0	0.0	42.0
09-1951	82.4	216.4	133.0	152.4	82.4	0.0	0.0	96.6	69.3
10-1951	62.4	31.5	-30.9	121.5	62.4	0.0	0.0	0.0	34.6
11-1951	38.5	63.2	24.7	146.3	38.5	0.0	0.0	0.0	17.3
12-1951	41.1	103.9	62.8	152.4	41.1	0.0	0.0	56.6	36.0
01-1952	47.8	44.5	-3.4	149.0	47.8	0.0	0.0	0.0	18.5
02-1952	40.4	214.6	174.2	152.4	40.4	0.0	0.0	170.8	94.7
03-1952	42.3	68.8	26.6	152.4	42.3	0.0	0.0	26.6	60.6
04-1952	51.4	201.7	150.2	152.4	51.4	0.0	0.0	150.2	105.4
05-1952	71.1	154.7	83.6	152.4	71.1	0.0	0.0	83.6	94.5
06-1952	90.2	87.9	-2.3	150.1	90.2	0.0	0.0	0.0	47.3
07-1952	91.4	196.3	104.9	152.4	91.4	0.0	0.0	102.6	74.0
08-1952	93.0	124.7	31.7	152.4	93.0	0.0	0.0	31.7	53.3
09-1952	74.3	104.9	30.6	152.4	74.3	0.0	0.0	30.6	41.9
10-1952	46.5	0.5	-46.0	106.4	46.5	0.0	0.0	0.0	20.0
11-1952	39.4	96.0	56.6	152.4	39.4	0.0	0.0	10.5	15.8
12-1952	34.4	141.2	106.9	152.4	34.4	0.0	0.0	106.9	61.3
01-1953	37.5	99.6	62.1	152.4	37.5	0.0	0.0	62.1	61.7
02-1953	36.8	135.1	98.3	152.4	36.8	0.0	0.0	98.3	80.0
03-1953	54.7	82.8	28.1	152.4	54.7	0.0	0.0	28.1	54.0
04-1953	56.4	173.0	117.6	152.4	56.4	0.0	0.0	117.6	85.8

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1953	76.7	193.3	116.6	152.4	76.7	0.0	0.0	116.6	101.2
06-1953	96.6	88.6	-7.9	144.5	96.6	0.0	0.0	0.0	50.6
07-1953	91.4	175.8	84.4	152.4	91.4	0.0	0.0	76.4	63.5
08-1953	91.4	188.7	97.3	152.4	91.4	0.0	0.0	97.3	80.4
09-1953	80.5	28.4	-52.0	100.4	80.5	0.0	0.0	0.0	40.2
10-1953	60.3	27.4	-32.8	78.8	49.1	11.2	0.0	0.0	20.1
11-1953	41.4	165.6	124.2	152.4	41.4	0.0	0.0	50.6	35.3
12-1953	32.9	253.7	220.9	152.4	32.9	0.0	0.0	220.9	128.1
01-1954	37.8	113.3	75.4	152.4	37.8	0.0	0.0	75.4	101.8
02-1954	42.7	40.1	-2.6	149.8	42.7	0.0	0.0	0.0	50.9
03-1954	42.8	37.1	-5.8	144.2	42.7	0.1	0.0	0.0	25.4
04-1954	65.2	78.2	13.0	152.4	65.2	0.0	0.0	4.8	15.1
05-1954	64.3	108.5	44.1	152.4	64.3	0.0	0.0	44.1	29.6
06-1954	89.9	74.7	-15.2	137.2	89.9	0.0	0.0	0.0	14.8
07-1954	94.9	340.4	245.4	152.4	94.9	0.0	0.0	230.2	122.5
08-1954	94.9	87.6	-7.3	145.1	94.9	0.0	0.0	0.0	61.3
09-1954	85.3	88.4	3.1	148.2	85.3	0.0	0.0	0.0	30.6
10-1954	63.2	127.5	64.3	152.4	63.2	0.0	0.0	60.0	45.3
11-1954	40.7	65.5	24.8	152.4	40.7	0.0	0.0	24.8	35.1
12-1954	35.5	80.5	45.1	152.4	35.5	0.0	0.0	45.1	40.1
01-1955	33.3	134.9	101.6	152.4	33.3	0.0	0.0	101.6	70.8
02-1955	38.8	159.5	120.7	152.4	38.8	0.0	0.0	120.7	95.8
03-1955	51.1	1.3	-49.8	102.6	51.1	0.0	0.0	0.0	47.9
04-1955	62.6	207.3	144.7	152.4	62.6	0.0	0.0	94.9	71.4
05-1955	77.2	138.7	61.5	152.4	77.2	0.0	0.0	61.5	66.4
06-1955	81.0	86.6	5.6	152.4	81.0	0.0	0.0	5.6	36.0
07-1955	89.2	226.3	137.1	152.4	89.2	0.0	0.0	137.1	86.5
08-1955	91.1	208.0	116.9	152.4	91.1	0.0	0.0	116.9	101.7
09-1955	86.2	138.4	52.2	152.4	86.2	0.0	0.0	52.2	76.0
10-1955	58.6	48.0	-10.6	141.8	58.6	0.0	0.0	0.0	38.5
11-1955	42.6	90.7	48.1	152.4	42.6	0.0	0.0	37.5	38.0
12-1955	36.6	103.4	66.8	152.4	36.6	0.0	0.0	66.8	52.4
01-1956	32.2	77.5	45.3	152.4	32.2	0.0	0.0	45.3	48.8
02-1956	42.4	189.5	147.1	152.4	42.4	0.0	0.0	147.1	97.0
03-1956	44.8	72.6	27.8	152.4	44.8	0.0	0.0	27.8	62.9
04-1956	54.7	73.4	18.7	152.4	54.7	0.0	0.0	18.7	40.8
05-1956	75.1	130.0	54.9	152.4	75.1	0.0	0.0	54.9	47.9
06-1956	81.0	144.5	63.5	152.4	81.0	0.0	0.0	63.5	55.7
07-1956	90.5	110.0	20.5	152.4	90.5	0.0	0.0	20.5	38.1
08-1956	87.7	123.2	35.5	152.4	87.7	0.0	0.0	35.5	36.8
09-1956	76.0	71.4	-5.6	146.8	76.0	0.0	0.0	0.0	18.4
10-1956	62.2	64.8	2.6	149.4	62.2	0.0	0.0	0.0	9.2
11-1956	41.5	66.8	25.3	152.4	41.5	0.0	0.0	22.3	15.8
12-1956	42.8	213.4	170.5	152.4	42.8	0.0	0.0	170.5	93.1
01-1957	41.1	20.1	-21.0	131.4	41.1	0.0	0.0	0.0	46.6
02-1957	47.5	80.5	33.0	152.4	47.5	0.0	0.0	11.0	29.3
03-1957	42.7	175.8	133.1	152.4	42.7	0.0	0.0	133.1	81.2
04-1957	60.5	149.9	89.4	152.4	60.5	0.0	0.0	89.4	85.3
05-1957	76.2	84.1	7.9	152.4	76.2	0.0	0.0	7.9	46.6
06-1957	88.0	259.1	171.1	152.4	88.0	0.0	0.0	171.1	108.8
07-1957	97.6	106.2	8.6	152.4	97.6	0.0	0.0	8.6	58.7
08-1957	92.0	107.7	15.7	152.4	92.0	0.0	0.0	15.7	37.2
09-1957	76.0	196.1	119.1	152.4	76.0	0.0	0.0	119.1	78.2
10-1957	52.5	155.2	102.7	152.4	52.5	0.0	0.0	102.7	90.4
11-1957	45.1	160.0	114.9	152.4	45.1	0.0	0.0	114.9	102.7
12-1957	36.6	81.3	44.7	152.4	36.6	0.0	0.0	44.7	73.7
01-1958	28.4	117.9	89.4	152.4	28.4	0.0	0.0	89.4	81.6
02-1958	28.0	107.4	79.4	152.4	28.0	0.0	0.0	79.4	80.5
03-1958	39.9	116.3	76.5	152.4	39.9	0.0	0.0	76.5	78.5
04-1958	57.0	91.7	34.7	152.4	57.0	0.0	0.0	34.7	56.6
05-1958	74.3	122.4	48.1	152.4	74.3	0.0	0.0	48.1	52.3
06-1958	91.1	123.2	32.1	152.4	91.1	0.0	0.0	32.1	42.2
07-1958	93.3	206.5	113.2	152.4	93.3	0.0	0.0	113.2	77.7
08-1958	90.2	196.8	106.7	152.4	90.2	0.0	0.0	106.7	92.2

