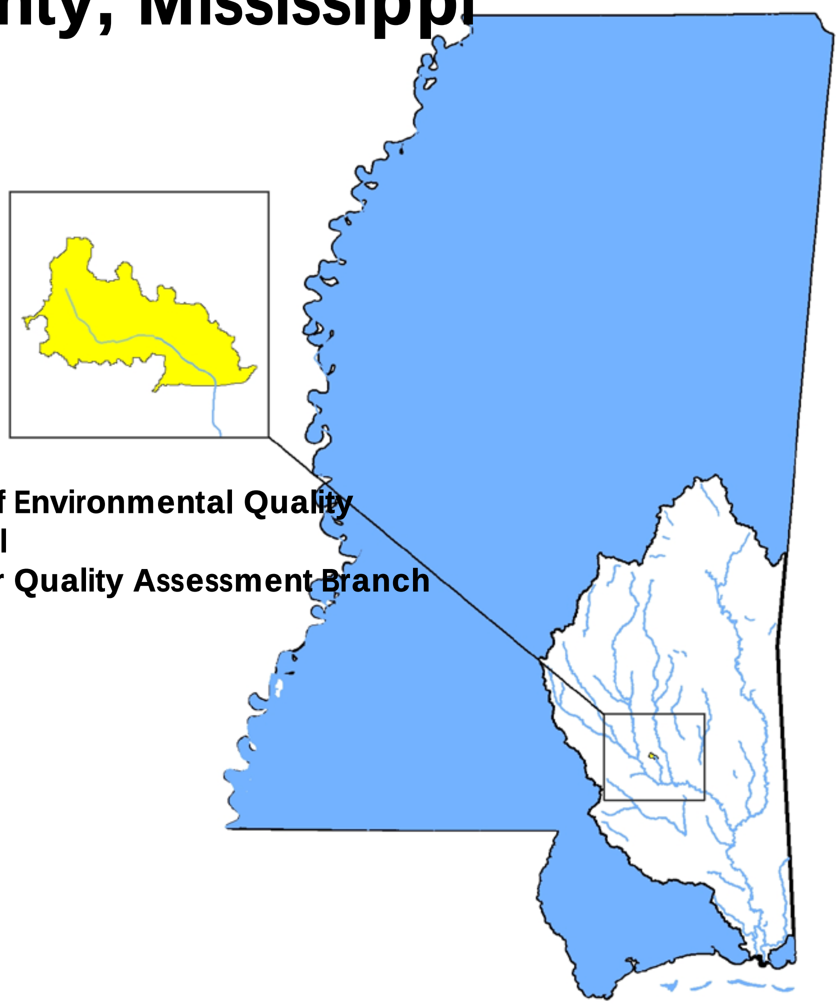
FINAL REPORT
May 2013

Organic Enrichment / Low DO TMDL for

For Reese Creek

Pascagoula River Basin
Forrest County, Mississippi



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FOREWORD

The report contains one or more Total Maximum Daily Loads (TMDLs) for water body segments found on Mississippi's current Section 303(d) List of Impaired Water Bodies. The implementation of the TMDLs contained herein will be prioritized within Mississippi's rotating basin approach.

As additional information becomes available, the TMDLs may be updated. Such additional information may include water quality and quantity data, changes in pollutant loadings, modifications to the water quality standards or criteria, or changes in landuse within the watershed. In some cases, additional water quality data may indicate that no impairment exists.

Conversion Factors

To convert from	To	Multiply by	To convert from	To	Multiply by
mile^2	acre	640	acre	ft^2	43560
km^2	acre	247.1	days	seconds	86400
m^3	ft^3	35.3	meters	feet	3.28
ft^3	gallons	7.48	ft^3	gallons	7.48
ft^3	liters	28.3	hectares	acres	2.47
cfs	gal/min	448.8	miles	meters	1609.3
cfs	MGD	0.646	tonnes	tons	1.1
m^3	gallons	264.2	µg/l * cfs	gm/day	2.45
m^3	liters	1000	µg/l * MGD	gm/day	3.79

Fraction	Prefix	Symbol	Multiple	Prefix	Symbol
10^{-1}	deci	d	10	deka	da
10^{-2}	centi	c	10^{2}	hecto	h
10^{-3}	milli	m	10^{3}	kilo	k
10^{-6}	micro	:	10^{6}	mega	M
10^{-9}	nano	n	10^{9}	giga	G
10^{-12}	pico	p	10^{12}	tera	T
10^{-15}	femto	f	10^{15}	peta	P
10^{-18}	atto	a	10^{18}	exa	E

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TMDL INFORMATION PAGE

Table 1. Listing Information

Name	ID	County	HUC	Impaired Use	Impairment
Reese Creek	416213	Forrest	3170004	Fish and Wildlife	From Twin Lakes outfall to Temple Road
Location: Near Hattiesburg					

Table 2. Water Quality Standards

Parameter	Beneficial use	Water Quality Criteria
Dissolved Oxygen	Aquatic Life Support	DO concentrations shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l

Table 3. NPDES Facilities

NPDES ID	Facility Name	Permitted Discharge (MGD)	Receiving Water
MS0031771	Sherwood Forest Subdivision*	0.20	Reese Creek

*Facility is no longer active

Table 4. Total Maximum Daily Load

Pollutant	WLAsw (lbs/day)	LA (lbs/day)	MOS	TMDL (lbs/day)
TBODu	0.22	7.84	Implicit	8.06

EXECUTIVE SUMMARY

This TMDL has been developed for Reese Creek which was placed on the Mississippi Section 2012 303(d) List of Impaired Water Bodies due to monitoring data that indicate impairment. It was determined that organic enrichment / low dissolved oxygen is the cause of impairment. This TMDL will provide an allocation for TBODu for the watershed.

The Reese Creek Watershed is located in HUC 3170004. Reese Creek is located near Hattiesburg, MS in Forrest County, Figure 1. The entire length of the water body is approximately 13.35 miles to the Leaf River. The 303(d) listed segment is approximately 1.2 miles and flows in a westerly direction from the outflow from Twin Lakes to Temple Road. The 7Q10 flow for the impaired Reese Creek Watershed is estimated to be 0.19 cfs at Temple Road.

There is one point source that was included in the model for the Reese Creek Watershed. The Sherwood Forrest Subdivision lagoon was connected to the City of Petal collection system and no longer discharges to Reese Creek. In calculating the TMDL for the creek, the discharge was removed from the model to calculate the final TMDL. All WLA load is, therefore, assigned to the stormwater portion of the WLAsw.

According to MDEQ's STREAM model, the TBODu load in the water body exceeds the assimilative capacity of Reese Creek for organic material at the critical conditions. Therefore, reductions in TBODu are required.

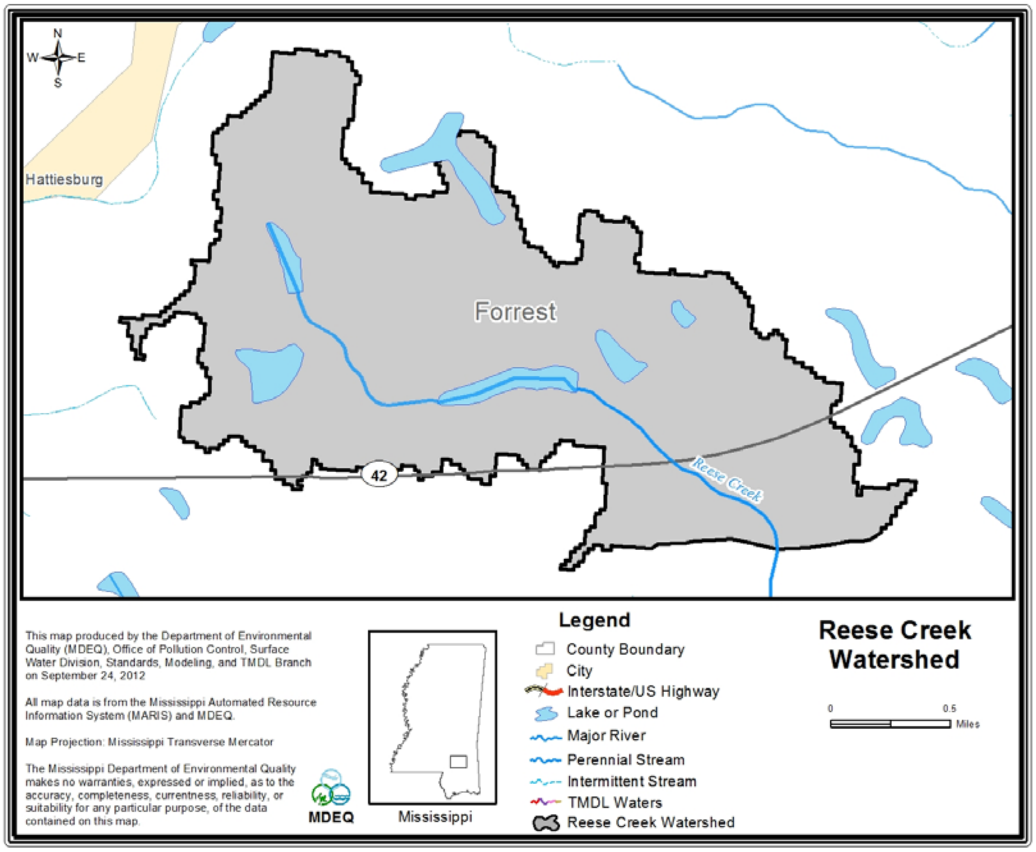


Figure 1. Reese Creek Watershed

INTRODUCTION

1.1 Background

The identification of water bodies not meeting their designated use and the development of total maximum daily loads (TMDLs) for those water bodies are required by Section 303(d) of the Clean Water Act and the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (40 CFR part 130). The TMDL process is designed to restore and maintain the quality of those impaired water bodies through the establishment of pollutant specific allowable loads. This TMDL has been developed for the 2012 §303(d) listed segment shown in Figure 2. The impaired segment of the stream is shown in green.

