FINAL REPORT
June 2009
509062205

Nutrient Total Maximum Daily Load

For

Pelahatchie Creek

Pearl River Basin

Scott and Rankin Counties, Mississippi

Prepared By

Mississippi Department of Environmental Quality
Office of Pollution Control
Standards, Modeling, and TMDL Branch

MDEQ
PO Box 2261
Jackson, MS 39225
(601) 961-5171
www.deq.state.ms.us

Mississippi Department of Environmental Quality

FOREWORD

This report has been prepared in accordance with the schedule contained within the federal consent decree dated December 22, 1998. The report contains one or more Total Maximum Daily Loads (TMDLs) for water body segments found on Mississippi's 1996 Section 303(d) List of Impaired Water bodies. Because of the accelerated schedule required by the consent decree, many of these TMDLs have been prepared out of sequence with the State's rotating basin approach. The implementation of the TMDLs contained herein will be prioritized within Mississippi's rotating basin approach.

The amount and quality of the data on which this report is based are limited. As additional information becomes available, the TMDLs may be updated. Such additional information may include water quality and quantity data, changes in pollutant loadings, 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	µ	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

TABLE OF CONTENTS

FIGURES

TABLES

TMDL INFORMATION PAGE

Table 1. Listing Information

Name	ID	County	HUC	Evaluated Cause
Pelahatchie Creek	MS153PE	Scott and Rankin	03180002	Nutrients
Near Fannin from headwaters at Martin Creek to the Ross Barnett Reservoir Flood Pool				

Table 2. Water Quality Standards

Parameter	Beneficial use	Water Quality Criteria
Nutrients	Aquatic Life Support	Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions, in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated uses.

Table 3. Total Maximum Daily Load for Pelahatchie Creek

	WLA lbs/day	WLA sw lbs/day	LA lbs/day	MOS	TMDL lbs/day
Total Nitrogen	**104.09**	**26.08**	**882.67**	Implicit	**1012.84**
Total Phosphorous	**47.02**	**2.80**	**94.87**	Implicit	**144.69**

Table 4. Point Source Loads for Pelahatchie Creek

Permit	Facility	Flow MGD	TN Load lbs/day	TP Load lbs/day
Reservoir East Subdivision	MS0035327	0.175	16.80	7.59
Lake Pelahatchie Park	MS0045730	0.0015	0.17	0.07
Pelahatchie POTW, West	MS0021008	0.84	80.62	36.45
Roosevelt State Park	MS0028398	0.05	4.80	2.17
MDOT, Interstate 20 West, Rest Area, Scott	MS0028347	0.015	1.70	0.73

EXECUTIVE SUMMARY

This TMDL has been developed for Pelahatchie Creek which was placed on the Mississippi 2008 Section 303(d) List of Impaired Water Bodies. Pelahatchie Creek was listed due to evaluated causes of sediment and nutrients. Sediment will be addressed in a separate TMDL report. This TMDL will provide an estimate of the total nitrogen (TN) and total phosphorus (TP) allowable in this water body.

Mississippi does not have water quality standards for allowable nutrient concentrations. MDEQ currently has a Nutrient Task Force (NTF) working on the development of criteria for nutrients. An annual concentration of 0.7 mg/l is an applicable target for TN and 0.10 mg/l for TP for water bodies located in ecoregion 65. MDEQ is presenting these preliminary target values for TMDL development which are subject to revision after the development of numeric nutrient criteria.

The Pelahatchie Creek Watershed is located in HUC 03180002. The listed portion of Pelahatchie Creek is near Fannin from the headwaters at Morton Creek to the Ross Barnett Reservoir Flood Pool. The location of the watershed for the listed segment is shown in Figure 1.

The Pelahatchie Creek Watershed evaluation indicated that the impairment is due to phosphorus from nonpoint sources. The estimated existing ecoregion concentrations indicate reductions of phosphorus can be accomplished with installation of best management practices and reductions to point sources in the watershed.