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1958	85.0	179.1	94.0	152.4	85.0	0.0	0.0	94.0	93.1
10-1958	58.4	53.1	-5.3	147.1	58.4	0.0	0.0	0.0	46.6
11-1958	46.9	30.7	-16.1	131.5	46.3	0.6	0.0	0.0	23.3
12-1958	32.3	43.9	11.6	143.1	32.3	0.0	0.0	0.0	11.6
01-1959	30.0	105.4	75.4	152.4	30.0	0.0	0.0	66.1	38.9
02-1959	37.1	229.6	192.5	152.4	37.1	0.0	0.0	192.5	115.7
03-1959	40.0	46.7	5.8	152.4	40.0	0.0	0.0	5.8	60.7
04-1959	55.1	65.5	10.4	152.4	55.1	0.0	0.0	10.4	35.6
05-1959	75.9	191.5	115.6	152.4	75.9	0.0	0.0	115.6	75.6
06-1959	87.7	106.9	19.2	152.4	87.7	0.0	0.0	19.2	47.4
07-1959	90.8	229.6	138.8	152.4	90.8	0.0	0.0	138.8	93.1
08-1959	93.3	137.4	44.1	152.4	93.3	0.0	0.0	44.1	68.6
09-1959	83.6	76.7	-6.9	145.5	83.6	0.0	0.0	0.0	34.3
10-1959	64.6	170.2	105.6	152.4	64.6	0.0	0.0	98.8	66.5
11-1959	39.2	32.8	-6.4	145.0	39.2	0.0	0.0	0.0	33.3
12-1959	35.1	93.0	58.9	152.4	35.1	0.0	0.0	52.5	42.9
01-1960	31.3	71.4	40.1	152.4	31.3	0.0	0.0	40.1	41.5
02-1960	29.7	95.3	65.5	152.4	29.7	0.0	0.0	65.5	53.5
03-1960	36.4	63.5	27.1	152.4	36.4	0.0	0.0	27.1	40.3
04-1960	57.8	141.0	84.2	152.4	57.8	0.0	0.0	84.2	62.2
05-1960	65.0	48.8	-16.2	136.2	65.0	0.0	0.0	0.0	31.1
06-1960	88.9	53.6	-35.3	104.6	85.2	3.8	0.0	0.0	15.6
07-1960	98.0	144.8	45.8	150.4	98.0	0.0	0.0	0.0	7.8
08-1960	87.1	265.2	178.1	152.4	87.1	0.0	0.0	176.1	91.9
09-1960	81.3	58.9	-22.4	130.0	81.3	0.0	0.0	0.0	45.0
10-1960	63.0	97.3	34.3	152.4	63.0	0.0	0.0	11.9	28.9
11-1960	45.6	27.9	-17.6	134.8	45.6	0.0	0.0	0.0	14.5
12-1960	31.0	123.7	91.7	152.4	31.0	0.0	0.0	74.1	44.3
01-1961	27.2	108.5	81.3	152.4	27.2	0.0	0.0	81.3	62.8
02-1961	39.6	187.7	148.1	152.4	39.6	0.0	0.0	148.1	105.4
03-1961	50.4	102.4	51.0	152.4	50.4	0.0	0.0	51.0	78.7
04-1961	50.9	60.2	9.3	152.4	50.9	0.0	0.0	9.3	44.0
05-1961	67.7	165.4	97.6	152.4	67.7	0.0	0.0	97.6	70.8
06-1961	79.9	249.7	169.8	152.4	79.9	0.0	0.0	169.8	120.3
07-1961	86.8	209.0	122.2	152.4	86.8	0.0	0.0	122.2	121.3
08-1961	84.7	135.1	50.4	152.4	84.7	0.0	0.0	50.4	85.8
09-1961	78.8	155.0	77.1	152.4	78.8	0.0	0.0	77.1	81.5
10-1961	56.1	43.7	-12.4	140.0	56.1	0.0	0.0	0.0	40.7
11-1961	42.6	187.5	144.9	152.4	42.6	0.0	0.0	132.5	86.6
12-1961	35.7	207.5	171.8	152.4	35.7	0.0	0.0	171.8	129.2
01-1962	29.0	122.7	93.7	152.4	29.0	0.0	0.0	93.7	111.4
02-1962	46.4	14.0	-31.4	121.0	46.4	0.0	0.0	0.0	55.7
03-1962	38.5	56.9	18.4	139.4	38.5	0.0	0.0	0.0	27.9
04-1962	53.2	110.5	57.3	152.4	53.2	0.0	0.0	44.3	36.1
05-1962	74.9	29.7	-45.1	107.3	74.9	0.0	0.0	0.0	18.0
06-1962	85.9	191.0	105.1	152.4	85.9	0.0	0.0	59.9	38.0
07-1962	98.6	76.7	-21.9	130.5	98.6	0.0	0.0	0.0	19.5
08-1962	97.9	100.1	2.1	132.6	97.9	0.0	0.0	0.0	9.7
09-1962	83.0	97.0	14.0	146.7	83.0	0.0	0.0	0.0	4.9
10-1962	65.0	138.7	73.7	152.4	65.0	0.0	0.0	67.9	36.4
11-1962	39.7	36.3	-3.4	149.0	39.7	0.0	0.0	0.0	18.2
12-1962	32.5	110.5	77.0	152.4	32.5	0.0	0.0	74.6	46.4
01-1963	27.0	94.0	67.0	152.4	27.0	0.0	0.0	67.0	56.7
02-1963	30.3	85.3	55.1	152.4	30.3	0.0	0.0	55.1	55.9
03-1963	50.4	22.6	-27.8	124.6	50.4	0.0	0.0	0.0	27.0
04-1963	66.4	12.0	-53.4	80.0	56.6	9.7	0.0	0.0	13.0
05-1963	76.2	52.8	-23.3	68.6	65.2	10.9	0.0	0.0	6.0
06-1963	87.4	237.5	150.1	152.4	87.4	0.0	0.0	66.2	36.6
07-1963	92.0	161.5	69.5	152.4	92.0	0.0	0.0	69.5	53.1
08-1963	93.0	96.0	3.0	152.4	93.0	0.0	0.0	3.0	28.0
09-1963	81.0	153.9	72.9	152.4	81.0	0.0	0.0	72.9	50.5
10-1963	63.7	0.0	-63.7	88.7	63.7	0.0	0.0	0.0	25.2
11-1963	44.0	172.7	128.7	152.4	44.0	0.0	0.0	65.0	45.1
12-1963	26.5	110.5	83.9	152.4	26.5	0.0	0.0	83.9	64.5