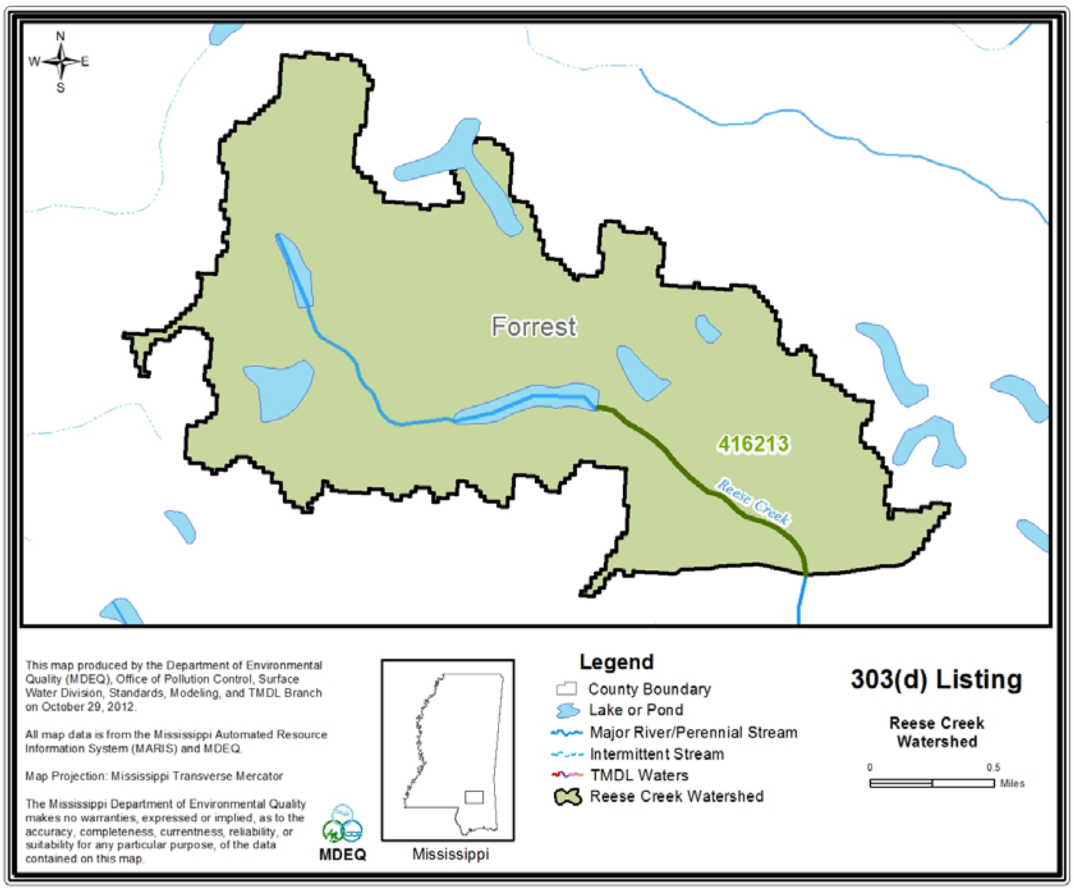


Figure 2. Reese Creek §303(d) Segment

1.2 Listing History

The impaired segment was listed due to failure to meet minimum water quality criteria for aquatic use support. The listing was based on diel DO data collected during a water quality study on Reese Creek in 2004.

1.3 Applicable Water Body Segment Use

The water use classifications are established by the State of Mississippi in the document *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2012). The designated beneficial use for the listed segment is fish and wildlife.

1.4 Applicable Water Body Segment Standard

The water quality standard applicable to the use of the water body and the pollutant of concern is defined in the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2012).

The applicable standard specifies that the dissolved oxygen (DO) concentrations shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l.

WATER BODY ASSESSMENT

2.1 Reese Creek Water Quality Data

Dissolved oxygen data for the Reese Creek Watershed were gathered in 2004. Based on the data, this water body was not supporting the use of aquatic life support and indicates violations of the DO Standard. This conclusion was based on data collected at stations A0350105, A0350106, and A0350107 given in Appendix A. A summary of the data is shown in Table 5 and Figure 3. Figure 4 shows the location of the monitoring stations.

Table 5. Summary of Reese Creek DO Data
9/22/2004 - 9/23/2004

Station	Max DO	Avg DO	Min DO	% exceedance
A0350105	4.15	3.52	2.67	100
A0350106	1.68	0.24	0.07	100
A0350107	2.7	2.29	2.09	100

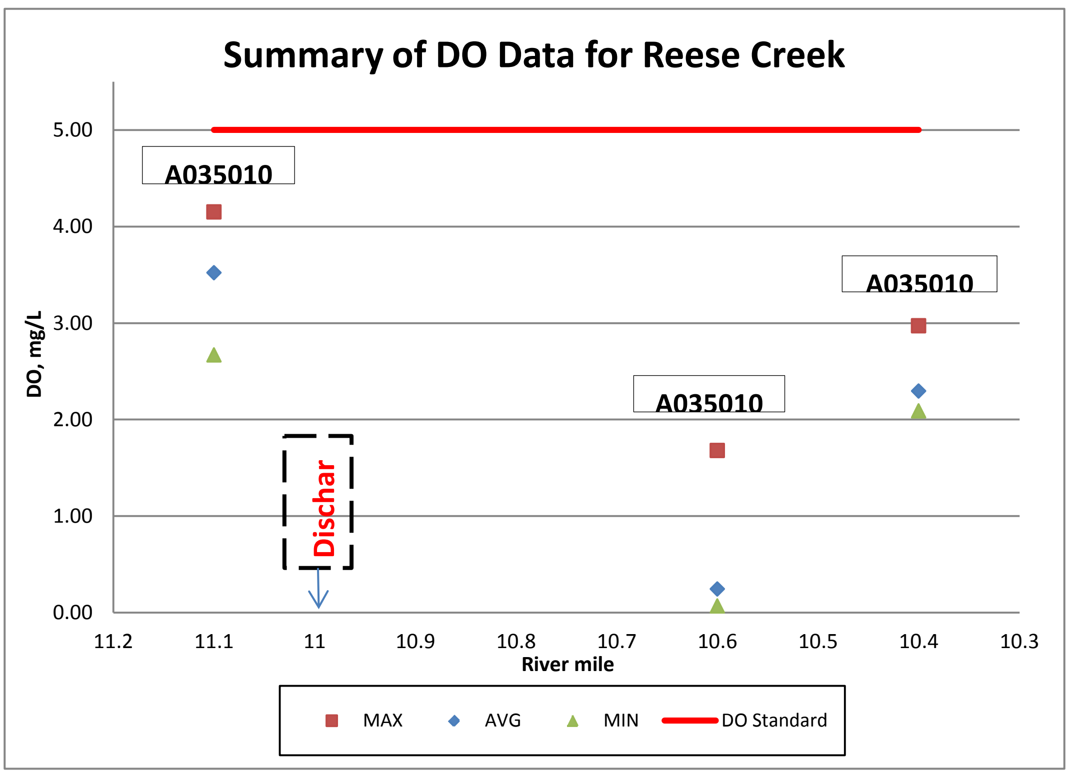


Figure 3. DO Summary for DO Data in Reese Creek

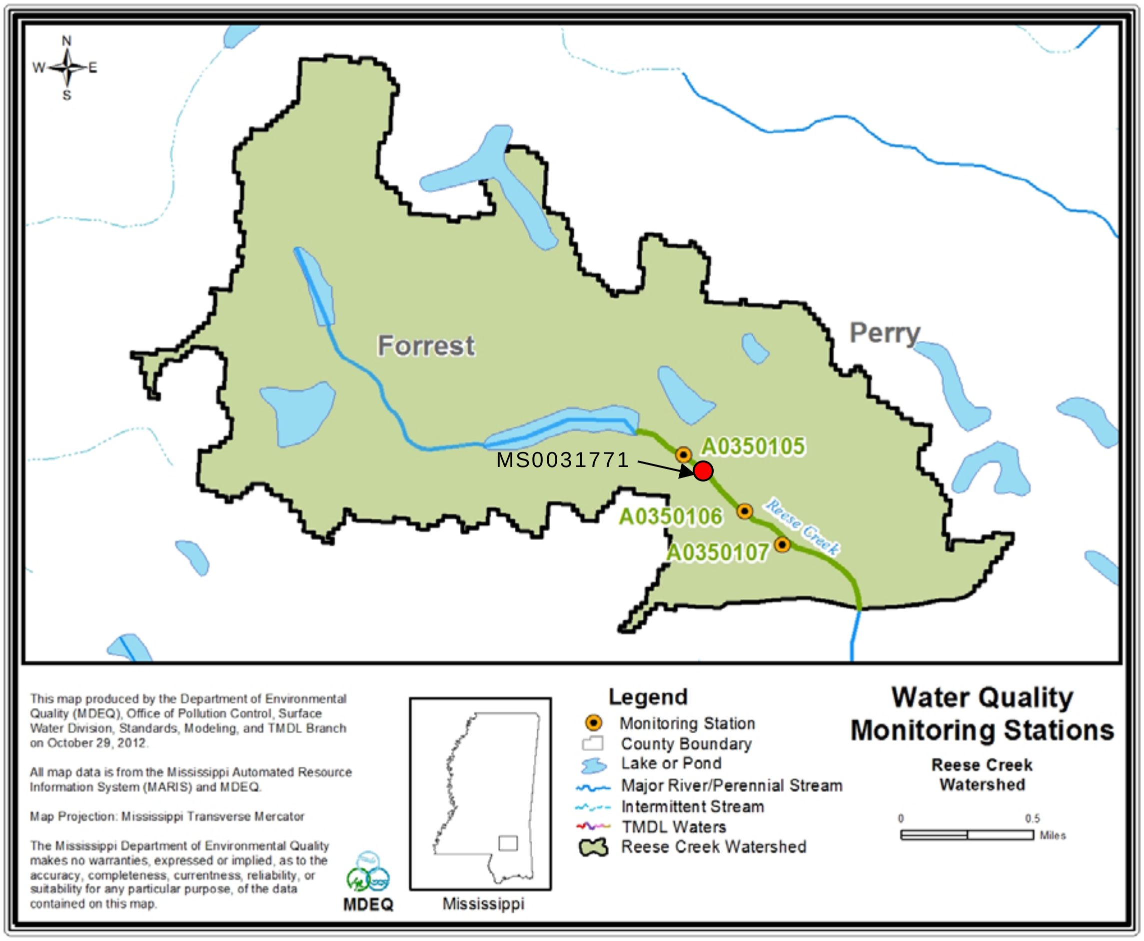


Figure 4. Reese Creek Watershed Water Quality Monitoring Stations

2.2 Assessment of Point Sources

An important part of the TMDL analysis is the identification of individual sources, source categories, or source subcategories in the watershed and the amount of pollutant loading contributed by each of these sources. Under the CWA, sources are broadly classified as either point or nonpoint sources. Under 40 CFR §122.2, a point source is defined as a discernible, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. The National Pollutant Discharge Elimination System (NPDES) program regulates point source discharges. Point sources can be described by two broad categories: 1) NPDES regulated municipal, commercial, and industrial wastewater treatment plants (WWTPs) and 2) NPDES regulated activities, which include construction activities and municipal storm water discharges (Municipal Separate Storm Sewer Systems [MS4s]).

The Reese Creek Watershed had one NPDES commercial treatment plant. It serves the Sherwood Forest Subdivision. The discharge point of the facility was located below monitoring station, A0350105, and upstream of the other monitoring stations. The permit limits for this facility are listed in Table 6. The location of the facility is shown in Figure 5.