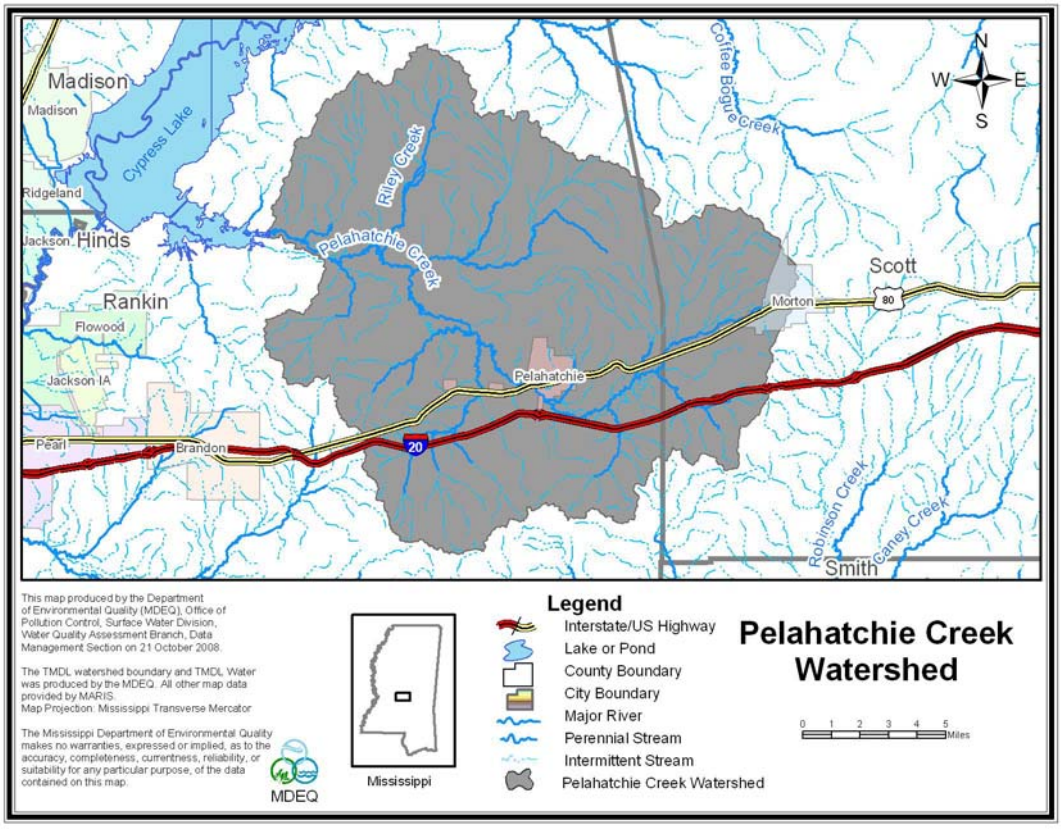


Figure 1. Pelahatchie Creek

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 2008 §303(d) listed segment shown in Figure 2.

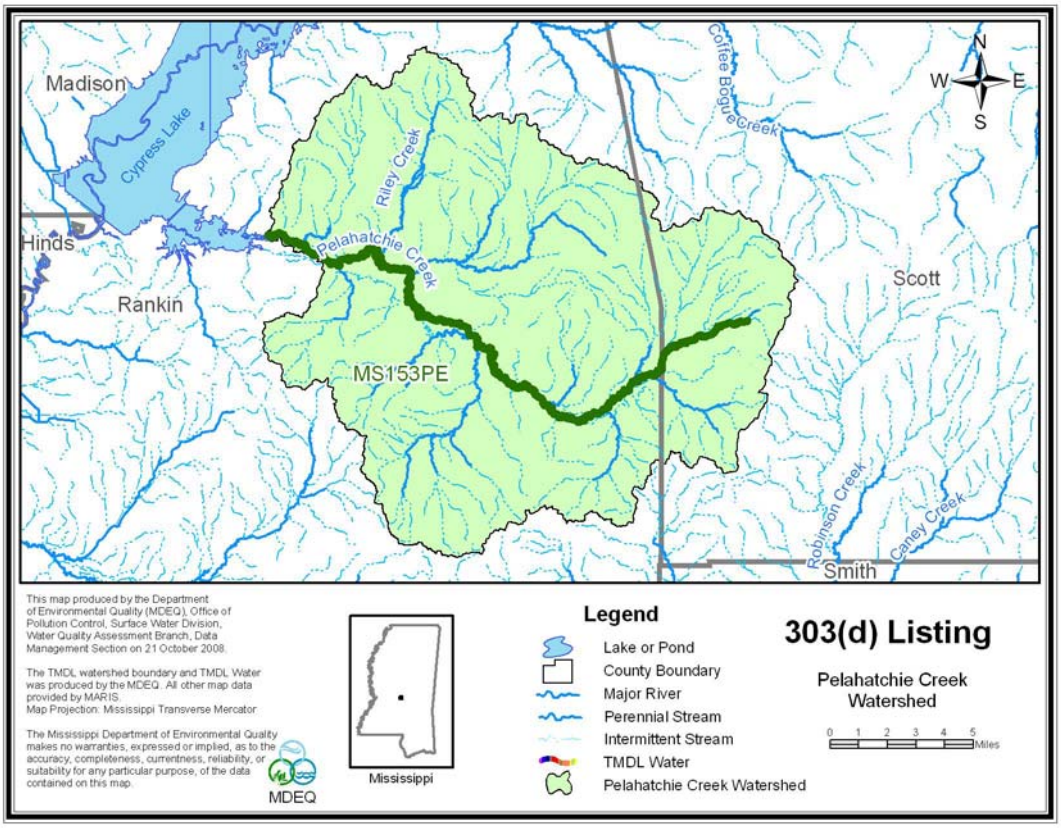


Figure 2. Pelahatchie Creek §303(d) Listed Segment

Pelahatchie (pee-luh-HATCH-ee) is commonly believed to mean "hurricane river", from Choctaw *apeli*, "hurricane" and *hucha*, "river." An alternate translation is "far off river", from Choctaw *pilla*, "away off" and *hucha*, "river" (Baca, pg. 60-62).