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1964	30.2	178.6	148.4	152.4	30.2	0.0	0.0	148.4	106.5
02-1964	30.5	131.1	100.6	152.4	30.5	0.0	0.0	100.6	103.5
03-1964	44.3	169.4	125.1	152.4	44.3	0.0	0.0	125.1	114.3
04-1964	63.2	86.4	23.1	152.4	63.2	0.0	0.0	23.1	68.7
05-1964	74.9	102.1	27.2	152.4	74.9	0.0	0.0	27.2	47.0
06-1964	86.5	85.1	-1.4	150.0	86.5	0.0	0.0	0.0	23.0
07-1964	89.9	336.8	246.0	152.4	89.9	0.0	0.0	245.5	134.8
08-1964	93.6	157.5	63.8	152.4	93.6	0.0	0.0	63.8	99.3
09-1964	80.8	120.4	39.6	152.4	80.8	0.0	0.0	39.6	69.5
10-1964	53.0	287.5	234.5	152.4	53.0	0.0	0.0	234.5	151.0
11-1964	49.9	78.5	28.6	152.4	49.9	0.0	0.0	28.6	90.3
12-1964	37.3	63.5	26.2	152.4	37.3	0.0	0.0	26.2	58.2
01-1965	37.5	88.4	50.9	152.4	37.5	0.0	0.0	50.9	54.6
02-1965	34.7	154.7	119.0	152.4	34.7	0.0	0.0	119.0	87.3
03-1965	40.1	103.6	63.5	152.4	40.1	0.0	0.0	63.5	75.4
04-1965	65.0	20.8	-44.2	108.2	65.0	0.0	0.0	0.0	37.7
05-1965	73.6	71.9	-1.7	107.0	73.1	0.5	0.0	0.0	18.8
06-1965	87.1	90.4	3.3	110.3	87.1	0.0	0.0	0.0	9.4
07-1965	90.8	140.0	50.2	152.4	90.8	0.0	0.0	8.1	8.8
08-1965	87.4	181.1	93.7	152.4	87.4	0.0	0.0	93.7	51.2
09-1965	82.4	179.6	97.1	152.4	82.4	0.0	0.0	97.1	74.2
10-1965	56.8	25.4	-31.4	120.0	56.8	0.0	0.0	0.0	37.1
11-1965	52.5	65.5	13.0	134.0	52.5	0.0	0.0	0.0	18.5
12-1965	36.9	175.5	138.6	152.4	36.9	0.0	0.0	120.2	69.4
01-1966	27.9	255.8	227.9	152.4	27.9	0.0	0.0	227.9	148.6
02-1966	32.9	336.0	303.2	152.4	32.9	0.0	0.0	303.2	225.9
03-1966	42.4	29.5	-12.9	139.5	42.4	0.0	0.0	0.0	112.0
04-1966	58.2	187.5	129.2	152.4	58.2	0.0	0.0	116.3	114.6
05-1966	73.3	109.5	36.1	152.4	73.3	0.0	0.0	36.1	75.4
06-1966	82.2	108.7	26.6	152.4	82.2	0.0	0.0	26.6	50.0
07-1966	93.6	209.6	115.9	152.4	93.6	0.0	0.0	115.9	83.4
08-1966	86.2	211.1	124.9	152.4	86.2	0.0	0.0	124.9	104.1
09-1966	78.3	165.9	87.6	152.4	78.3	0.0	0.0	87.6	95.9
10-1966	54.2	96.0	41.9	152.4	54.2	0.0	0.0	41.9	68.9
11-1966	47.3	41.1	-6.2	146.2	47.3	0.0	0.0	0.0	34.4
12-1966	34.5	60.2	25.7	152.4	34.5	0.0	0.0	19.5	26.0
01-1967	33.2	95.5	62.3	152.4	33.2	0.0	0.0	62.3	44.6
02-1967	33.6	106.2	72.6	152.4	33.6	0.0	0.0	72.6	58.6
03-1967	50.0	65.0	14.0	152.4	50.0	0.0	0.0	14.0	36.8
04-1967	68.7	51.8	-16.9	135.5	68.7	0.0	0.0	0.0	18.4
05-1967	68.4	183.1	114.7	152.4	68.4	0.0	0.0	97.8	58.1
06-1967	87.4	82.8	-4.6	147.8	87.4	0.0	0.0	0.0	29.1
07-1967	85.6	180.1	94.5	152.4	85.6	0.0	0.0	89.9	59.5
08-1967	84.7	242.8	158.1	152.4	84.7	0.0	0.0	158.1	108.8
09-1967	72.6	102.4	29.8	152.4	72.6	0.0	0.0	29.8	69.3
10-1967	54.7	92.2	37.5	152.4	54.7	0.0	0.0	37.5	53.4
11-1967	43.7	5.6	-38.2	114.2	43.7	0.0	0.0	0.0	26.7
12-1967	39.2	194.1	154.9	152.4	39.2	0.0	0.0	116.7	71.7
01-1968	32.3	53.8	21.5	152.4	32.3	0.0	0.0	21.5	46.6
02-1968	28.3	83.6	55.2	152.4	28.3	0.0	0.0	55.2	50.9
03-1968	39.3	69.1	29.8	152.4	39.3	0.0	0.0	29.8	40.4
04-1968	60.5	72.1	11.7	152.4	60.5	0.0	0.0	11.7	26.0
05-1968	71.6	114.3	42.7	152.4	71.6	0.0	0.0	42.7	34.4
06-1968	86.5	130.8	44.3	152.4	86.5	0.0	0.0	44.3	39.3
07-1968	89.5	146.8	57.3	152.4	89.5	0.0	0.0	57.3	48.3
08-1968	89.2	197.1	107.9	152.4	89.2	0.0	0.0	107.9	78.1
09-1968	74.9	95.3	20.4	152.4	74.9	0.0	0.0	20.4	49.2
10-1968	62.2	42.7	-19.5	132.9	62.2	0.0	0.0	0.0	24.6
11-1968	39.3	168.7	129.3	152.4	39.3	0.0	0.0	109.9	67.2
12-1968	33.1	133.1	100.0	152.4	33.1	0.0	0.0	100.0	83.6
01-1969	34.0	58.4	23.5	152.4	34.0	0.0	0.0	23.5	53.5
02-1969	35.6	129.5	93.0	152.4	35.6	0.0	0.0	93.0	73.8
03-1969	35.7	152.1	116.4	152.4	35.7	0.0	0.0	116.4	95.1
04-1969	59.4	245.9	186.4	152.4	59.4	0.0	0.0	186.4	140.8



Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1969	71.1	180.3	109.3	152.4	71.1	0.0	0.0	109.3	125.0
06-1969	89.5	46.2	-43.3	109.1	89.5	0.0	0.0	0.0	62.5
07-1969	96.3	244.3	148.1	152.4	96.3	0.0	0.0	104.8	83.6
08-1969	91.4	133.6	42.2	152.4	91.4	0.0	0.0	42.2	62.9
09-1969	79.4	65.0	-14.3	138.1	79.4	0.0	0.0	0.0	31.5
10-1969	62.4	64.5	2.1	140.2	62.4	0.0	0.0	0.0	15.7
11-1969	41.0	23.4	-18.6	123.1	40.5	1.5	0.0	0.0	7.9
12-1969	35.8	139.2	103.4	152.4	35.8	0.0	0.0	74.1	40.0
01-1970	27.9	56.9	29.0	152.4	27.9	0.0	0.0	29.0	35.0
02-1970	33.8	58.4	24.6	152.4	33.8	0.0	0.0	24.6	29.8
03-1970	42.4	141.0	99.6	152.4	42.4	0.0	0.0	99.6	64.7
04-1970	63.7	38.4	-25.3	127.1	63.7	0.0	0.0	0.0	32.3
05-1970	70.4	109.0	39.6	152.4	70.4	0.0	0.0	14.3	23.3
06-1970	83.9	159.0	75.1	152.4	83.9	0.0	0.0	75.1	49.2
07-1970	91.1	157.7	66.6	152.4	91.1	0.0	0.0	66.6	57.9
08-1970	94.3	224.8	130.5	152.4	94.3	0.0	0.0	130.5	94.2
09-1970	86.5	214.4	127.9	152.4	86.5	0.0	0.0	127.9	111.0
10-1970	56.8	169.9	113.1	152.4	56.8	0.0	0.0	113.1	112.1
11-1970	37.0	35.1	-2.9	149.5	37.0	0.0	0.0	0.0	56.0
12-1970	41.7	103.6	61.0	152.4	41.7	0.0	0.0	59.0	57.5
01-1971	36.2	32.3	-3.9	148.5	36.2	0.0	0.0	0.0	28.8
02-1971	36.2	87.9	51.7	152.4	36.2	0.0	0.0	47.8	38.3
03-1971	41.5	51.1	9.5	152.4	41.5	0.0	0.0	9.5	23.9
04-1971	54.7	22.6	-32.1	120.3	54.7	0.0	0.0	0.0	11.9
05-1971	68.2	118.9	50.7	152.4	68.2	0.0	0.0	18.5	15.2
06-1971	86.5	135.9	49.4	152.4	86.5	0.0	0.0	49.4	32.3
07-1971	90.5	210.1	119.6	152.4	90.5	0.0	0.0	119.6	75.9
08-1971	88.6	149.9	61.2	152.4	88.6	0.0	0.0	61.2	68.6
09-1971	83.3	298.7	215.4	152.4	83.3	0.0	0.0	215.4	142.0
10-1971	67.0	77.2	9.2	152.4	67.0	0.0	0.0	9.2	75.6
11-1971	43.7	56.1	12.4	152.4	43.7	0.0	0.0	12.4	44.0
12-1971	48.2	285.5	237.3	152.4	48.2	0.0	0.0	237.3	140.7
01-1972	40.7	215.1	174.4	152.4	40.7	0.0	0.0	174.4	157.6
02-1972	38.4	126.5	88.1	152.4	38.4	0.0	0.0	88.1	122.8
03-1972	48.5	167.1	118.6	152.4	48.5	0.0	0.0	118.6	120.7
04-1972	61.5	54.6	-6.9	145.5	61.5	0.0	0.0	0.0	60.4
05-1972	71.8	159.8	87.9	152.4	71.8	0.0	0.0	81.0	70.7
06-1972	91.1	50.5	-40.6	111.8	91.1	0.0	0.0	0.0	35.3
07-1972	89.5	173.0	84.4	152.4	89.5	0.0	0.0	43.9	39.6
08-1972	92.7	102.6	9.9	152.4	92.7	0.0	0.0	9.9	24.8
09-1972	91.4	116.8	25.4	152.4	91.4	0.0	0.0	25.4	25.1
10-1972	62.2	81.8	19.6	152.4	62.2	0.0	0.0	19.6	22.4
11-1972	38.8	165.4	126.6	152.4	38.8	0.0	0.0	126.6	74.5
12-1972	37.2	185.2	147.0	152.4	37.2	0.0	0.0	147.0	111.2
01-1973	31.1	89.7	58.6	152.4	31.1	0.0	0.0	58.6	84.9
02-1973	33.1	68.3	35.2	152.4	33.1	0.0	0.0	35.2	60.1
03-1973	51.3	266.2	214.9	152.4	51.3	0.0	0.0	214.9	137.5
04-1973	52.5	270.0	217.5	152.4	52.5	0.0	0.0	217.5	177.5
05-1973	70.4	72.6	2.3	152.4	70.4	0.0	0.0	2.3	89.9
06-1973	88.9	69.1	-19.8	132.6	88.9	0.0	0.0	0.0	44.9
07-1973	96.9	129.0	32.1	152.4	96.9	0.0	0.0	12.3	28.6
08-1973	87.7	137.4	49.7	152.4	87.7	0.0	0.0	49.7	39.2
09-1973	83.6	433.8	350.2	152.4	83.6	0.0	0.0	350.2	194.7
10-1973	68.4	92.7	24.3	152.4	68.4	0.0	0.0	24.3	109.5
11-1973	54.2	125.2	71.1	152.4	54.2	0.0	0.0	71.1	90.3
12-1973	34.6	165.6	131.0	152.4	34.6	0.0	0.0	131.0	110.6
01-1974	44.3	174.2	129.9	152.4	44.3	0.0	0.0	129.9	120.3
02-1974	37.7	86.6	48.9	152.4	37.7	0.0	0.0	48.9	84.6
03-1974	53.0	135.4	81.4	152.4	53.0	0.0	0.0	81.4	82.0
04-1974	56.8	147.1	90.2	152.4	56.8	0.0	0.0	90.2	86.6
05-1974	76.7	118.4	41.7	152.4	76.7	0.0	0.0	41.7	64.1
06-1974	83.3	89.4	6.1	152.4	83.3	0.0	0.0	6.1	35.1
07-1974	91.1	134.9	43.8	152.4	91.1	0.0	0.0	43.8	39.5
08-1974	90.5	172.2	81.7	152.4	90.5	0.0	0.0	81.7	60.6