Table 6. NPDES Permitted Facilities and Treatment Type

Name	NPDES Permit	Treatment Type	Discharge (MGD)	BOD_5 (mg/l)	NH_3-N mg/L
Sherwood Forest Subdivision	MS0031771	Conventional lagoon	0.20	30	2

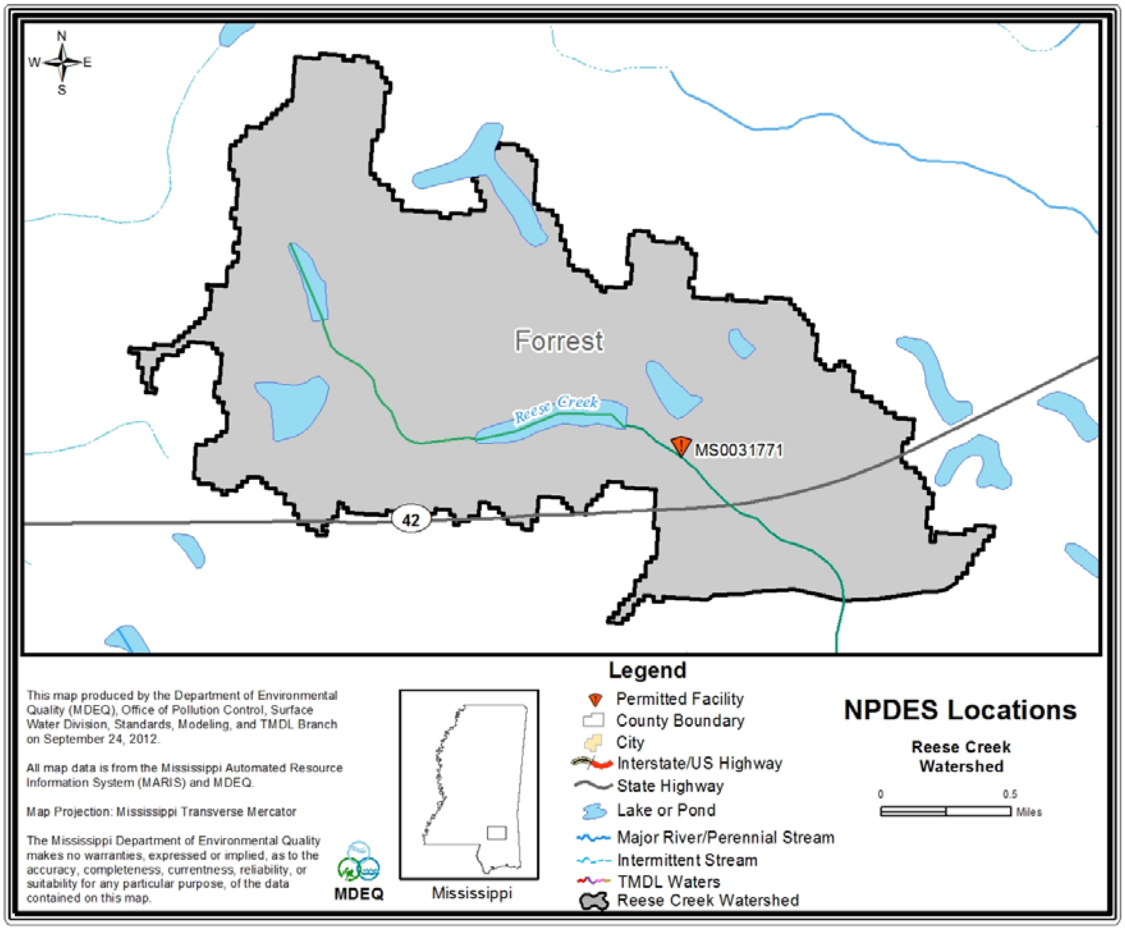


Figure 5. Reese Creek Watershed Point Sources

Reese Creek is also located within a Phase II MS4 county. MDEQ established a method to estimate the stormwater waste load allocation (WLAsw). The WLAsw = LA * % Urban Area in the MS4 in watershed (5.4%)*70%. The intent of the stormwater NPDES permit is not to treat the water after collection, but to reduce the exposure of stormwater runoff to pollutants by implementing various controls. Stormwater NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment. (GA, 2009) The TMDL WLA stormwater loads were calculated, using Equation 1. The MS4 located within the Reese Creek Watershed is MS4 Stormwater Management Program for Forrest County (MSRMS4016).

Waste Load Allocation stormwater (WLAsw) = LA * % Urban Area in MS4 within watershed * 70% (Eq.1)

Nonpoint source loadings from NPDES regulated construction activities and MS4s are considered point sources to surface waters. These discharges occur in response to storm events and are included in the WLAsw portion of this TMDL. As of March 2003, discharge of storm water from construction activities disturbing more than one acre must obtain an NPDES permit. The purpose of the NPDES permit is to eliminate or minimize the discharge of pollutants from construction activities. Since construction activities at a site are of a temporary, relatively short term nature, the number of construction sites covered by the general permit varies. The target for these areas is the same range as the TMDL target for the watershed. The WLAs provided to the NPDES regulated construction activities and MS4s will be implemented as best management practices (BMPs) as specified in Mississippi's General Storm Water Permits for Small Construction, Construction, and Phase I & II MS4 permits. Properly designed and well-maintained BMPs are expected to provide attainment of water quality standards.

2.3 Assessment of Nonpoint Sources

Nonpoint loading of organic material in a water body results from the transport of the pollutants into receiving waters by overland surface runoff, groundwater infiltration, and atmospheric deposition.

The Reese Creek watershed contains mainly forest but also has different landuse types, including urban, water, and wetlands. The land use information for the watershed is based on the National Land Cover Database (NLCD). The landuse distribution for the Reese Creek Watershed is shown in Table 7 and Figure 6.

Table 7. Landuse Distribution for the Reese Creek Watershed

Acres	Water	Urban	Forest	Scrub/ Barren	Pasture	Cropland	Wetland	Total
Reese (Acres)	163.0	227.3	1443.6	665.4	1031.5	514.8	140.8	4186.4
Percentage	3.9%	5.4%	34.5%	15.9%	24.6%	12.3%	3.4%	100%

An embayment on Reese Creek just upstream of the first monitoring station may be responsible for the lower DO values seen at the station. This is dependent on the discharge structure at the pond.

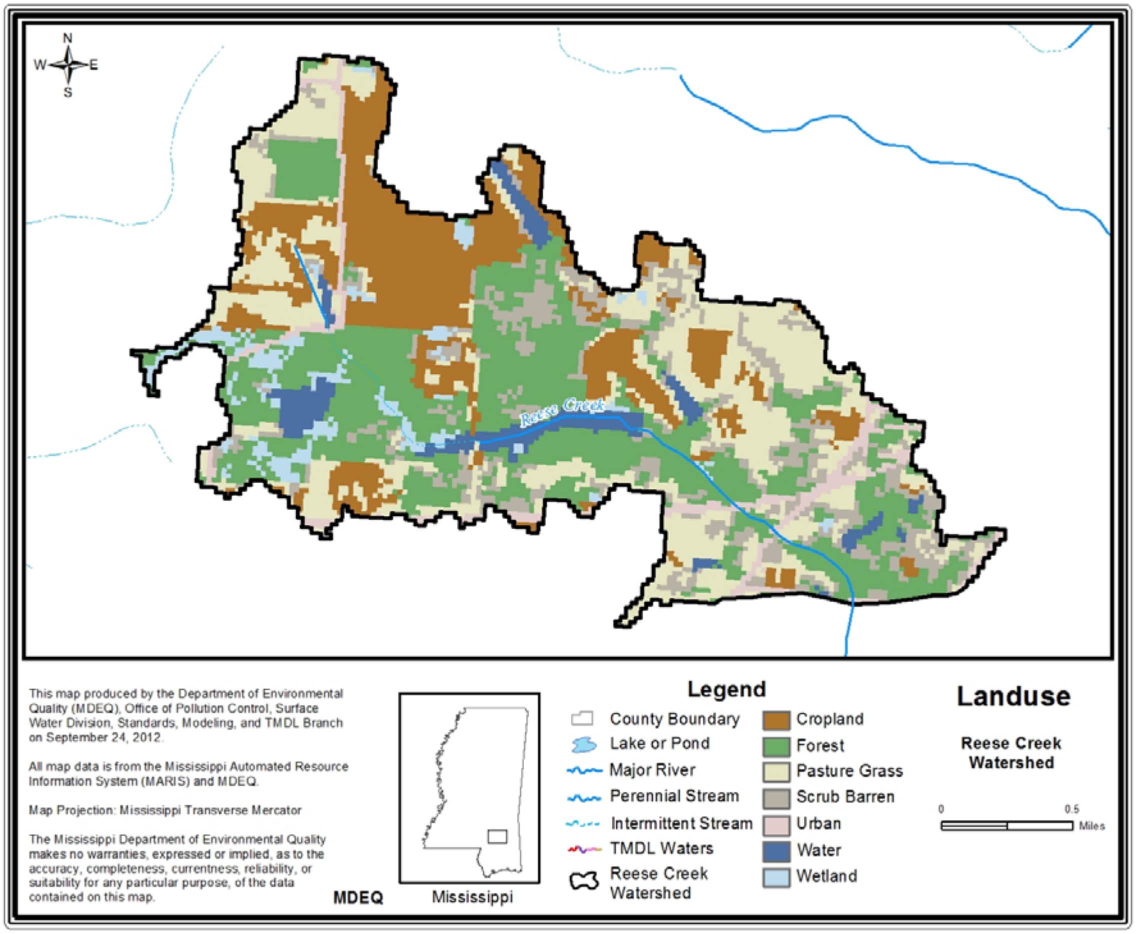


Figure 6. Landuse in Reese Creek Watershed

MODELING PROCEDURE: LINKING THE SOURCES TO THE ENDPOINT

Establishing the relationship between the instream water quality target and the source loading is a critical component of TMDL development. It allows for the evaluation of management options that will achieve the desired source load reductions. The link can be established through a range of techniques, from qualitative assumptions based on sound scientific principles to sophisticated modeling techniques. Ideally, the linkage will be supported by monitoring data that allow the TMDL developer to associate certain water body responses to flow and loading conditions. In this section, the selection of the modeling tools, setup, and model application are discussed.

3.1 Modeling Framework Selection

MDEQ's mathematical model, STeady Riverine Environmental Assessment Model (STREAM), for DO distribution in freshwater streams was used for developing the TMDL. The use of STREAM is promulgated in the *Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, Underground Injection Control (UIC) Permits, State Permits, Water Quality Based Effluent Limitations and Water Quality Certification* (MDEQ, 2010)(WPC-2). This model has been approved by EPA and has been used extensively at MDEQ. A key reason for using the STREAM model in TMDL development is its ability to assess instream water quality conditions in response to point and nonpoint source loadings.