1.2 Listing History

The impaired segment was listed due to evaluating the watershed for potential impairment. There is limited data available in the watershed.

There are no state criteria in Mississippi for nutrients. These criteria are currently being developed by the Mississippi Nutrient Task Force in coordination with EPA Region 4. MDEQ

proposed a work plan for nutrient criteria development that has been mutually agreed upon with EPA Region 4 and is on schedule according to the approved timeline for development of nutrient criteria (MDEQ, 2007).

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, 2007). The designated beneficial use for the listed segments is Fish and Wildlife.

1.4 Applicable Water Body Segment Standards

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, 2007). Mississippi's current standards contain a narrative criteria that can be applied to nutrients which states "*Waters shall be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended or dissolved solids, sediment, turbidity, or other conditions in such degree as to create a nuisance, render the waters injurious to public health, recreation, or to aquatic life and wildlife, or adversely affect the palatability of fish, aesthetic quality, or impair the waters for any designated use* (MDEQ, 2007)."

1.5 Nutrient Target Development

Nutrient data were collected quarterly at 99 discrete sampling stations state wide where biological data already existed. These stations were identified and used to represent a range of stream reaches according to biological health status, geographic location (selected to account for ecoregion, bioregion, basin and geologic variability) and streams that potentially receive non-point source pollution from urban, agricultural, and silviculture lands as well as point source pollution from NPDES permitted facilities.

Nutrient concentration data were not normally distributed; therefore, data were log transformed for statistical analyses. Data were evaluated for distinct patterns of various data groupings (stratification) according to natural variability. Only stations that were characterized as "least disturbed" through a defined process in the M-BISQ process (M-BISQ 2003) or stations that resulted in a biological impairment rating of "fully attaining" were used to evaluate natural variability of the data set. Each of these two groups was evaluated separately ("least disturbed sites" and "fully attaining sites). Some stations were used in both sets, in other words, they were considered "least disturbed" and "fully attaining". The number of stations considered "least disturbed" was 30 of 99, and the number of stations considered "fully attaining" was 53 of 99.

Several analysis techniques were used to evaluate nutrient data. Graphical analyses were used as the primary evaluation tool. Specific analyses used included; scatter plots, box plots, Pearson's correlation, and general descriptive statistics.

In general, natural nutrient variability was not apparent based on box plot analyses according to the 4 stratification scenarios. Bioregions were selected as the stratification scheme to use for TMDLs in the Pascagoula Basin. However, this was not appropriate for some water bodies in smaller bioregions. Therefore, MDEQ now uses ecoregions as a stratification scheme for the water bodies in the remainder of the state.

In order to use the data set to determine possible nutrient thresholds, nutrient concentrations were evaluated as to their correlation with biological metrics. That thorough evaluation was completed prior to the Pascagoula River Basin TMDLs. The methodology and approach were verified. The same methodology was applied to the subsequent ecoregions.

For the preliminary target concentration range for each ecoregion, the 75^{th} and 90^{th} percentiles were derived from the mean nutrient value at each site found to be fully supporting of aquatic life support according to the M-BISQ scores. For the estimate of the existing concentrations the 50th percentile (median) was derived from the mean nutrient value at each site of sites that were not attaining and had nutrient concentrations greater than the target. For this report, only the 90^{th} percentile was used.

WATER BODY ASSESSMENT

2.1 Water Quality Data

There are no data available for Pelahatchie Creek.

2.2 Assessment of Point Sources

An important part of the TMDL analysis is the identification of individual sources, source categories, or source subcategories of nutrients 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 discernable, 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 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]). For the purposes of this TMDL, all sources of nutrient loading not regulated by NPDES permits are considered nonpoint sources.

There are 5 NPDES regulated municipal and industrial WWTPs in the watershed included in the TMDL that are shown in Table 5. The wastewater from the facilities was characterized based upon the best available information. Literature values were used to estimate the mass loadings from municipal discharges (USEPA 1999).

Table 5. NPDES Sources

Facility Name	Permit	Discharge (MGD)	Treatment Type
Reservoir East Subdivision	MS0035327	0.175	Aerated Lagoon
Lake Pelahatchie Park	MS0045730	0.0015	Aerobic Treatment Unit
Pelahatchie POTW, West	MS0021008	0.84	Aerated Lagoon
Roosevelt State Park	MS0028398	0.05	Aerated Lagoon
MDOT, Interstate 20 West, Rest Area, Scott	MS0028347	0.015	Activated Sludge

Nutrient 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.

There is 1 MS4 permits within the Pelahatchie Creek Watershed. This MS4 permit is listed in Table 6.