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1974	77.5	109.2	31.7	152.4	77.5	0.0	0.0	31.7	46.2
10-1974	57.8	28.7	-29.1	123.3	57.8	0.0	0.0	0.0	23.1
11-1974	44.5	153.9	109.4	152.4	44.5	0.0	0.0	80.3	51.7
12-1974	37.1	117.9	80.8	152.4	37.1	0.0	0.0	80.8	66.2
01-1975	39.9	123.4	83.6	152.4	39.9	0.0	0.0	83.6	74.9
02-1975	41.1	27.4	-13.7	138.7	41.1	0.0	0.0	0.0	37.5
03-1975	45.3	123.2	77.9	152.4	45.3	0.0	0.0	64.2	50.8
04-1975	55.3	125.0	70.7	152.4	55.3	0.0	0.0	70.7	60.8
05-1975	75.6	229.9	154.2	152.4	75.6	0.0	0.0	154.2	107.5
06-1975	86.5	250.0	164.4	152.4	86.5	0.0	0.0	164.4	135.0
07-1975	90.5	349.8	259.3	152.4	90.5	0.0	0.0	259.3	197.6
08-1975	89.9	261.9	172.0	152.4	89.9	0.0	0.0	172.0	184.8
09-1975	73.1	87.9	14.8	152.4	73.1	0.0	0.0	14.8	99.8
10-1975	61.7	45.2	-16.5	135.9	61.7	0.0	0.0	0.0	49.9
11-1975	45.7	67.6	21.8	152.4	45.7	0.0	0.0	5.3	27.6
12-1975	33.7	73.7	39.0	152.4	33.7	0.0	0.0	39.0	33.8
01-1976	30.9	58.9	28.0	152.4	30.9	0.0	0.0	28.0	30.9
02-1976	43.3	66.0	22.7	152.4	43.3	0.0	0.0	22.7	26.8
03-1976	50.5	111.5	60.0	152.4	50.5	0.0	0.0	60.0	43.9
04-1976	59.6	15.2	-44.4	108.0	59.6	0.0	0.0	0.0	21.9
05-1976	66.8	107.2	40.4	148.4	66.8	0.0	0.0	0.0	10.0
06-1976	81.3	89.2	7.8	152.4	81.3	0.0	0.0	3.8	7.4
07-1976	89.9	125.0	36.1	152.4	89.9	0.0	0.0	36.1	21.8
08-1976	89.5	78.7	-10.8	141.6	89.5	0.0	0.0	0.0	10.9
09-1976	79.4	100.8	21.5	152.4	79.4	0.0	0.0	10.7	10.8
10-1976	46.7	110.2	63.5	152.4	46.7	0.0	0.0	63.5	37.2
11-1976	33.9	156.5	122.6	152.4	33.9	0.0	0.0	122.6	79.9
12-1976	32.1	196.8	164.8	152.4	32.1	0.0	0.0	164.8	122.3
01-1977	24.7	145.8	121.1	152.4	24.7	0.0	0.0	121.1	121.7
02-1977	34.0	56.9	21.9	152.4	34.0	0.0	0.0	21.9	71.8
03-1977	48.7	74.2	25.5	152.4	48.7	0.0	0.0	25.5	48.7
04-1977	58.0	184.9	126.9	152.4	58.0	0.0	0.0	126.9	87.8
05-1977	75.1	46.2	-28.9	123.5	75.1	0.0	0.0	0.0	43.9
06-1977	91.4	69.6	-21.8	105.8	87.3	4.1	0.0	0.0	21.9
07-1977	95.6	179.3	83.7	152.4	95.6	0.0	0.0	37.2	29.5
08-1977	90.8	296.4	205.6	152.4	90.8	0.0	0.0	205.6	117.6
09-1977	87.1	227.6	140.5	152.4	87.1	0.0	0.0	140.5	129.0
10-1977	57.0	127.5	70.5	152.4	57.0	0.0	0.0	70.5	99.8
11-1977	48.7	243.1	194.4	152.4	48.7	0.0	0.0	194.4	147.1
12-1977	34.7	108.5	73.7	152.4	34.7	0.0	0.0	73.7	110.4
01-1978	24.7	256.3	231.6	152.4	24.7	0.0	0.0	231.6	171.0
02-1978	26.2	55.4	29.2	152.4	26.2	0.0	0.0	29.2	100.1
03-1978	39.3	86.4	47.0	152.4	39.3	0.0	0.0	47.0	73.6
04-1978	58.0	94.7	36.7	152.4	58.0	0.0	0.0	36.7	55.1
05-1978	76.0	157.0	81.0	152.4	76.0	0.0	0.0	81.0	68.1
06-1978	90.2	243.1	152.9	152.4	90.2	0.0	0.0	152.9	110.5
07-1978	94.6	219.2	124.6	152.4	94.6	0.0	0.0	124.6	117.5
08-1978	92.4	228.1	135.7	152.4	92.4	0.0	0.0	135.7	126.6
09-1978	84.7	94.7	9.0	152.4	84.7	0.0	0.0	9.0	68.3
10-1978	58.8	4.3	-54.5	97.9	58.8	0.0	0.0	0.0	34.2
11-1978	53.2	135.4	82.2	152.4	53.2	0.0	0.0	27.6	30.9
12-1978	35.5	60.5	25.0	152.4	35.5	0.0	0.0	25.0	27.0
01-1979	26.0	152.1	126.1	152.4	26.0	0.0	0.0	126.1	77.0
02-1979	31.0	261.6	229.6	152.4	31.0	0.0	0.0	229.6	153.3
03-1979	45.9	87.1	41.2	152.4	45.9	0.0	0.0	41.2	97.3
04-1979	61.3	330.2	268.9	152.4	61.3	0.0	0.0	268.9	183.1
05-1979	68.2	203.0	135.8	152.4	68.2	0.0	0.0	135.8	159.4
06-1979	86.2	33.3	-52.9	99.5	86.2	0.0	0.0	0.0	79.7
07-1979	92.0	270.8	178.7	152.4	92.0	0.0	0.0	125.8	102.7
08-1979	91.4	172.0	81.6	152.4	91.4	0.0	0.0	81.6	92.2
09-1979	75.6	113.8	38.2	152.4	75.6	0.0	0.0	38.2	65.2
10-1979	60.9	38.6	-22.3	130.1	60.9	0.0	0.0	0.0	32.6
11-1979	38.4	95.8	57.4	152.4	38.4	0.0	0.0	35.1	33.8
12-1979	33.1	70.6	37.5	152.4	33.1	0.0	0.0	37.5	35.7