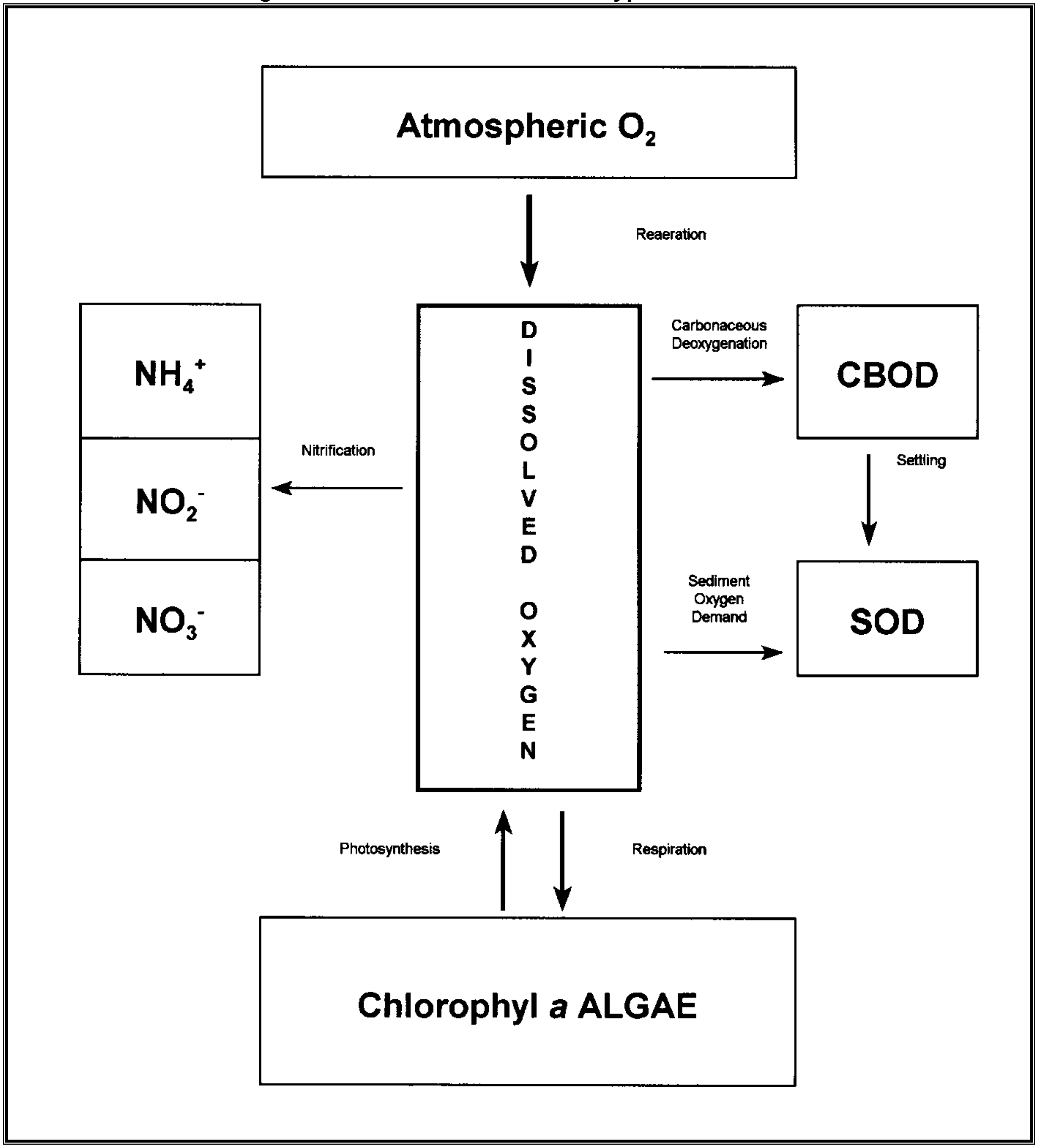
STREAM is a steady-state, daily average computer model that utilizes a modified Streeter-Phelps DO sag equation. Instream processes simulated by the model include CBODu decay, nitrification, reaeration, sediment oxygen demand, and respiration and photosynthesis of algae. Figure 6 shows how these processes are related in a typical DO model. Reaction rates for the instream processes are input by the user and corrected for temperature by the model. The model output includes water quality conditions in each computational element for DO, CBODu, and NH_3-N concentrations. The hydrological processes simulated by the model include stream velocity and flow from point sources and spatially distributed inputs.

The model calculates reaeration within each reach using the Tsivoglou formulation. The Tsivoglou formulation calculates the reaeration rate, K_a (day^{-1} base *e*), within each reach according to Equation 3.

$$K_a = C*S*U \qquad \textbf{(Eq. 3)}$$

C is the escape coefficient, U is the reach velocity in mile/day, and S is the average reach slope in ft/mile. The value of the escape coefficient is assumed to be 0.11 for streams with flows less than 10 cfs and 0.0597 for stream flows equal to or greater than 10 cfs. Reach velocities were calculated using an equation based on slope. The slope of each reach was estimated with the NHD Plus GIS coverage and input into the model in units of feet/mile.

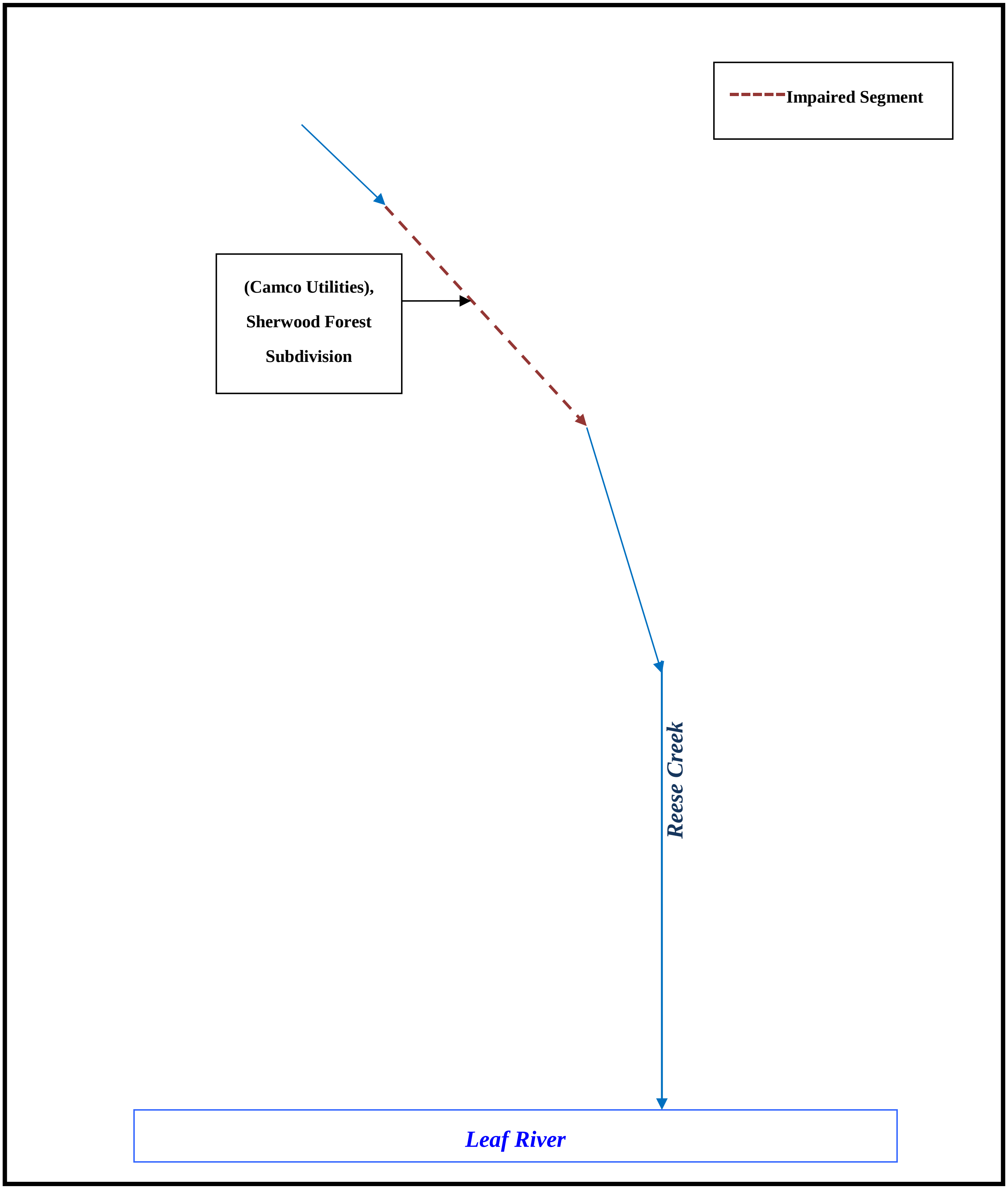
Figure 7. Instream Processes in a Typical DO Model



3.2 Model Setup

The model for this TMDL includes the §303(d) listed segment, Reese Creek. A diagram showing the model setup is shown in Figure 8.

Figure 8. Reese Creek Watershed Model Setup (Note: Not to Scale)



The water body was divided into reaches for modeling purposes. Reach divisions were made at locations where there is a significant change in hydrological and water quality characteristics, such as the confluence of a point source or tributary. Within each reach, the modeled segments were divided into computational elements of 0.1 mile. The simulated hydrological and water quality characteristics were calculated and output by the model for each computational element.

The STREAM model simulates the critical flow and temperature conditions, which were determined to be the critical condition for this TMDL. MDEQ Regulations state that when the flow in a water body is less than 50 cfs, the temperature used in the model is 26°C. The headwater instream DO was assumed to be 85% of saturation at the stream temperature. The instream CBODu decay rate at K_d at 20°C was input as 0.3 day^{-1} (base e) as specified in MDEQ regulations. The model adjusts the K_d rate based on temperature, according to Equation 4.

$$K_{d(T)} = K_{d(20^\circ C)}(1.047)^{T-20} \qquad \textbf{(Eq. 4)}$$

Where K_d is the CBODu decay rate and T is the assumed instream temperature. The assumptions regarding the instream temperatures, background DO saturation, and CBODu decay rate are required by the *Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, Underground Injection Control (UIC) Permits, State Permits, Water Quality Based Effluent Limitations and Water Quality Certification* (MDEQ, 2010). Also based on MDEQ Regulations, the rates for photosynthesis, respiration, and sediment oxygen demand were set to zero because data for these model parameters are not available.