Table 6. MS4 Permits

Permit ID #	MS4 Name
MSRMS4035	Rankin County, MS4 Storm Water Management Program

2.3 Assessment of Non-Point Sources

Non-point loading of nutrients in a water body results from the transport of the pollutants into receiving waters by overland surface runoff, groundwater infiltration, and atmospheric deposition. The two primary nutrients of concern are nitrogen and phosphorus. Total nitrogen is a combination of many forms of nitrogen found in the environment. Inorganic nitrogen can be transported in particulate and dissolved phases in surface runoff. Dissolved inorganic nitrogen can be transported in groundwater and may enter a water body from groundwater infiltration. Finally, atmospheric gaseous nitrogen may enter a water body from atmospheric deposition.

Unlike nitrogen, phosphorus is primarily transported in surface runoff when it has been sorbed by eroding sediment. Phosphorus may also be associated with fine-grained particulate matter in the atmosphere and can enter streams as a result of dry fallout and rainfall (USEPA, 1999). However, phosphorus is typically not readily available from the atmosphere or the natural water supply (Davis and Cornwell, 1988). As a result, phosphorus is typically the limiting nutrient in most non-point source dominated rivers and streams, with the exception of watersheds which are dominated by agriculture and have high concentrations of phosphorus contained in the surface runoff due to fertilizers and animal excrement or watersheds with naturally occurring soils which are rich in phosphorus (Thomann and Mueller, 1987).

Watersheds with a large number of failing septic tanks may also deliver significant loadings of phosphorus to a water body. All domestic wastewater contains phosphorus which comes from humans and the use of phosphate containing detergents. Table 7 presents the estimated loads from various land use types in the Pearl Basin based on information from USDA ARS Sedimentation Laboratory (Shields, et. al., 2008).

The watershed contains mainly forest land 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). Forest is the dominant landuse within this watershed. The landuse distribution for the Pelahatchie Creek Watershed is shown in Table 7 and Figure 3. By multiplying the landuse category size by the estimated nutrient load, the watershed specific estimate can be calculated. Table 7 presents the estimated loads, the target loads, and the reductions needed to meet the TMDLs.