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1980	36.8	152.1	115.3	152.4	36.8	0.0	0.0	115.3	75.5
02-1980	31.5	24.6	-6.9	145.5	31.5	0.0	0.0	0.0	37.8
03-1980	44.7	248.4	203.8	152.4	44.7	0.0	0.0	196.9	117.3
04-1980	53.2	271.8	218.6	152.4	53.2	0.0	0.0	218.6	167.9
05-1980	72.8	275.8	203.0	152.4	72.8	0.0	0.0	203.0	185.5
06-1980	91.1	59.9	-31.2	121.2	91.1	0.0	0.0	0.0	92.7
07-1980	99.0	97.0	-2.9	118.9	99.4	0.6	0.0	0.0	46.4
08-1980	95.3	98.0	2.8	121.7	95.3	0.0	0.0	0.0	23.2
09-1980	90.2	122.9	32.8	152.4	90.2	0.0	0.0	2.0	12.6
10-1980	52.3	115.6	63.2	152.4	52.3	0.0	0.0	63.2	37.9
11-1980	39.6	138.2	98.6	152.4	39.6	0.0	0.0	98.6	68.3
12-1980	33.1	39.4	6.3	152.4	33.1	0.0	0.0	6.3	37.3
01-1981	28.0	35.3	7.3	152.4	28.0	0.0	0.0	7.3	22.3
02-1981	33.9	129.3	95.4	152.4	33.9	0.0	0.0	95.4	58.8
03-1981	42.0	31.8	-11.2	141.2	42.0	0.0	0.0	0.0	29.4
04-1981	66.4	27.4	-38.9	105.1	63.5	2.9	0.0	0.0	14.7
05-1981	67.0	113.0	45.1	150.2	67.0	0.0	0.0	0.0	7.4
06-1981	93.0	193.3	100.3	152.4	93.0	0.0	0.0	98.0	52.7
07-1981	97.9	188.2	90.3	152.4	97.9	0.0	0.0	90.3	71.5
08-1981	94.3	94.7	0.5	152.4	94.3	0.0	0.0	0.5	35.0
09-1981	77.8	80.3	2.5	152.4	77.8	0.0	0.0	2.5	19.2
10-1981	61.3	65.8	4.5	152.4	61.3	0.0	0.0	4.5	11.9
11-1981	48.5	52.3	3.8	152.4	48.5	0.0	0.0	3.8	7.8
12-1981	34.0	149.4	115.3	152.4	34.0	0.0	0.0	115.3	61.6
01-1982	33.7	75.7	42.0	152.4	33.7	0.0	0.0	42.0	51.8
02-1982	34.0	136.1	102.1	152.4	34.0	0.0	0.0	102.1	76.0
03-1982	47.5	69.8	22.3	152.4	47.5	0.0	0.0	22.3	49.7
04-1982	56.8	136.9	80.1	152.4	56.8	0.0	0.0	80.1	64.9
05-1982	73.1	98.0	24.0	152.4	73.1	0.0	0.0	24.0	44.9
06-1982	91.1	118.4	27.3	152.4	91.1	0.0	0.0	27.3	36.1
07-1982	93.6	150.1	56.5	152.4	93.6	0.0	0.0	56.5	46.3
08-1982	92.0	168.7	76.6	152.4	92.0	0.0	0.0	76.6	61.4
09-1982	76.0	171.7	94.8	152.4	76.0	0.0	0.0	94.8	78.1
10-1982	59.8	94.5	34.6	152.4	59.8	0.0	0.0	34.6	56.4
11-1982	47.3	92.0	45.6	152.4	47.3	0.0	0.0	45.6	50.0
12-1982	41.5	322.8	281.3	152.4	41.5	0.0	0.0	281.3	166.1
01-1983	31.1	155.2	124.1	152.4	31.1	0.0	0.0	124.1	145.1
02-1983	34.5	167.6	133.2	152.4	34.5	0.0	0.0	133.2	139.1
03-1983	40.3	124.5	84.2	152.4	40.3	0.0	0.0	84.2	111.7
04-1983	49.0	171.0	122.0	152.4	49.0	0.0	0.0	122.0	117.3
05-1983	68.9	148.3	79.4	152.4	68.9	0.0	0.0	79.4	98.4
06-1983	80.8	230.1	149.4	152.4	80.8	0.0	0.0	149.4	123.9
07-1983	95.9	99.3	3.4	152.4	95.9	0.0	0.0	3.4	63.6
08-1983	94.9	250.0	156.0	152.4	94.9	0.0	0.0	156.0	109.8
09-1983	75.1	193.5	118.4	152.4	75.1	0.0	0.0	118.4	114.1
10-1983	59.8	66.3	6.5	152.4	59.8	0.0	0.0	6.5	60.3
11-1983	44.8	109.7	64.9	152.4	44.8	0.0	0.0	64.9	62.6
12-1983	30.0	123.7	93.6	152.4	30.0	0.0	0.0	93.6	78.1
01-1984	27.0	116.1	88.1	152.4	27.0	0.0	0.0	88.1	83.1
02-1984	36.7	108.0	72.3	152.4	36.7	0.0	0.0	72.3	77.7
03-1984	45.1	45.2	0.1	152.4	45.1	0.0	0.0	0.1	38.9
04-1984	57.2	23.6	-33.6	118.8	57.2	0.0	0.0	0.0	19.4
05-1984	72.1	128.3	56.2	152.4	72.1	0.0	0.0	22.6	21.0
06-1984	83.9	221.2	137.4	152.4	83.9	0.0	0.0	137.4	79.2
07-1984	89.9	177.5	87.7	152.4	89.9	0.0	0.0	87.7	83.4
08-1984	89.5	209.3	119.8	152.4	89.5	0.0	0.0	119.8	101.6
09-1984	77.5	82.8	5.3	152.4	77.5	0.0	0.0	5.3	53.5
10-1984	70.4	286.0	215.6	152.4	70.4	0.0	0.0	215.6	134.6
11-1984	42.6	39.9	-2.7	149.7	42.6	0.0	0.0	0.0	67.3
12-1984	49.2	107.4	58.3	152.4	49.2	0.0	0.0	55.6	61.4
01-1985	26.9	157.7	130.8	152.4	26.9	0.0	0.0	130.8	96.1
02-1985	32.6	123.7	91.1	152.4	32.6	0.0	0.0	91.1	93.6
03-1985	52.9	121.2	68.3	152.4	52.9	0.0	0.0	68.3	80.9
04-1985	62.2	36.1	-26.1	126.3	62.2	0.0	0.0	0.0	40.5

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-1985	74.1	66.3	-7.8	119.9	72.8	1.3	0.0	0.0	20.2
06-1985	90.5	67.3	-23.2	101.6	85.5	4.9	0.0	0.0	10.1
07-1985	91.4	187.2	95.8	152.4	91.4	0.0	0.0	45.0	27.6
08-1985	94.3	223.0	128.7	152.4	94.3	0.0	0.0	128.7	78.1
09-1985	80.2	180.3	100.1	152.4	80.2	0.0	0.0	100.1	89.1
10-1985	66.4	296.7	230.3	152.4	66.4	0.0	0.0	230.3	159.7
11-1985	55.7	26.2	-29.5	122.9	55.7	0.0	0.0	0.0	79.9
12-1985	31.4	145.0	113.6	152.4	31.4	0.0	0.0	84.1	81.0
01-1986	32.5	89.4	56.9	152.4	32.5	0.0	0.0	56.9	69.4
02-1986	41.3	84.8	43.6	152.4	41.3	0.0	0.0	43.6	56.5
03-1986	44.8	50.3	5.5	152.4	44.8	0.0	0.0	5.5	30.0
04-1986	56.8	57.7	0.8	152.4	56.8	0.0	0.0	0.8	15.9
05-1986	74.6	98.6	23.9	152.4	74.6	0.0	0.0	23.9	19.9
06-1986	89.5	197.6	108.1	152.4	89.5	0.0	0.0	108.1	63.0
07-1986	95.3	197.9	102.6	152.4	95.3	0.0	0.0	102.6	83.3
08-1986	91.1	136.9	45.8	152.4	91.1	0.0	0.0	45.8	64.6
09-1986	89.5	116.8	27.3	152.4	89.5	0.0	0.0	27.3	45.9
10-1986	59.8	122.2	62.3	152.4	59.8	0.0	0.0	62.3	54.1
11-1986	50.5	150.1	99.6	152.4	50.5	0.0	0.0	99.6	76.8
12-1986	32.9	164.8	131.0	152.4	32.9	0.0	0.0	131.0	104.4
01-1987	29.8	187.2	157.4	152.4	29.8	0.0	0.0	157.4	130.9
02-1987	36.8	181.1	144.3	152.4	36.8	0.0	0.0	144.3	137.6
03-1987	42.4	77.0	35.6	152.4	42.4	0.0	0.0	35.6	86.6
04-1987	52.1	40.6	-11.5	140.9	52.1	0.0	0.0	0.0	43.3
05-1987	76.2	163.3	87.2	152.4	76.2	0.0	0.0	75.7	59.5
06-1987	85.3	321.3	235.0	152.4	85.3	0.0	0.0	235.0	147.7
07-1987	92.4	188.2	95.9	152.4	92.4	0.0	0.0	95.9	121.8
08-1987	95.3	196.3	101.1	152.4	95.3	0.0	0.0	101.1	111.4
09-1987	79.1	56.9	-22.2	130.2	79.1	0.0	0.0	0.0	55.7
10-1987	50.4	30.0	-19.4	113.6	47.6	2.8	0.0	0.0	27.9
11-1987	44.2	104.4	60.2	152.4	44.2	0.0	0.0	21.4	24.6
12-1987	40.1	73.2	33.0	152.4	40.1	0.0	0.0	33.0	28.8
01-1988	28.4	82.5	54.1	152.4	28.4	0.0	0.0	54.1	41.5
02-1988	34.3	270.3	236.0	152.4	34.3	0.0	0.0	236.0	138.7
03-1988	43.6	232.7	189.1	152.4	43.6	0.0	0.0	189.1	163.9
04-1988	57.0	133.9	76.8	152.4	57.0	0.0	0.0	76.8	120.4
05-1988	67.7	47.2	-20.5	131.9	67.7	0.0	0.0	0.0	60.2
06-1988	82.7	126.7	44.0	152.4	82.7	0.0	0.0	23.5	41.9
07-1988	90.2	168.1	77.0	152.4	90.2	0.0	0.0	77.0	59.9
08-1988	92.4	228.6	136.2	152.4	92.4	0.0	0.0	136.2	98.1
09-1988	81.6	157.0	76.4	152.4	81.6	0.0	0.0	76.4	87.2
10-1988	55.7	89.2	33.5	152.4	55.7	0.0	0.0	33.5	60.4
11-1988	49.5	42.7	-6.8	145.6	49.5	0.0	0.0	0.0	30.2
12-1988	36.2	97.5	61.3	152.4	36.2	0.0	0.0	54.5	42.3
01-1989	41.8	91.9	50.1	152.4	41.8	0.0	0.0	50.1	46.2
02-1989	34.8	17.5	-17.3	135.1	34.8	0.0	0.0	0.0	23.1
03-1989	45.3	91.9	46.7	152.4	45.3	0.0	0.0	29.4	26.2
04-1989	54.7	34.5	-20.2	132.2	54.7	0.0	0.0	0.0	13.1
05-1989	75.9	136.4	60.5	152.4	75.9	0.0	0.0	40.3	26.7
06-1989	83.0	391.4	308.4	152.4	83.0	0.0	0.0	308.4	167.6
07-1989	88.9	232.7	143.7	152.4	88.9	0.0	0.0	143.7	155.6
08-1989	88.9	156.2	67.3	152.4	88.9	0.0	0.0	67.3	111.5
09-1989	75.9	130.6	54.7	152.4	75.9	0.0	0.0	54.7	83.1
10-1989	56.6	48.5	-8.1	144.3	56.6	0.0	0.0	0.0	41.5
11-1989	45.9	197.4	151.5	152.4	45.9	0.0	0.0	143.3	92.4
12-1989	25.6	159.3	133.7	152.4	25.6	0.0	0.0	133.7	113.1
01-1990	38.9	141.0	103.1	152.4	38.9	0.0	0.0	103.1	108.1
02-1990	43.6	177.8	134.2	152.4	43.6	0.0	0.0	134.2	121.1
03-1990	47.3	167.9	120.5	152.4	47.3	0.0	0.0	120.5	120.8
04-1990	56.4	75.2	18.7	152.4	56.4	0.0	0.0	18.7	69.8
05-1990	74.6	82.5	7.9	152.4	74.6	0.0	0.0	7.9	38.9
06-1990	93.0	126.2	32.3	152.4	93.0	0.0	0.0	32.3	35.6
07-1990	91.4	104.9	13.5	152.4	91.4	0.0	0.0	13.5	24.5
08-1990	93.6	90.9	-2.7	149.7	93.6	0.0	0.0	0.0	12.3