There are no USGS gages located on Reese Creek. The flow for the watershed was calculated using a unit coefficient from the USGS Water-Resources Investigation Report 90-4130 Low-Flow and Flow Duration Characteristics of Mississippi Streams (Telis, 1991). The 7Q10 flow is estimated at 0.19 cfs.

3.3 Source Representation

Both point and nonpoint sources were represented in the model. The loads from the NPDES permitted point source were added as a direct input into the appropriate reach as flows in MGD and concentrations of $CBOD_u$ and ammonia nitrogen in mg/l. Spatially distributed loads, which represent nonpoint sources of flow, $CBOD_5$, and ammonia-nitrogen were distributed evenly into each computational element of the modeled water body.

Organic material discharged to a stream from an NPDES permitted point source is typically quantified as 5-day biochemical oxygen demand (BOD_5). BOD_5 is a measure of the oxidation of carbonaceous and nitrogenous material over a 5-day incubation period. However, oxidation of nitrogenous material, called nitrification, usually does not take place within the 5-day period because the bacteria that are responsible for nitrification are normally not present in large numbers and have slow reproduction rates (Metcalf and Eddy, 1991). Thus, BOD_5 is generally considered equal to $CBOD_5$. Because permits for point source facilities are written in terms of $CBOD_5$ while TMDLs are typically developed using CBODu, a ratio between the two terms is needed, Equation 5.

$$\mathbf{CBODu = CBOD_5 * Ratio} \qquad \textbf{(Eq.5)}$$

The CBODu to $CBOD_5$ ratios are given in *Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, Underground Injection Control (UIC) Permits, State Permits, Water Quality Based Effluent Limitations and Water Quality Certification* (MDEQ, 2010). These values are recommended for use by MDEQ regulations when actual field data are not available. The value of the ratio depends on the wastewater treatment type.

In order to convert the ammonia nitrogen (NH_3-N) loads to an oxygen demand, a factor of 4.57 pounds of oxygen per pound of ammonia nitrogen (NH_3-N) oxidized to nitrate nitrogen (NO_3-N) was used. Using this factor is a conservative modeling assumption because it assumes that all of the ammonia is converted to nitrate through nitrification. The oxygen demand caused by nitrification of ammonia is equal to the NBODu load. The sum of CBODu and NBODu is equal to the point source load of TBODu. The permitted loads of TBODu from the existing point source used in the STREAM model are given in Table 8.

Table 8. Point Sources, Maximum Permitted Model Inputs

Permit	Facility	F-Ratio	Flow (mgd)	CBOD5 (mg/L)	CBODu (lbs/day)	NH3-N (mg/L)	NBODu (lbs/day)	TBODu (lbs/day)
MS0031771	Sherwood Forest Subdivision	1.5	0.2	30	75.06	5*	38.11	113.17
			Total		**75.06**		**38.11**	**113.17**

*Estimate

Direct measurements of background concentrations of CBODu were not available for the Reese Creek Watershed. Because there were no background data available, the background concentrations of CBODu and NH_3-N were estimated based on *Wastewater Regulations for National Pollutant Discharge Elimination System (NPDES) Permits, Underground Injection Control (UIC) Permits, State Permits, Water Quality Based Effluent Limitations and Water Quality Certification* (MDEQ, 2010). According to these regulations, the background concentration used in modeling for $CBOD_5$ is 1.33 mg/l and for NH_3-N is 0.1 mg/l. These concentrations are used as estimates for the $CBOD_5$ and NH_3-N levels of water entering the water bodies through nonpoint source flow and tributaries. It is noted that because there were DO violations indicated upstream of the discharge point, higher values of $CBOD_5$ and NH_3-N for the nonpoint source concentrations were used to reflect the measured instream average DO value. Nonpoint source flows were included in the model to account for water entering due to groundwater infiltration, overland flow, and small, unmeasured tributaries. The nonpoint source loads were assumed to be distributed evenly on a river mile basis throughout the modeled reaches. The loads input into the model are shown in Table 9.

Table 9. Load Allocation for TBODu

River mile	Flow (mgd)	$CBOD_5$ (mg/l)	F-Ratio	CBODu (lbs/day)	NH_3-N (mg/l)	NBODu (lbs/day)	TBODu (lbs/day)
11.8	0.09	50	1.5	56.61	3	10.35	66.96
11.1	0.01	50	1.5	5.66	3	1.03	6.69
11.0	0.03	1.33	1.5	0.54	0.1	0.12	0.66
10.6	0.01	1.33	1.5	0.22	0.1	0.05	0.27
				63.03		**11.55**	**74.58**

3.4 Model Calibration

The model used to develop the Reese Creek Watershed TMDL was not calibrated. However, the measured background DO levels were used to adjust the model inputs due to the impairment upstream of the discharge point.

3.5 Model Results

Once the model setup was complete, the model was used to predict water quality conditions in the listed segment in the Reese Creek Watershed. The model was first run under regulatory load conditions. Under regulatory load conditions, the load from the NPDES permitted point source was based on its current location and loads shown above in Tables 8 and 9.

3.5.1 Regulatory Load Scenario

As shown in the figure, the model predicts that the DO does go below the standard of 5.0 mg/l using the permit based allowable loads, thus reductions are needed to meet the water quality. It is noted that the water body was modeled to the mouth at the Leaf River to determine the DO sag. The regulatory load scenario model results are shown in Figure 9.

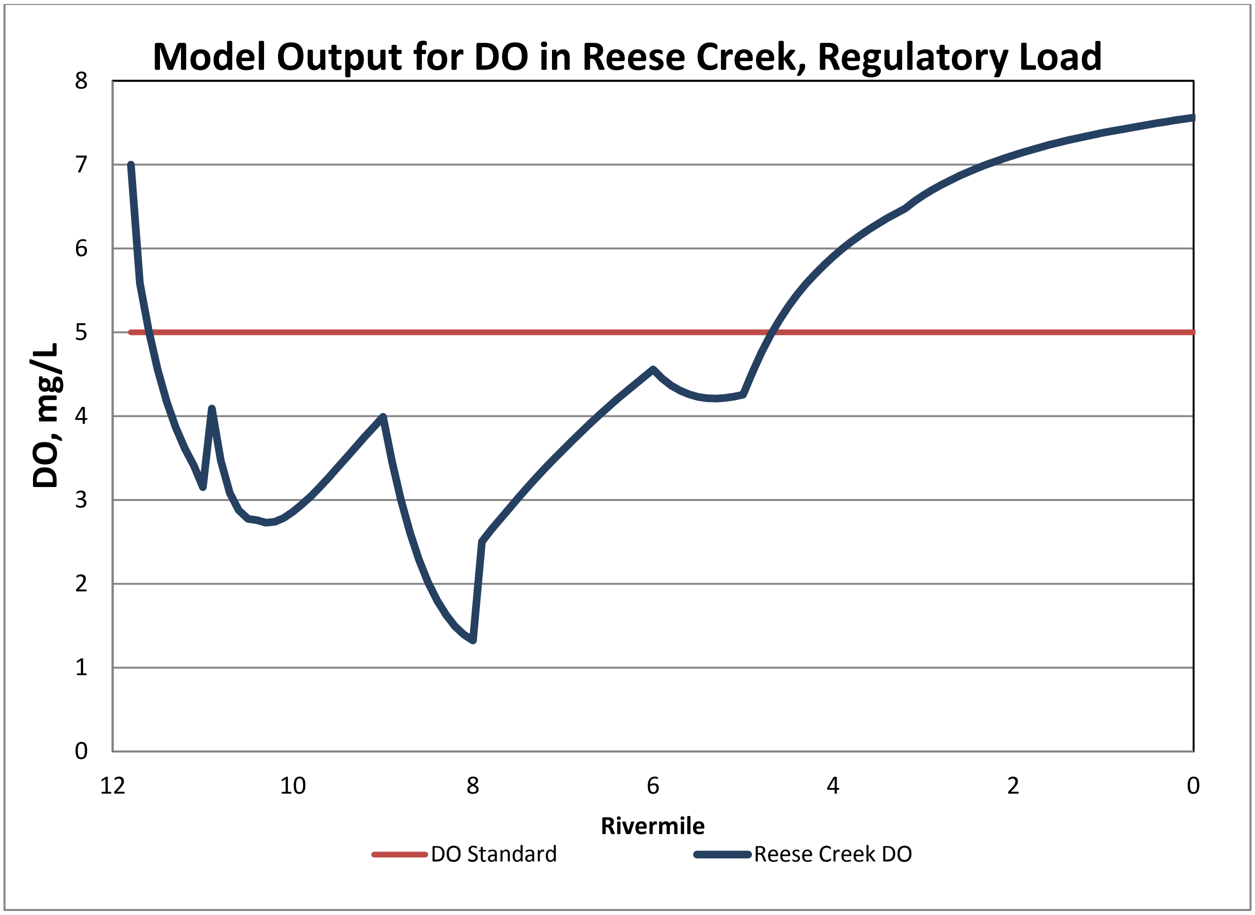


Figure 9. Model Output for DO in Reese Creek, Regulatory Load Scenario

3.5.2 Maximum Load Scenario

The graph of the regulatory load scenario output shows that the predicted DO does fall below the DO standard of 5.0 mg/l in Reese Creek during critical conditions. Thus, reductions of the loads of TBODu are necessary. Calculating the maximum allowable loads of TBODu involved decreasing the model input loads in the model until the modeled DO was above 5.0 mg/l. The decreased loads were then used to develop the allowable maximum daily load for this report. The maximum load scenario model results are shown in Figure 10.