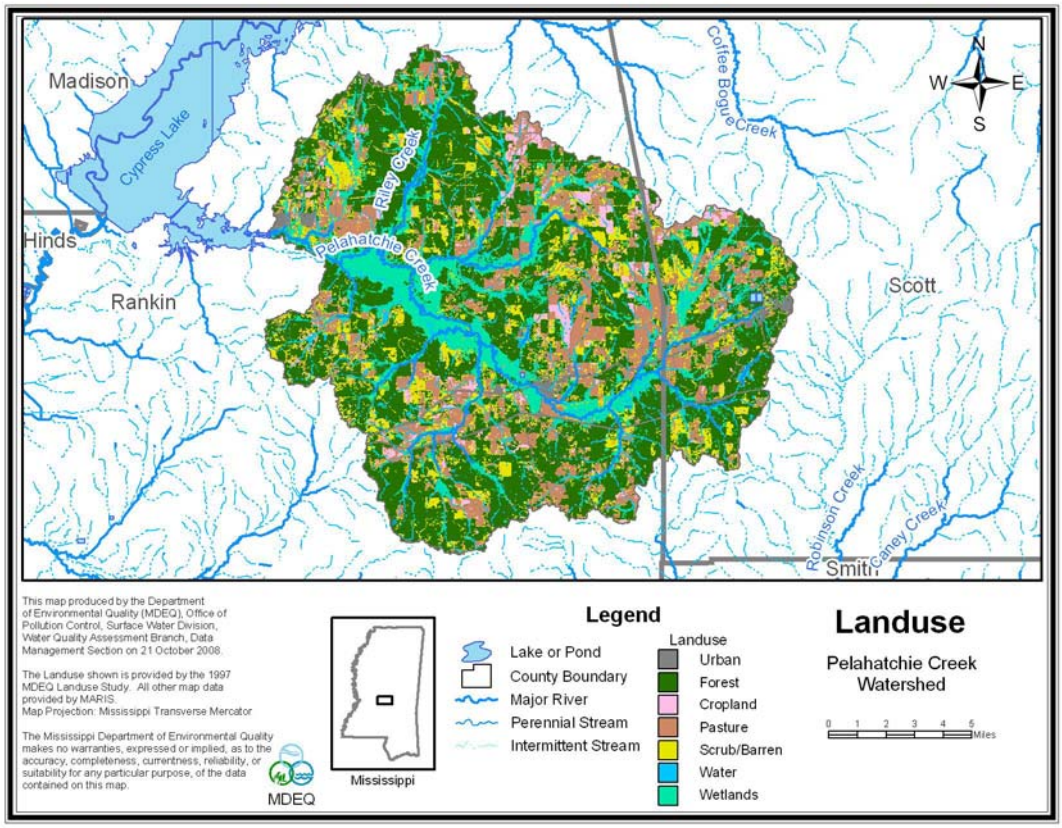
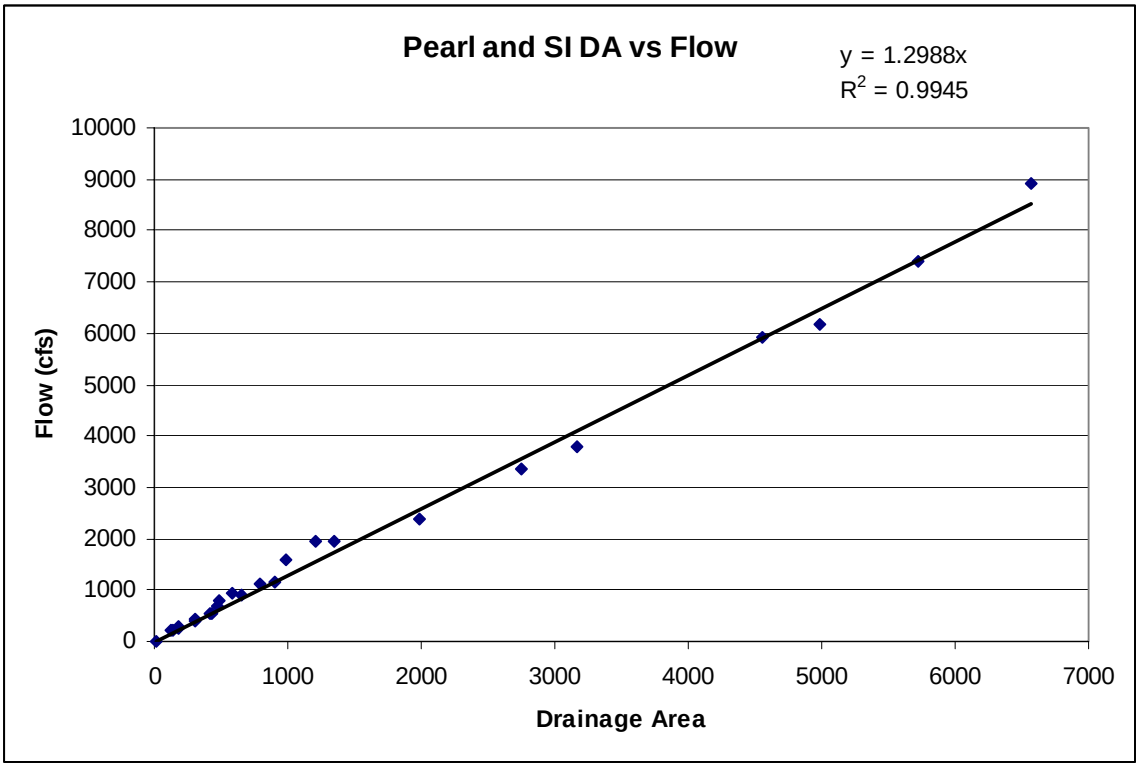


Figure 3. Pelahatchie Creek Watershed Landuse

2.4 Estimated Existing Load for Total Nitrogen and Total Phosphorus

The average annual flow in the watershed was calculated by utilizing the flow vs. watershed area graph shown in Figure 4. All available gages were compared to the watershed size. A very strong correlation between flow and watershed size was developed for the Pearl and South Independent Streams Basins. The equation for the line that best fits the data was then used to estimate the annual average flow for the Pelahatchie Creek watershed. The TMDL target TN and TP loads were then calculated, using Equation 1 and the results are shown in Table 7.

Figure 4. Pearl and South Independent Drainage Area to Flow Comparison



Nutrient Load (lb/day) = Flow (cfs) * 5.394 (conversion factor)* Nutrient Concentration (mg/L) (Equation 1)

Table 7. TMDL Calculations and Watershed Sizes

Water body	**Pelahatchie Creek**		**Water**	**Urban**	**Scrub/Barren**	**Forest**	**Pasture/Grass**	**Cropland**	**Wetland**	**Total**	
		Acres	1016	6174	17493	59645	20964	4428	22461	132181	
Land Use	**TN kg/mile2**	Percent	0.77%	4.67%	13.23%	45.12%	15.86%	3.35%	16.99%	100.00%	
Forest	111.3	Miles^2 in watershed	1.6	9.6	27.3	93.2	32.8	6.9	35.1	206.5	
Pasture	777.2	Flow in cfs based on area	268.2	cfs							
Cropland	5179.9										
Urban	296.4	TN Load kg/mi^2 annual avg	257.4	296.4	111.3	111.3	777.2	5179.9	265.2		
Water	257.4	TP Load kg/mi^2 annual avg	257.4	3.1	62.1	62.1	777.2	2589.9	265.2		
Wetland	265.2										
aquaculture	111.3	TN Load kg/day	1.1	7.8	8.3	28.4	69.7	98.2	25.5	239.1	kg/day
		TP Load kg/day	1.1	0.1	4.7	15.9	69.7	49.1	25.5	166.0	kg/day
Land Use	**TP kg/mile2**										
Forest	62.1	TN target concentration	0.7	mg/l							
Pasture	777.2	TP target concentration	0.1	mg/l							
Cropland	2589.9										
Urban	3.1	TN estimated concentration	0.36	mg/l							
Water	257.4	TP estimated concentration	0.25	mg/l							
Wetland	265.2										
aquaculture	62.1	TN target load	1012.84	lbs/day							
		TP target load	144.69	lbs/day							
		TN estimated load per day	527.23	lbs/day							
		TP estimated load per day	366.08	lbs/day							
		TN reduction needed	*NA*								
		TP reduction needed	60%								