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
09-1990	83.0	100.6	17.6	152.4	83.0	0.0	0.0	14.9	13.6
10-1990	54.9	65.0	10.1	152.4	54.9	0.0	0.0	10.1	11.8
11-1990	46.4	79.8	33.4	152.4	46.4	0.0	0.0	33.4	22.6
12-1990	39.0	144.8	105.7	152.4	39.0	0.0	0.0	105.7	64.2
01-1991	31.8	290.6	258.8	152.4	31.8	0.0	0.0	258.8	161.5
02-1991	39.2	153.7	114.5	152.4	39.2	0.0	0.0	114.5	137.0
03-1991	48.5	104.1	55.6	152.4	48.5	0.0	0.0	55.6	96.8
04-1991	63.7	250.2	186.5	152.4	63.7	0.0	0.0	186.5	141.7
05-1991	77.2	388.6	311.4	152.4	77.2	0.0	0.0	311.4	226.5
06-1991	87.4	145.5	58.1	152.4	87.4	0.0	0.0	58.1	142.3
07-1991	93.6	185.4	91.8	152.4	93.6	0.0	0.0	91.8	117.1
08-1991	90.5	160.0	69.5	152.4	90.5	0.0	0.0	69.5	93.3
09-1991	78.6	150.1	71.6	152.4	78.6	0.0	0.0	71.6	82.4
10-1991	63.0	137.7	74.7	152.4	63.0	0.0	0.0	74.7	78.5
11-1991	37.5	38.9	1.4	152.4	37.5	0.0	0.0	1.4	39.0
12-1991	39.3	46.5	7.2	152.4	39.3	0.0	0.0	7.2	23.6
01-1992	31.1	337.3	306.2	152.4	31.1	0.0	0.0	306.2	164.9
02-1992	40.8	217.9	177.1	152.4	40.8	0.0	0.0	177.1	170.0
03-1992	46.7	103.1	56.4	152.4	46.7	0.0	0.0	56.4	113.7
04-1992	55.1	150.6	95.5	152.4	55.1	0.0	0.0	95.5	104.6
05-1992	67.5	93.2	25.7	152.4	67.5	0.0	0.0	25.7	65.2
06-1992	85.6	229.9	144.2	152.4	85.6	0.0	0.0	144.2	104.7
07-1992	92.4	207.3	114.9	152.4	92.4	0.0	0.0	114.9	109.8
08-1992	83.6	260.6	177.0	152.4	83.6	0.0	0.0	177.0	143.4
09-1992	79.9	113.5	33.6	152.4	79.9	0.0	0.0	33.6	88.5
10-1992	58.4	41.4	-17.0	135.4	58.4	0.0	0.0	0.0	44.3
11-1992	38.4	243.3	204.0	152.4	38.4	0.0	0.0	187.9	116.1
12-1992	38.6	124.7	86.1	152.4	38.6	0.0	0.0	86.1	101.1
01-1993	35.9	255.5	219.6	152.4	35.9	0.0	0.0	219.6	160.3
02-1993	35.8	80.0	44.2	152.4	35.8	0.0	0.0	44.2	102.3
03-1993	40.8	120.7	79.8	152.4	40.8	0.0	0.0	79.8	91.0
04-1993	49.5	288.8	239.3	152.4	49.5	0.0	0.0	239.3	165.2
05-1993	66.6	115.6	48.0	152.4	66.6	0.0	0.0	48.0	107.1
06-1993	87.7	159.0	71.3	152.4	87.7	0.0	0.0	71.3	89.2
07-1993	93.0	176.5	82.6	152.4	93.0	0.0	0.0	82.6	85.9
08-1993	98.3	81.8	-16.5	135.9	98.3	0.0	0.0	0.0	42.9
09-1993	84.2	92.7	8.5	144.5	84.2	0.0	0.0	0.0	21.5
10-1993	58.6	160.5	101.9	152.4	58.6	0.0	0.0	93.0	57.7
11-1993	40.4	141.2	100.8	152.4	40.4	0.0	0.0	100.8	79.3
12-1993	34.3	98.6	64.3	152.4	34.3	0.0	0.0	64.3	71.8
01-1994	30.0	111.3	80.3	152.4	30.0	0.0	0.0	80.3	76.0
02-1994	38.2	71.1	32.9	152.4	38.2	0.0	0.0	32.9	54.4
03-1994	44.7	81.5	36.9	152.4	44.7	0.0	0.0	36.9	45.7
04-1994	59.8	154.4	94.6	152.4	59.8	0.0	0.0	94.6	70.1
05-1994	71.1	116.3	45.2	152.4	71.1	0.0	0.0	45.2	57.7
06-1994	88.3	165.9	77.5	152.4	88.3	0.0	0.0	77.5	67.6
07-1994	88.6	227.6	138.0	152.4	88.6	0.0	0.0	138.0	103.3
08-1994	89.2	98.6	9.3	152.4	89.2	0.0	0.0	9.3	56.3
09-1994	78.3	118.6	40.3	152.4	78.3	0.0	0.0	40.3	48.3
10-1994	60.9	80.3	19.4	152.4	60.9	0.0	0.0	19.4	33.8
11-1994	51.8	48.5	-3.3	149.1	51.8	0.0	0.0	0.0	16.9
12-1994	38.5	114.6	76.0	152.4	38.5	0.0	0.0	72.8	44.9
01-1995	33.9	118.4	84.5	152.4	33.9	0.0	0.0	84.5	64.7
02-1995	38.2	56.9	18.7	152.4	38.2	0.0	0.0	18.7	41.7
03-1995	46.9	287.5	240.7	152.4	46.9	0.0	0.0	240.7	141.2
04-1995	57.4	126.5	69.1	152.4	57.4	0.0	0.0	69.1	105.1
05-1995	78.0	191.5	113.5	152.4	78.0	0.0	0.0	113.5	109.3
06-1995	85.0	61.5	-23.6	128.8	85.0	0.0	0.0	0.0	54.7
07-1995	96.6	155.4	58.9	152.4	96.6	0.0	0.0	35.3	44.0
08-1995	98.3	123.0	25.7	152.4	98.3	0.0	0.0	25.7	35.3
09-1995	83.9	73.2	-10.7	141.7	83.9	0.0	0.0	0.0	17.7
10-1995	58.6	153.7	95.1	152.4	58.6	0.0	0.0	84.3	50.0
11-1995	41.5	223.3	181.7	152.4	41.5	0.0	0.0	181.7	116.4
12-1995	34.7	165.6	130.9	152.4	34.7	0.0	0.0	130.9	123.6