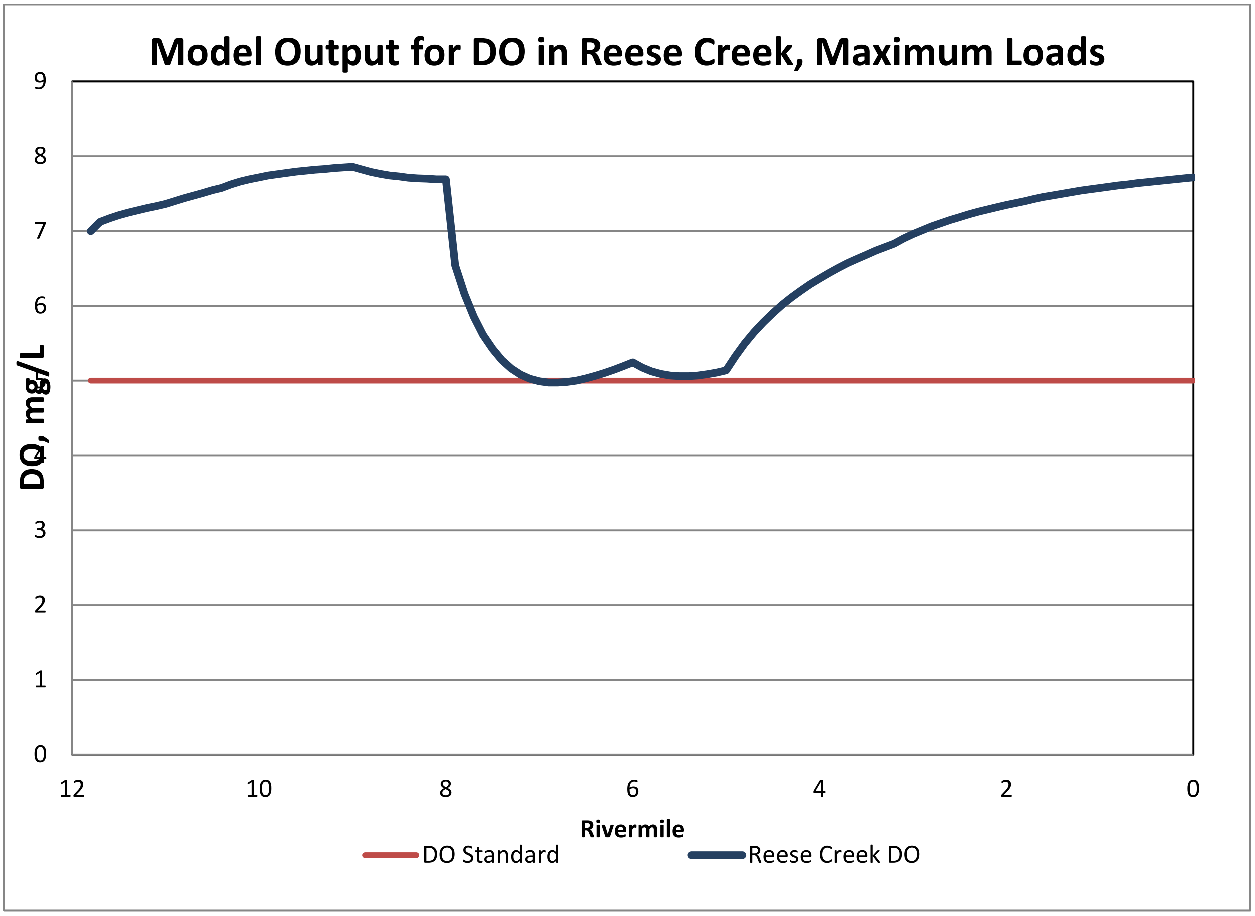


Figure 10. Model Output for DO in Reese Creek, Maximum Load Scenario

ALLOCATION

The allocation for this TMDL involves a wasteload allocation for point sources and a load allocation for nonpoint sources necessary for attainment of water quality standards in the Reese Creek Watershed.

4.1 Wasteload Allocation

There is one point source that was included in the model for the Reese Creek Watershed. This point source is now connected to the City of Petal and no longer discharges to Reese Creek. In calculating the TMDL for the creek, the discharge was removed from the model to calculate the final TMDL.

4.2 Wasteload Allocation Stormwater

There is a phase II MS4 in this TMDL watershed. Stormwater NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment. The WLAsw is estimated to be 0.22 lbs/day shown in Table 11. See Section 2.2 on page 13 for this equation.

4.3 Load Allocation

The load allocation for the TBODu TMDL is shown in Table 10. Because the water body indicates DO violations above the point of discharge from the treatment plant, it is believed that the nonpoint source loadings need to be reduced in that section of the creek. To simulate the impaired conditions above the discharge, the model loads based on regulations were altered to have more load. This increase leads to a larger estimated reduction in the load allocation. An 89.5% reduction is needed to restore water quality.

Table 10. Load Allocation for TBODu

Water Body	CBODu (lbs/day)	NBODu (lbs/day)	TBODu (lbs/day)	% Reduction
Reese Creek	3.87	3.97	7.84	89.5%

Table 11. WLAsw for Reese Creek

Water Body	CBODu (lbs/day)	NBODu (lbs/day)	TBODu (lbs/day)
Reese Creek	0.11	0.11	0.22

4.4 Incorporation of a Margin of Safety

The margin of safety is a required component of a TMDL and accounts for the uncertainty about the relationship between pollutant loads and the quality of the receiving water body. The two types of MOS development are to implicitly incorporate the MOS using conservative model assumptions or to explicitly specify a portion of the total TMDL as the MOS. The MOS selected for this TMDL is implicit.

4.5 Calculation of the TMDL

The STREAM model was used to calculate the TBODu for the TMDL. The TMDL is calculated based on the following equation.

$$TMDL = WLA + WLAsw + LA + MOS \quad \textbf{(Eq. 6)}$$

where WLA is the Wasteload Allocation, WLAsw is Wasteload Allocation from stormwater activities, LA is the Load Allocation, and MOS is the Margin of Safety. The allocations for TBODu are given in Table 12. These allocations are established to attain the applicable water quality standards.

Table 12. TMDL for TBODu Reese Creek Watershed

	WLA (lbs/day)	WLAsw (lbs/day)	LA (lbs/day)	MOS (lbs/day)	TMDL (lbs/day)
CBODu	0	0.11	3.87	Implicit	3.98
NBODu	0	0.11	3.97	Implicit	4.08
TBODu	**0**	**0.22**	**7.84**		**8.06**

4.6 Seasonality and Critical Condition

This TMDL accounts for seasonal variability by requiring allocations that ensure year-round protection of water quality standards, including during critical conditions.

CONCLUSION

The monitoring data indicate that Reese Creek was not meeting water quality standards for dissolved oxygen at the 2004 loading of TBODu. A reduction from point and nonpoint sources will be necessary to meet water quality standards.

The only point source in the watershed, Sherwood Forest Subdivision, is now connected to the City of Petal and no longer discharges to the creek. However, due to DO violations above the discharge, it is believed that the nonpoint source loads near the headwaters should also be reduced. An estimated 89% reduction in nonpoint source loads is necessary to restore water quality to Reese Creek. The implementation of BMP activities is recommended and should restore water quality.

5.1 Next Steps

MDEQ's Basin Management Approach and Nonpoint Source Program emphasize restoration of impaired waters with developed TMDLs. During the watershed prioritization process to be conducted by the Pascagoula River Basin Team, this TMDL will be considered as a basis for implementing possible restoration projects. The basin team is made up of state and federal resource agencies and stakeholder organizations and provides the opportunity for these entities to work with local stakeholders to achieve quantifiable improvements in water quality. Together, basin team members work to understand water quality conditions, determine causes and sources of problems, prioritize watersheds for potential water quality restoration and protection activities, and identify collaboration and leveraging opportunities. The Basin Management Approach and the Nonpoint Source Program work together to facilitate and support these activities.

The Nonpoint Source Program provides financial incentives to eligible parties to implement appropriate restoration and protection projects through the Clean Water Act's Section 319 Nonpoint Source (NPS) Grant Program. This program makes available around $1.6M each grant year for restoration and protections efforts by providing a 60% cost share for eligible projects.

Mississippi Soil and Water Conservation Commission (MSWCC) is the lead agency responsible for abatement of agricultural NPS pollution through training, promotion, and installation of BMPs on agricultural lands. USDA Natural Resource Conservation Service (NRCS) provides technical assistance to MSWCC through its conservation districts located in each county. NRCS assists animal producers in developing nutrient management plans and grazing management plans. MDEQ, MSWCC, NRCS, and other governmental and nongovernmental organizations work closely together to reduce agricultural runoff through the Section 319 NPS Program.

Mississippi Forestry Commission (MFC), in cooperation with the Mississippi Forestry Association (MFA) and Mississippi State University (MSU), have taken a leadership role in the development and promotion of the forestry industry Best Management Practices (BMPs) in Mississippi. MDEQ is designated as the lead agency for implementing an urban polluted runoff control program through its Stormwater Program. Through this program, MDEQ regulates most construction activities. Mississippi Department of Transportation (MDOT) is responsible for implementation of erosion and sediment control practices on highway construction.

5.2 Public Participation

This TMDL will be published for a 30-day public notice. During this time, the public will be notified by publication in the statewide newspaper. The public will be given an opportunity to review the TMDLs and submit comments. MDEQ also distributes all TMDLs at the beginning of the public notice to those members of the public who have requested to be included on a TMDL mailing list. Anyone wishing to become a member of the TMDL mailing list should contact Greg Jackson at Greg_Jackson@deq.state.ms.us.

All comments should be directed to Greg_Jackson@deq.state.ms.us or Greg Jackson, MDEQ, PO Box 2261, Jackson, MS 39225. All comments received during the public notice period and at any public hearings become a part of the record of this TMDL and will be considered in the submission of this TMDL to EPA Region 4 for final approval.

REFERENCES

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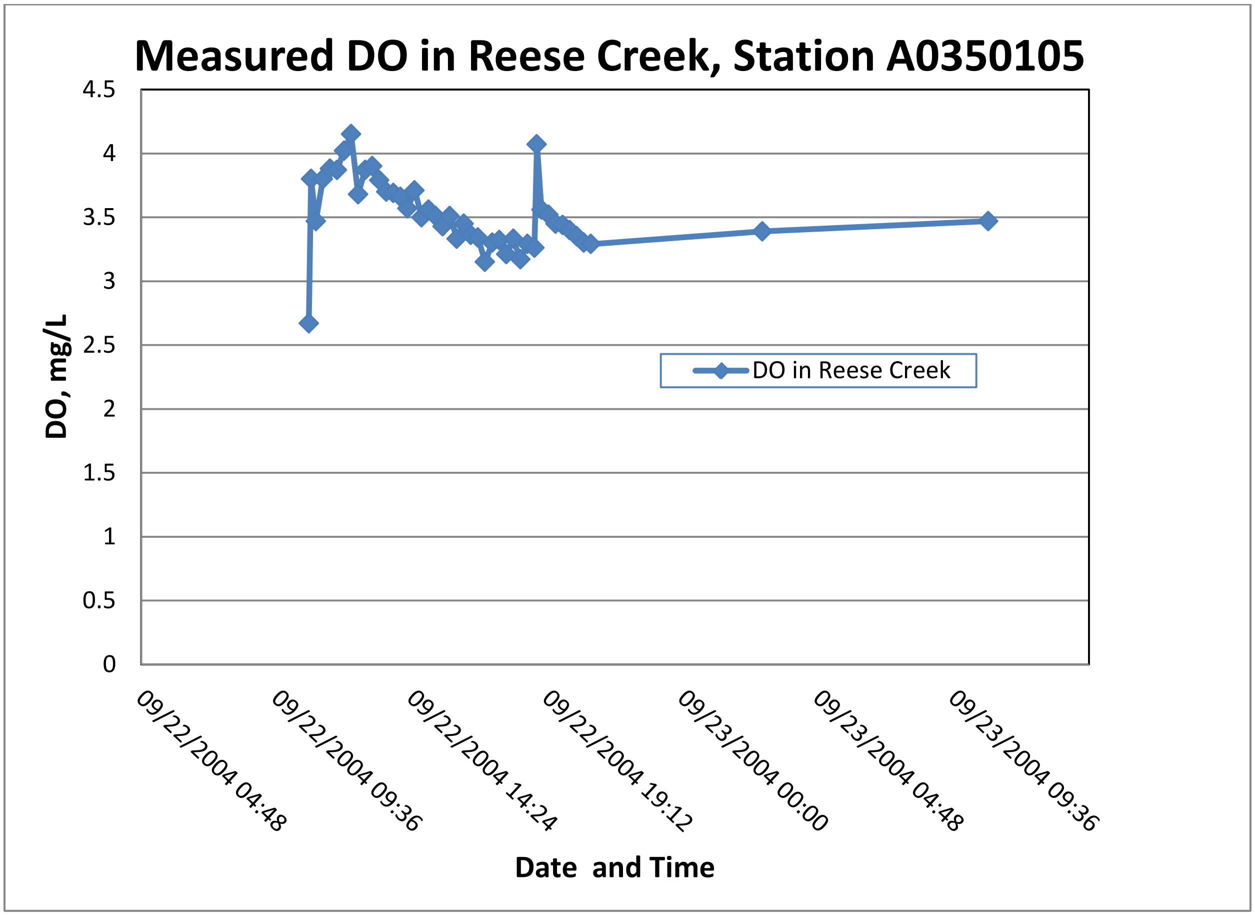
Appendix A – Reese Creek DO Data, mg/L 9/22/2004-9/23/2004