The land use calculations are based on 2004 data. The nutrient estimates are based on USDA ARS. The TMDL targets are based on EPA guidance for calculation of targets when considering all available data.

ALLOCATION

3.1 Wasteload Allocation

There are 5 NPDES point sources included in this nutrient TMDL. The WLA for the 5 point sources is shown in Table 7. Future permits will be considered in accordance with Mississippi's *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*(1994).

While this TMDL does not recommend a reduction to point source loading of TN, it does recommend quarterly monitoring of TN and applying the TN WLA load at these facilities. These limits are shown in Table 8. The estimated existing point source contribution of TN is 104.09 lbs and 10.28% of the TMDL target load. The breakdown of the TN TMDL target load into the WLA and LA is shown in Figure 5.

This TMDL also does not recommend a reduction to point source loading of TP. The estimated existing point source contribution is 47.02 lbs TP and 32.5% of the TP TMDL target load as shown in Figure 6. Given that the point source contribution is less than a third of the TMDL target load and the lack of water quality data for Pelahatchie Creek, this TMDL recommends applying the TP WLA load at these facilities. The breakdown of the TP TMDL target load into the WLA and LA is shown in Figure 6.

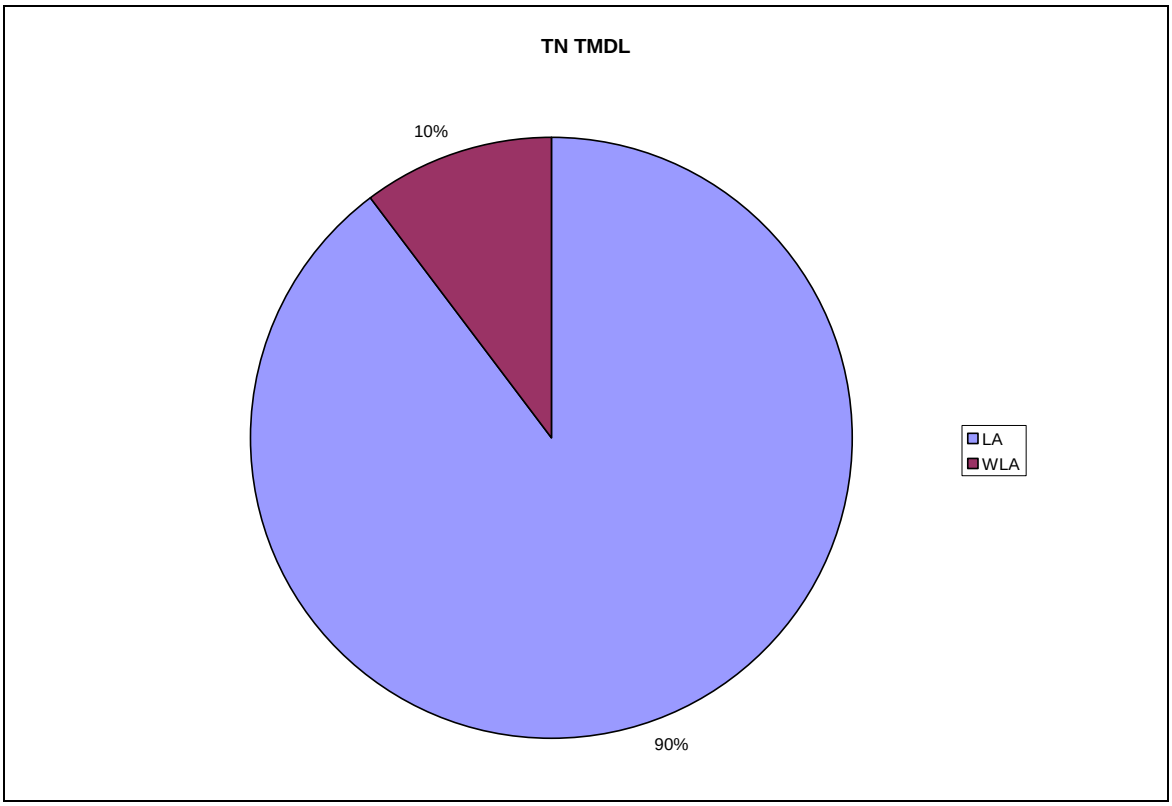


Figure 5. TN TMDL

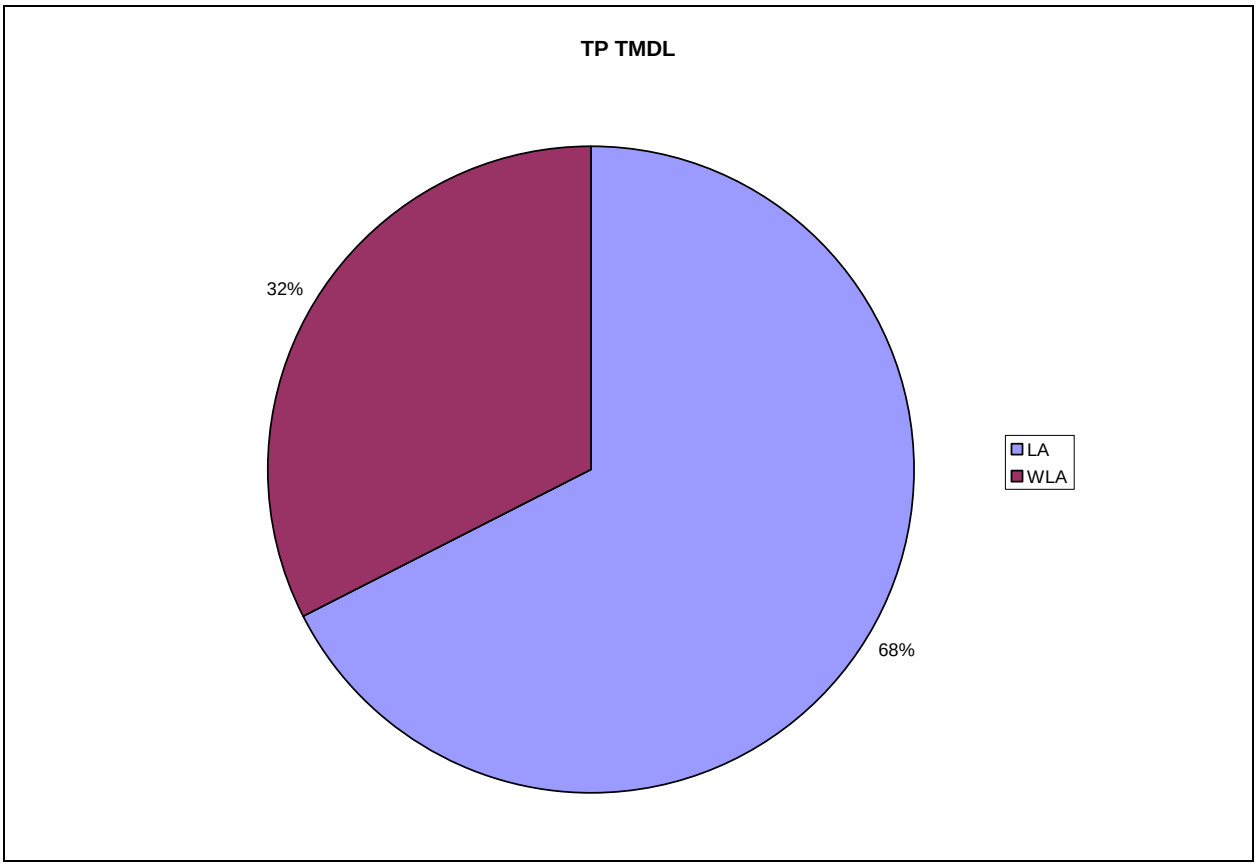


Figure 6. TP Estimated Existing Load

Table 8. NPDES Sources

Facility Name	Permit	Discharge (MGD)	TP (mg/l)	TN (mg/l)	TP (lbs/day)	TN (lbs/day)
Reservoir East Subdivision	MS0035327	0.175	5.2	11.5	7.59	16.80
Lake Pelahatchie Park	MS0045730	0.0015	5.8	13.6	0.07	0.17
Pelahatchie POTW, West	MS0021008	0.84	5.2	11.5	36.45	80.62
Roosevelt State Park	MS0028398	0.05	5.2	11.5	2.17	4.80
MDOT, Interstate 20 West, Rest Area, Scott	MS0028347	0.015	5.8	13.6	0.73	1.70

3.1.1 Wasteload Allocation Storm Water

MDEQ has established a method to estimate the storm water waste load allocation (WLAsw). The WLAsw is calculated according to equation 2 below. The intent of the storm water NPDES permit is not to treat the water after collection, but to reduce the exposure of storm water runoff to pollutants by implementing various controls. Storm water NPDES permits require the establishment of controls or BMPs to reduce the pollutants entering the environment.