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
01-1996	33.1	74.7	41.6	152.4	33.1	0.0	0.0	41.6	82.6
02-1996	35.7	54.4	18.7	152.4	35.7	0.0	0.0	18.7	50.6
03-1996	38.6	65.0	26.4	152.4	38.6	0.0	0.0	26.4	38.5
04-1996	53.4	75.7	22.3	152.4	53.4	0.0	0.0	22.3	30.4
05-1996	78.3	45.2	-33.1	119.3	78.3	0.0	0.0	0.0	15.2
06-1996	86.2	209.6	123.3	152.4	86.2	0.0	0.0	90.3	52.7
07-1996	94.6	133.3	38.7	152.4	94.6	0.0	0.0	38.7	45.7
08-1996	88.0	225.3	137.3	152.4	88.0	0.0	0.0	137.3	91.5
09-1996	78.8	172.5	93.6	152.4	78.8	0.0	0.0	93.6	92.6
10-1996	58.2	240.0	181.8	152.4	58.2	0.0	0.0	181.8	137.2
11-1996	46.2	70.1	23.9	152.4	46.2	0.0	0.0	23.9	80.5
12-1996	38.9	137.4	98.5	152.4	38.9	0.0	0.0	98.5	89.5
01-1997	33.4	119.4	85.9	152.4	33.4	0.0	0.0	85.9	87.7
02-1997	38.1	157.5	119.4	152.4	38.1	0.0	0.0	119.4	103.6
03-1997	52.9	92.7	39.8	152.4	52.9	0.0	0.0	39.8	71.7
04-1997	50.0	204.2	154.2	152.4	50.0	0.0	0.0	154.2	112.9
05-1997	70.4	186.9	116.6	152.4	70.4	0.0	0.0	116.6	114.8
06-1997	85.0	254.0	168.0	152.4	85.0	0.0	0.0	168.0	141.9
07-1997	95.9	156.7	60.8	152.4	95.9	0.0	0.0	60.8	101.3
08-1997	93.0	88.6	-4.4	148.0	93.0	0.0	0.0	0.0	50.7
09-1997	84.5	68.3	-16.1	132.4	83.0	0.5	0.0	0.0	25.3
10-1997	59.0	57.9	-1.1	131.4	58.9	0.1	0.0	0.0	12.7
11-1997	40.1	152.1	112.0	152.4	40.1	0.0	0.0	91.0	51.8
12-1997	32.8	107.4	74.7	152.4	32.8	0.0	0.0	74.7	63.3
01-1998	37.8	383.5	345.7	152.4	37.8	0.0	0.0	345.7	204.5
02-1998	36.9	147.1	110.1	152.4	36.9	0.0	0.0	110.1	157.3
03-1998	43.1	140.7	97.6	152.4	43.1	0.0	0.0	97.6	127.4
04-1998	54.3	89.2	34.8	152.4	54.3	0.0	0.0	34.8	81.1
05-1998	80.5	6.9	-73.6	78.8	80.5	0.0	0.0	0.0	40.6
06-1998	95.3	103.4	8.1	86.9	95.3	0.0	0.0	0.0	20.3
07-1998	100.3	102.6	2.3	89.2	100.3	0.0	0.0	0.0	10.1
08-1998	97.9	109.5	11.5	100.7	97.9	0.0	0.0	0.0	5.1
09-1998	88.9	295.4	206.5	152.4	88.9	0.0	0.0	154.8	79.9
10-1998	65.9	67.8	1.9	152.4	65.9	0.0	0.0	1.9	40.9
11-1998	50.0	80.5	30.5	152.4	50.0	0.0	0.0	30.5	35.7
12-1998	38.6	64.8	26.1	152.4	38.6	0.0	0.0	26.1	30.9
01-1999	38.5	96.8	58.3	152.4	38.5	0.0	0.0	58.3	44.6
02-1999	43.7	44.0	1.2	152.4	43.7	0.0	0.0	1.2	22.9
03-1999	45.1	115.1	69.9	152.4	45.1	0.0	0.0	69.9	46.4
04-1999	66.6	11.9	-54.6	97.8	66.6	0.0	0.0	0.0	23.2
05-1999	73.6	148.3	74.8	152.4	73.6	0.0	0.0	20.1	21.7
06-1999	87.4	188.7	101.3	152.4	87.4	0.0	0.0	101.3	61.5
07-1999	91.7	132.3	40.6	152.4	91.7	0.0	0.0	40.6	51.0
08-1999	101.4	64.8	-36.6	115.8	101.4	0.0	0.0	0.0	25.5
09-1999	76.4	99.8	23.4	139.2	76.4	0.0	0.0	0.0	12.8
10-1999	57.8	140.2	82.4	152.4	57.8	0.0	0.0	69.2	40.0
11-1999	45.1	31.8	-13.4	139.0	45.1	0.0	0.0	0.0	20.5
12-1999	34.1	118.4	84.2	152.4	34.1	0.0	0.0	70.9	45.7
01-2000	36.3	68.1	31.8	152.4	36.3	0.0	0.0	31.8	38.7
02-2000	43.9	22.4	-21.5	130.9	43.9	0.0	0.0	0.0	19.4
03-2000	50.5	102.4	51.8	152.4	50.5	0.0	0.0	30.3	24.8
04-2000	54.5	23.4	-31.2	121.2	54.5	0.0	0.0	0.0	12.4
05-2000	79.9	18.3	-61.6	72.2	67.3	12.6	0.0	0.0	6.2
06-2000	87.7	153.7	65.0	138.2	87.7	0.0	0.0	0.0	3.1
07-2000	94.9	136.1	41.2	152.4	94.9	0.0	0.0	26.0	15.0
08-2000	95.9	85.6	-10.3	142.1	95.9	0.0	0.0	0.0	7.5
09-2000	79.4	132.8	53.5	152.4	79.4	0.0	0.0	43.1	25.3
10-2000	57.8	31.8	-26.1	126.3	57.8	0.0	0.0	0.0	12.7
11-2000	39.6	341.1	301.5	152.4	39.6	0.0	0.0	275.5	144.1
12-2000	28.2	78.5	50.2	152.4	28.2	0.0	0.0	50.2	97.2
01-2001	29.0	114.0	85.0	152.4	29.0	0.0	0.0	85.0	91.1
02-2001	43.1	60.2	17.1	152.4	43.1	0.0	0.0	17.1	54.1
03-2001	41.5	259.8	218.3	152.4	41.5	0.0	0.0	218.3	136.2
04-2001	64.1	36.8	-27.3	125.1	64.1	0.0	0.0	0.0	68.1

Month & Year	Potential ET	Precip	Precip - Pot ET	SM Storage	Act ET	Pot ET - Act ET	Snow Storage	Surplus	Runoff
05-2001	73.3	51.3	-22.0	107.0	69.4	3.9	0.0	0.0	34.0
06-2001	82.2	519.9	437.8	152.4	82.2	0.0	0.0	392.4	213.2
07-2001	93.0	170.9	77.9	152.4	93.0	0.0	0.0	77.9	145.6
08-2001	89.2	184.4	95.2	152.4	89.2	0.0	0.0	95.2	120.4
09-2001	75.9	220.7	144.8	152.4	75.9	0.0	0.0	144.8	132.6
10-2001	53.2	115.6	62.3	152.4	53.2	0.0	0.0	62.3	97.5
11-2001	50.5	51.6	1.0	152.4	50.5	0.0	0.0	1.0	49.2
12-2001	38.6	60.2	21.6	152.4	38.6	0.0	0.0	21.6	35.4
01-2002	35.1	106.7	71.6	152.4	35.1	0.0	0.0	71.6	53.5
02-2002	32.4	39.1	6.7	152.4	32.4	0.0	0.0	6.7	30.1
03-2002	44.8	140.2	95.4	152.4	44.8	0.0	0.0	95.4	62.7
04-2002	63.5	114.3	50.8	152.4	63.5	0.0	0.0	50.8	56.8
05-2002	71.8	62.2	-9.6	142.8	71.8	0.0	0.0	0.0	28.4
06-2002	84.2	189.0	105.8	152.4	84.2	0.0	0.0	96.2	62.3
07-2002	92.0	182.4	90.3	152.4	92.0	0.0	0.0	90.3	76.3
08-2002	90.2	185.4	95.3	152.4	90.2	0.0	0.0	95.3	85.8
09-2002	83.0	132.8	49.8	152.4	83.0	0.0	0.0	49.8	67.8
10-2002	65.7	346.2	280.5	152.4	65.7	0.0	0.0	280.5	174.2
11-2002	41.7	123.2	81.5	152.4	41.7	0.0	0.0	81.5	127.8
12-2002	34.4	149.1	114.7	152.4	34.4	0.0	0.0	114.7	121.3
01-2003	28.9	17.3	-11.7	140.7	28.9	0.0	0.0	0.0	60.6
02-2003	35.7	135.1	99.4	152.4	35.7	0.0	0.0	87.8	74.2
03-2003	45.9	59.9	14.0	152.4	45.9	0.0	0.0	14.0	44.1
04-2003	58.4	148.6	90.2	152.4	58.4	0.0	0.0	90.2	67.1
05-2003	84.7	8.6	-76.1	76.3	84.7	0.0	0.0	0.0	33.6
06-2003	83.3	306.6	223.3	152.4	83.3	0.0	0.0	147.2	90.4
07-2003	93.0	204.2	110.2	152.4	93.0	0.0	0.0	110.2	100.3
08-2003	95.6	130.6	34.0	152.4	95.6	0.0	0.0	34.0	67.6
Averages:	61.6	127.9	66.3	147.2	61.4	0.2	0.0	66.4	66.4

Average runoff in mm per month = 66.4  
Average runoff in inches per year = 31.4  
Average runoff in cfs per square mile = 2.31

Area of Subsegment 010601 (square miles) = 21.6  
Average annual flow from Subsegment 010601 (cfs) = 49.9