Station ID	Date and Time	Dissolved Oxygen Mg/L
A0350105	09/22/2004 10:45	2.67
A0350105	09/22/2004 10:50	3.8
A0350105	09/22/2004 11:00	3.47
A0350105	09/22/2004 11:15	3.8
A0350105	09/22/2004 11:30	3.88
A0350105	09/22/2004 11:45	3.87
A0350105	09/22/2004 12:00	4.02
A0350105	09/22/2004 12:15	4.15
A0350105	09/22/2004 12:30	3.68
A0350105	09/22/2004 12:45	3.87
A0350105	09/22/2004 13:00	3.9
A0350105	09/22/2004 13:15	3.79
A0350105	09/22/2004 13:30	3.7
A0350105	09/22/2004 13:45	3.69
A0350105	09/22/2004 14:00	3.66
A0350105	09/22/2004 14:15	3.57
A0350105	09/22/2004 14:30	3.71
A0350105	09/22/2004 14:45	3.5
A0350105	09/22/2004 15:00	3.56
A0350105	09/22/2004 15:15	3.51
A0350105	09/22/2004 15:30	3.43
A0350105	09/22/2004 15:45	3.51
A0350105	09/22/2004 16:00	3.33
A0350105	09/22/2004 16:15	3.45
A0350105	09/22/2004 16:30	3.36
A0350105	09/22/2004 16:45	3.34
A0350105	09/22/2004 17:00	3.15
A0350105	09/22/2004 17:15	3.3
A0350105	09/22/2004 17:30	3.32
A0350105	09/22/2004 17:45	3.21
A0350105	09/22/2004 18:00	3.33
A0350105	09/22/2004 18:15	3.17
A0350105	09/22/2004 18:30	3.29
A0350105	09/22/2004 18:45	3.26
A0350105	09/22/2004 18:50	4.07
A0350105	09/22/2004 19:00	3.56

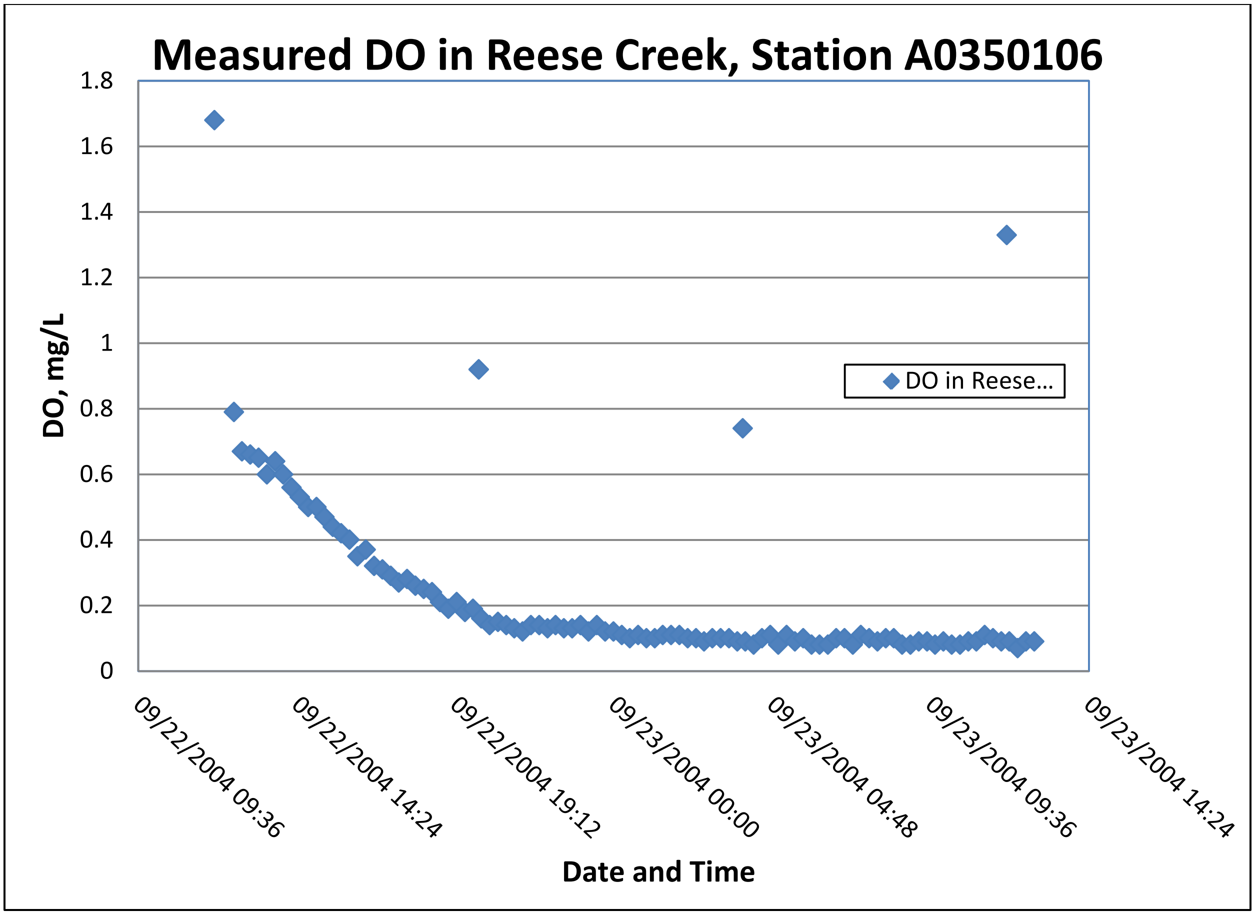
Station ID	Date and Time	Dissolved Oxygen Mg/L
A0350105	09/22/2004 19:15	3.52
A0350105	09/22/2004 19:30	3.45
A0350105	09/22/2004 19:45	3.44
A0350105	09/22/2004 20:00	3.4
A0350105	09/22/2004 20:15	3.35
A0350105	09/22/2004 20:30	3.3
A0350105	09/22/2004 20:45	3.29
A0350105	09/23/2004 02:50	3.39
A0350105	09/23/2004 10:50	3.47



Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350106	09/22/2004 11:55	1.68
A0350106	09/22/2004 12:30	0.79
A0350106	09/22/2004 12:45	0.67
A0350106	09/22/2004 13:00	0.66
A0350106	09/22/2004 13:15	0.65
A0350106	09/22/2004 13:30	0.6
A0350106	09/22/2004 13:45	0.64
A0350106	09/22/2004 14:00	0.6
A0350106	09/22/2004 14:15	0.56
A0350106	09/22/2004 14:30	0.53
A0350106	09/22/2004 14:45	0.5
A0350106	09/22/2004 15:00	0.5
A0350106	09/22/2004 15:15	0.47
A0350106	09/22/2004 15:30	0.44
A0350106	09/22/2004 15:45	0.42
A0350106	09/22/2004 16:00	0.4
A0350106	09/22/2004 16:15	0.35
A0350106	09/22/2004 16:30	0.37
A0350106	09/22/2004 16:45	0.32
A0350106	09/22/2004 17:00	0.31
A0350106	09/22/2004 17:15	0.29
A0350106	09/22/2004 17:30	0.27
A0350106	09/22/2004 17:45	0.28
A0350106	09/22/2004 18:00	0.26
A0350106	09/22/2004 18:15	0.25
A0350106	09/22/2004 18:30	0.24
A0350106	09/22/2004 18:45	0.21
A0350106	09/22/2004 19:00	0.19
A0350106	09/22/2004 19:15	0.21
A0350106	09/22/2004 19:30	0.18
A0350106	09/22/2004 19:45	0.19
A0350106	09/22/2004 19:55	0.92
A0350106	09/22/2004 19:55	0.92
A0350106	09/22/2004 20:00	0.16
A0350106	09/22/2004 20:15	0.14
A0350106	09/22/2004 20:30	0.15
A0350106	09/22/2004 20:45	0.14
A0350106	09/22/2004 21:00	0.13
A0350106	09/22/2004 21:15	0.12
A0350106	09/22/2004 21:30	0.14
A0350106	09/22/2004 21:45	0.14

Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350106	09/22/2004 22:00	0.13
A0350106	09/22/2004 22:15	0.14
A0350106	09/22/2004 22:30	0.13
A0350106	09/22/2004 22:45	0.13
A0350106	09/22/2004 23:00	0.14
A0350106	09/22/2004 23:15	0.12
A0350106	09/22/2004 23:30	0.14
A0350106	09/22/2004 23:45	0.12
A0350106	09/23/2004 00:00	0.12
A0350106	09/23/2004 00:15	0.11
A0350106	09/23/2004 00:30	0.1
A0350106	09/23/2004 00:45	0.11
A0350106	09/23/2004 01:00	0.1
A0350106	09/23/2004 01:15	0.1
A0350106	09/23/2004 01:30	0.11
A0350106	09/23/2004 01:45	0.11
A0350106	09/23/2004 02:00	0.11
A0350106	09/23/2004 02:15	0.1
A0350106	09/23/2004 02:30	0.1
A0350106	09/23/2004 02:45	0.09
A0350106	09/23/2004 03:00	0.1
A0350106	09/23/2004 03:15	0.1
A0350106	09/23/2004 03:30	0.1
A0350106	09/23/2004 03:45	0.09
A0350106	09/23/2004 03:55	0.74
A0350106	09/23/2004 04:00	0.09
A0350106	09/23/2004 04:15	0.08
A0350106	09/23/2004 04:30	0.1
A0350106	09/23/2004 04:45	0.11
A0350106	09/23/2004 05:00	0.08
A0350106	09/23/2004 05:15	0.11
A0350106	09/23/2004 05:30	0.09
A0350106	09/23/2004 05:45	0.1
A0350106	09/23/2004 06:00	0.08
A0350106	09/23/2004 06:15	0.08
A0350106	09/23/2004 06:30	0.08
A0350106	09/23/2004 06:45	0.1
A0350106	09/23/2004 07:00	0.1
A0350106	09/23/2004 07:15	0.08
A0350106	09/23/2004 07:30	0.11
A0350106	09/23/2004 07:45	0.1

Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350106	09/23/2004 08:00	0.09
A0350106	09/23/2004 08:15	0.1
A0350106	09/23/2004 08:30	0.1
A0350106	09/23/2004 08:45	0.08
A0350106	09/23/2004 09:00	0.08
A0350106	09/23/2004 09:15	0.09
A0350106	09/23/2004 09:30	0.09
A0350106	09/23/2004 09:45	0.08
A0350106	09/23/2004 10:00	0.09
A0350106	09/23/2004 10:15	0.08
A0350106	09/23/2004 10:30	0.08
A0350106	09/23/2004 10:45	0.09
A0350106	09/23/2004 11:00	0.09
A0350106	09/23/2004 11:15	0.11
A0350106	09/23/2004 11:30	0.1
A0350106	09/23/2004 11:45	0.09
A0350106	09/23/2004 11:55	1.33
A0350106	09/23/2004 12:00	0.09
A0350106	09/23/2004 12:15	0.07
A0350106	09/23/2004 12:30	0.09
A0350106	09/23/2004 12:45	0.09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1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
DO, mg/L
DO in Reese...
09/22/2004 09:36
09/22/2004 14:24
09/22/2004 19:12
09/23/2004 00:00
09/23/2004 04:48
09/23/2004 09:36
09/23/2004 14:24
Date and Time

Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350107	09/22/2004 12:45	2.78
A0350107	09/22/2004 13:00	2.97
A0350107	09/22/2004 13:15	2.72
A0350107	09/22/2004 13:30	2.66
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A0350107	09/22/2004 14:15	2.61
A0350107	09/22/2004 14:30	2.61
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A0350107	09/22/2004 15:00	2.58
A0350107	09/22/2004 15:15	2.56
A0350107	09/22/2004 15:30	2.55
A0350107	09/22/2004 15:45	2.55
A0350107	09/22/2004 16:00	2.53
A0350107	09/22/2004 16:15	2.48
A0350107	09/22/2004 16:30	2.48
A0350107	09/22/2004 16:45	2.47
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A0350107	09/22/2004 17:30	2.45
A0350107	09/22/2004 17:45	2.44
A0350107	09/22/2004 18:00	2.42
A0350107	09/22/2004 18:15	2.38
A0350107	09/22/2004 18:30	2.13
A0350107	09/22/2004 18:45	2.09
A0350107	09/22/2004 19:00	2.17
A0350107	09/22/2004 19:15	2.25
A0350107	09/22/2004 19:30	2.28
A0350107	09/22/2004 19:45	2.3
A0350107	09/22/2004 20:00	2.31
A0350107	09/22/2004 20:15	2.3
A0350107	09/22/2004 20:30	2.31
A0350107	09/22/2004 20:45	2.31
A0350107	09/22/2004 20:45	2.15
A0350107	09/22/2004 21:00	2.3
A0350107	09/22/2004 21:15	2.3
A0350107	09/22/2004 21:30	2.3
A0350107	09/22/2004 21:45	2.29
A0350107	09/22/2004 22:00	2.28
A0350107	09/22/2004 22:15	2.3
A0350107	09/22/2004 22:30	2.28

Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350107	09/22/2004 22:45	2.27
A0350107	09/22/2004 23:00	2.27
A0350107	09/22/2004 23:15	2.27
A0350107	09/22/2004 23:30	2.27
A0350107	09/22/2004 23:45	2.27
A0350107	09/23/2004 00:00	2.27
A0350107	09/23/2004 00:15	2.26
A0350107	09/23/2004 00:30	2.26
A0350107	09/23/2004 00:45	2.27
A0350107	09/23/2004 01:00	2.25
A0350107	09/23/2004 01:15	2.26
A0350107	09/23/2004 01:30	2.24
A0350107	09/23/2004 01:45	2.25
A0350107	09/23/2004 02:00	2.24
A0350107	09/23/2004 02:15	2.23
A0350107	09/23/2004 02:30	2.23
A0350107	09/23/2004 02:45	2.23
A0350107	09/23/2004 03:00	2.24
A0350107	09/23/2004 03:15	2.23
A0350107	09/23/2004 03:30	2.23
A0350107	09/23/2004 03:45	2.23
A0350107	09/23/2004 04:00	2.23
A0350107	09/23/2004 04:15	2.24
A0350107	09/23/2004 04:30	2.24
A0350107	09/23/2004 04:45	2.23
A0350107	09/23/2004 04:45	2.17
A0350107	09/23/2004 05:00	2.23
A0350107	09/23/2004 05:15	2.22
A0350107	09/23/2004 05:30	2.22
A0350107	09/23/2004 05:45	2.22
A0350107	09/23/2004 06:00	2.21
A0350107	09/23/2004 06:15	2.2
A0350107	09/23/2004 06:30	2.18
A0350107	09/23/2004 06:45	2.17
A0350107	09/23/2004 07:00	2.16
A0350107	09/23/2004 07:15	2.15
A0350107	09/23/2004 07:30	2.16
A0350107	09/23/2004 07:45	2.15
A0350107	09/23/2004 08:00	2.15
A0350107	09/23/2004 08:15	2.14
A0350107	09/23/2004 08:30	2.15

Station ID	Date and Time	Dissolved Oxygen, Mg/L
A0350107	09/23/2004 08:45	2.14
A0350107	09/23/2004 09:00	2.15
A0350107	09/23/2004 09:15	2.14
A0350107	09/23/2004 09:30	2.14
A0350107	09/23/2004 09:45	2.13
A0350107	09/23/2004 10:00	2.13
A0350107	09/23/2004 10:15	2.14
A0350107	09/23/2004 10:30	2.14
A0350107	09/23/2004 10:45	2.13
A0350107	09/23/2004 11:00	2.15
A0350107	09/23/2004 11:15	2.15
A0350107	09/23/2004 11:30	2.15
A0350107	09/23/2004 11:45	2.16
A0350107	09/23/2004 12:00	2.15
A0350107	09/23/2004 12:15	2.16
A0350107	09/23/2004 12:30	2.15
A0350107	09/23/2004 12:45	2.13
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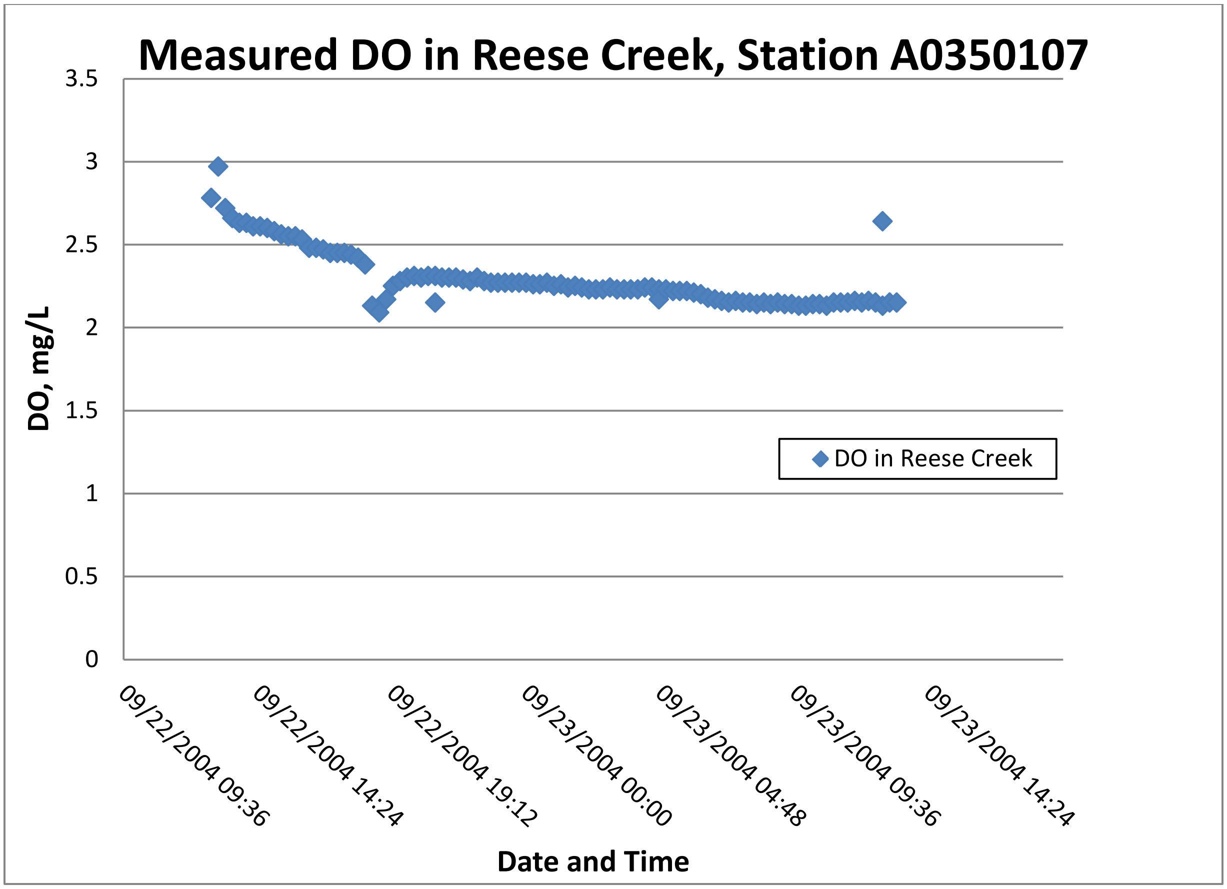
Measured DO in Reese Creek, Station A0350107
DO, mg/L
3.5
3
2.5
2
1.5
1
0.5
0
DO in Reese Creek
09/22/2004 09:36
09/22/2004 14:24
09/22/2004 19:12
09/23/2004 00:00
09/23/2004 04:48
09/23/2004 09:36
09/23/2004 14:24
Date and Time