Waste Load Allocation Storm Water (WLAsw) = LA * % Urban Area in MS4 within watershed * 70%
(Equation 2)

3.2 Load Allocation

This TMDL recommends a 60% reduction to nonpoint source loads of TP based on the analysis given in Table 7. Best management practices (BMPs) should be encouraged in the watersheds to reduce potential TN and TP loads from non-point sources. The LA for TN and TP was calculated by subtracting the WLA from the TMDL. For land disturbing activities related to silvaculture, construction, and agriculture, it is recommended that practices, as outlined in "Mississippi's BMPs: Best Management Practices for Forestry in Mississippi" (MFC, 2000), "Planning and Design Manual for the Control of Erosion, Sediment, and Stormwater" (MDEQ, et. al, 1994), and "Field Office Technical Guide" (NRCS, 2000), be followed, respectively.

3.3 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 model is implicit.

3.4 Calculation of the TMDL

Equation 1 was used to calculate the TMDL for TP and TN. The target concentration was used with the average flow for the watershed to determine the nutrient TMDLs. The existing point sources are a minor contributor to the nutrient load in the watershed. The allocations in the TMDL are established to attain the applicable water quality standards.

Table 9. TMDL Loads

	WLA lbs/day	WLA sw lbs/day	LA lbs/day	MOS	TMDL lbs/day
Total Nitrogen	**104.09**	**26.08**	**882.67**	Implicit	**1012.84**
Total Phosphorous	**47.02**	**2.80**	**94.87**	Implicit	**144.69**

The nutrient TMDL loads were then compared to the estimated existing loads previously calculated. A 60% reduction in TP loading is recommended. Best management practices are encouraged in this watershed to reduce the nonpoint nutrient loads.

3.5 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

Nutrients were addressed through an estimate of a preliminary total phosphorous concentration target and a preliminary total nitrogen concentration target. Based on the estimated existing and target total phosphorous concentrations, this TMDL recommends a 60% reduction of the nonpoint phosphorous loads entering these water bodies to meet the preliminary target of 0.10 mg/l. Due to the relatively low percent contribution of point sources to the phosphorous target load and the evaluated status of the water body, no point source reductions to phosphorous are recommended in this TMDL. This TMDL does not recommend reductions to nitrogen from either nonpoint sources or point sources. NPDES permit limits for TP and TN are recommended in Table 8. The implementation of BMP activities should reduce the nutrient load entering Pelahatchie Creek. This will provide improved water quality for the support of aquatic life in the water bodies, and will result in the attainment of the applicable water quality standards.

4.1 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 Pearl 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.

Due to this TMDL, projects within this watershed will receive a higher score and ranking for funding through the basin team process and Nonpoint Source Program described above.

4.2 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 Kay Whittington at Kay_Whittington@deq.state.ms.us.

All comments should be directed to Kay_Whittington@deq.state.ms.us or Kay Whittington, 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

Baca, Keith A., 2007. Native American Place Names in Mississippi. Jackson, Ms. Univeristy Press of Mississippi.

Davis and Cornwell. 1988. *Introduction to Environmental Engineering.* McGraw-Hill.

MDEQ. 2007. *Mississippi's Plan for Nutrient Criteria Development*. Office of Pollution Control.

MDEQ. 2007. *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters*. Office of Pollution Control.

MDEQ. 1994. *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.* Office of Pollution Control.

Metcalf and Eddy, Inc. 1991. *Wastewater Engineering: Treatment, Disposal, and Reuse 3rd ed*. New York: McGraw-Hill.

MFC. 2000. *Mississippi's BMPs: Best Management Practices for Forestry in Mississippi*. Publication # 107.

NRCS. 2000. *Field Office Technical Guide Transmittal No. 61*.

Shields, F.D. Jr., Cooper, C.M., Testa, S. III, Ursic, M.E., 2008. *Nutrient Transport in the Pearl River Basin, Mississippi*. USDA ARS National Sedimentation Labortory, Oxford, Mississippi.

Telis, Pamela A. 1992. *Techniques for Estimating 7-Day, 10-Year Low Flow Characteristics for Ungaged Sites on Water bodys in Mississippi*. U.S. Geological Survey, Water Resources Investigations Report 91-4130.

Thomann and Mueller. 1987. *Principles of Surface Water Quality Modeling and Control*. New York: Harper Collins.

USEPA. 1997. *Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2: Streams and Rivers, Part 1: Biochemical Oxygen Demand/Dissolved Oxygen and Nutrients/ Eutrophication*. United States Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-B-97-002.

USEPA. 1999. *Protocol for Developing Nutrient TMDLs*. EPA 841-B-99-007. Office of Water (4503F), United States Environmental Protection Agency, Washington D.C. 135 pp.

USEPA. 2000. Nutrient Criteria Technical Guidance Manual Rivers and Streams. United States Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-002.

USEPA. 2008. Modeling Report for Pelahatchie Creek (MS276E). United States Environmental Protection Agency, Region 4, Atlanta, GA.