FILE: R:\PROJECTS\2110-641\TECH\TMDL\DISSOLVED MINERALS\REGION 8 WATER BALANCE.XLS

# **APPENDIX E**

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## **Calculations for TMDLs and Percent Reductions**



TMDL CALCULATIONS FOR DISSOLVED MINERALS FOR SUBSEGMENT 010601

Average annual flow for subseg. 010601 (from LOSC water budget) = 49.9 cfs

Equations:

$$\text{TMDL, tons/day} = \text{Flow, cfs} * \text{Criterion, mg/L} * (28.316 \text{ L / ft}^3) * (1.0\text{E-}6 \text{ kg / mg}) * (2.2046 \text{ lbs / kg}) * (\text{ton / 2000 lbs}) * (86400 \text{ sec / day})$$

Criteria = 80 mg/L chloride  
50 mg/L sulfate  
350 mg/L TDS

$$\text{MOS, tons/day} = 10\% * \text{TMDL}$$

$$\text{WLA, tons/day} = \text{Effluent flow, MGD} * \text{Criterion, mg/L} * 8.345 * (\text{ton / 2000 lbs})$$

Effluent flow, MGD = 1.5 (Columbian Chemicals Company)

$$\text{FG, tons/day} = 10\% * \text{WLA} \quad (\text{per LDEQ comments})$$

$$\text{LA, tons/day} = \text{TMDL} - \text{MOS} - \text{FG} - \text{WLA}$$

Results:

	WLA (tons/day)	LA (tons/day)	FG (tons/day)	MOS (tons/day)	TMDL (tons/day)
Chloride	0.50	9.14	0.05	1.08	10.77
Sulfate	0.31	5.72	0.03	0.67	6.73
TDS	2.19	39.98	0.22	4.71	47.10

PERCENT REDUCTION CALCULATIONS FOR DISSOLVED MINERALS FOR SUBSEGMENT 010601

30% = maximum percentage of dissolved mineral exceedances for full support of aquatic life

Percent reduction needed =

92%

66%

83%

Date	Observed chloride (mg/L)	Reduced chloride (mg/L)
01/08/02	260	20.8
02/07/02	265	21.2
03/07/02	20	1.6
04/02/02	171	13.7
05/07/02	283	22.6
06/12/02	600	48.0
07/09/02	276	22.1
08/20/02	103	8.2
09/10/02	113	9.0
10/17/02	817	65.4
11/06/02	366	29.3
12/03/02	960	76.8
01/13/04	296	23.7
02/17/04	824	65.9
03/16/04	1,243	99.4
04/13/04	1,213	97.0
05/11/04	1,103	88.2
06/08/04	943	75.4
07/06/04	884	70.7
08/03/04	1,305	104.4
08/31/04	701	56.1
10/05/04	1,320	105.6
10/26/04	1,321	105.7
11/30/04	1,045	83.6
10/22/07	405	32.4
11/13/07	1,028	82.2
12/11/07	1,144	91.5
01/08/08	150	12.0
02/19/08	158	12.6
03/04/08	203	16.2
04/08/08	905	72.4
05/14/08	615	49.2
06/12/08	1,234	98.7
07/15/08	986	78.9
08/12/08	387	31.0

Observed sulfate (mg/L)	Reduced sulfate (mg/L)
176	59.8
300	102.0
41	14.0
264	89.8
290	98.6
171	58.1
264	89.8
212	72.1
174	59.2
3	1.0
8	2.8
8	2.8
73	24.9
5	1.5
< 1.3	0.2
< 1.3	0.2
< 1.3	0.2
3	0.9
3	0.9
< 1.3	0.2
2	0.7
< 1.3	0.2
4	1.3
6	2.1
141	47.9
139	47.3
132	44.9
161	54.7
147	50.0
107	36.4
146	49.6
171	58.1
133	45.2
97	32.8
87	29.7

Observed TDS (mg/L)	Reduced TDS (mg/L)
940	159.8
970	164.9
650	110.5
968	164.6
1,046	177.8
1,526	259.4
1,020	173.4
690	117.3
766	130.2
1,588	270.0
776	131.9
1,928	327.8
764	129.9
1,738	295.5
2,512	427.0
2,464	418.9
2,258	383.9
1,954	332.2
1,808	307.4
2,660	452.2
1,498	254.7
2,860	486.2
2,490	423.3
2,042	347.1
1,088	185.0
2,094	356.0
2,384	405.3
622	105.7
606	103.0
667	113.4
2,008	341.4
1,414	240.4
2,660	452.2
1,896	322.3
1,004	170.7

Total number of values =	35	35	35	35	35	35
Number of exceedances =	34	10	20	10	35	9
Percent of exceedances =	97%	29%	57%	29%	100%	26%

# **APPENDIX F**

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## **Public Comments and EPA Responses**

## **LDEQ Comments Concerning the following TMDLs submitted to EPA by Tetra Tech, Inc.:**

### **DRAFT TMDLs for Chloride, Sulfate, and Total Dissolved Solids for Subsegment 010601 in the Atchafalaya River Basin, Louisiana**

#### **General Comments:**

- The report fails to indicate any source for the chloride, sulfate, and TDS loads. The report indicates that two facilities (LA0119091 and LAG33A698) exist within subsegment 010601. LDEQ has documented another facility within the subsegment. The facility is Columbian Chemicals (AI 4998). It discharges to a location near LDEQ's Ambient Water Quality Network Station 1209. LDEQ has documented that this facility is the primary cause of the criteria exceedances for chloride, sulfate, and TDS for subsegment 010601. The TMDLs and report must be revised to address this facility.

**EPA Response:** The TMDLs and report have been revised to incorporate the Columbian Chemicals facility. During development of the draft report in the fall of 2008, FTN contacted several LDEQ personnel to obtain insight and information concerning the cause of the high dissolved minerals concentrations. At that time, LDEQ was unaware of any specific point sources that were suspected of causing dissolved mineral exceedances. EPA appreciates this new information that LDEQ has provided.

- The referenced subsegment is isolated from adjacent waterbodies. The only connection to adjacent waterbodies is via the North Bend Pumping Station. Due to this condition, LDEQ (with approval from EPA) did not develop a TMDL for dissolved oxygen for the subsegment 010601.

**EPA Response:** EPA acknowledges this comment.

#### **Specific Comments:**

- Section 1.0 Introduction, paragraph 1, sentence 4, page 1-1:  
The sentence states "The 303(d) list also specifies low dissolved oxygen as a suspected cause for impairment for subsegment 010601, but the impairment due to that parameter will be addressed by LDEQ and the United States Environmental Protection Agency (EPA) in other documents." This statement is incorrect. As stated in the general comments, LDEQ is not developing a TMDL for dissolved oxygen for subsegment 010601.

**EPA Response:** Section 1.0 of the report has been revised to state that the dissolved oxygen impairment is not addressed in this report.

- Section 2.5 Point Sources

As indicated in the general comments, this TMDL report fails to address the Columbian Chemicals facility. The TMDLs and report must be revised to address this facility.

**EPA Response:** Section 2.5 of the report (including Table 2.3) has been revised to include the Columbian Chemicals facility.

- Section 3.3 MOS and FG

The report states that the Margin of Safety (MOS) included factors for uncertainty and future growth. Each factor was set at 10%. The report also states that EPA believes the two facilities referenced in the report were not significant contributors to the chloride, sulfate, and TDS loads. LDEQ advises that it is not reasonable to apply a 10% growth factor to the load allocation (nonpoint loads) for an isolated waterbody. The growth factor should be applied to any significant point sources.

**EPA Response:** The 10% margin of safety was used to account for lack of knowledge concerning the relationship between pollutant loadings and water quality (as directed by Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7). The margin of safety was not intended to account for future growth. The future growth has been revised to be 10% of the WLA rather than 10% of the TMDL.

- Section 3.4 WLA and LA

This section states that the WLA for point source loads was set to zero for each of the TMDLs in this report. This indicates that the named facilities will not be allowed to discharge within Subsegment 010601. Thorough consideration must be provided for the Columbian Chemicals facility. In order for affected facilities to understand what this means, a statement should be added to the document that states reductions from point source discharges are not required and therefore no permit limitations are necessary as a result of this TMDL.

**EPA Response:** If a facility does not have a source of a pollutant above background levels, it will not be assigned a WLA (i.e., it will not be included in the TMDL), but it will still be able to discharge into the subsegment because it would not be causing or contributing to an impairment as long as its effluent concentrations were similar to background levels. For the Columbian Chemicals facility, we have now assigned a WLA that is within the assimilative capacity of the receiving stream. Because the 7Q10 is undefined for subsegment 010601 and the critical low stream flow is assumed to be near zero during extended dry periods, the WLA was calculated as the effluent flow rate multiplied by the dissolved minerals criteria in the water quality standards. In other words, the Columbian Chemicals facility will have to meet water quality standards at the “end of the pipe”. This level of stringency is necessary for the Columbian Chemicals facility because it

discharges into an unnamed drainage ditch that is assumed to have no dilution water much of the time. The discharge will likely comprise most or all of the water in the ditch during extended dry periods. The report also includes a statement that the Shadyside Compressor Station (the only other active point source in the subsegment) does not need permit limits for chloride, sulfate, or TDS.