Appendix C – Escatawpa River Phase One Total Maximum Daily Load for Mercury

JUNE 26, 2000
APPROVED VERSION

Escatawpa River Phase One Total Maximum Daily Load for Mercury

Pascagoula Basin Jackson and George Counties, Mississippi

Prepared By
Mississippi Department of Environmental Quality
Office of Pollution Control
TMDL/WLA Section/
Water Quality Assessment Branch

FOREWORD

This report has been prepared in accordance with the schedule contained within the federal consent decree dated December 22, 1998. (*Sierra Club v. Hankinson, No. 97-CV-3683 (N.D. Ga.)*) The report contains one or more Total Maximum Daily Loads (TMDLs) for waterbody segments found on Mississippi's 1996 Section 303(d) List of Impaired Waterbodies. 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 segments addressed are comprised of monitored segments that have data indicating impairment. 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, modification to state water quality criteria, or changes in landuse within the watershed. In some cases, additional water quality data may indicate that no impairment exists.

Prefixes for fractions and multiples of SI units

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

Conversion Factors

To convert from	To	Multiply by	To Convert from	To	Multiply by
Acres	Sq. miles	0.0015625	Days	Seconds	86400
Cubic feet	Cu. Meter	0.028316847	Feet	Meters	0.3048
Cubic feet	Gallons	7.4805195	Gallons	Cu feet	0.133680555
Cubic feet	Liters	28.316847	Hectares	Acres	2.4710538
cfs	Gal/min	448.83117	Miles	Meters	1609.344
cfs	MGD	.6463168	Mg/l	ppm	1
Cubic meters	Gallons	264.17205	µg/l * cfs	Gm/day	2.45

CONTENTS

NON-IMPAIRED SEGMENT IDENTIFICATION

Name:	Escatawpa River, Segment 3 (*Salt Water*)
Waterbody ID:	MS107M3
Location:	Near Moss Point: from Interstate 10 Bridge to mouth at the Pascagoula River
Counties:	Jackson
USGS HUC Code:	03170008
NRCS Watershed:	080
Length:	10 miles
Use Impairment:	A fish consumption advisory is not posted for this waterbody. Current fish flesh data show mercury levels below the FDA action level.
Cause Noted:	N/A
Standards Variance:	N/A
Pollutant Standard:	Mercury II, total chronic fresh water concentration may not exceed 0.012 µg/l expressed as total recoverable, Mercury II, total chronic salt water concentration may not exceed 0.025 µg/l expressed as total recoverable This segment is not classified as fresh water. The salt content is routinely 20 parts per thousand.

EXECUTIVE SUMMARY

The fresh water portions of the Escatawpa River, identified as Segments 1 and 2 in this report, are impaired by mercury. Largemouth bass and catfish caught in these segments have been sampled and the data show a definite impairment due to levels of mercury in the fish flesh, which exceed the FDA Action level.

Based on this data, the State of Mississippi issued a fish consumption advisory (See Appendix B) for Segment 1 and 2 of the Escatawpa River. This advisory was issued to help protect the people who regularly consume fish caught in this river. The bioaccumulation of methylmercury in fish flesh is the basis for the impairment in this stream.

This Phase One Mercury TMDL for the Escatawpa River has been developed prior to a complete understanding of the linkage between mercury in the water and mercury in the fish. There are no NPDES permitted dischargers currently in Segments 1 or 2. All of the dischargers are in Segment 3. However, Segment 3 does not have an advisory for mercury; there have been no fish sampled from Segment 3 with elevated mercury levels; and MDEQ intends to delist Segment 3 from the next Section 303(d) list. This segment is downstream of Segment 2, which is impaired for mercury. There is some process within the mercury cycle that is causing this phenomenon.

Additionally, this Phase One Mercury TMDL is only concerned with point source contributions to the waterbody. Atmospheric deposition, nonpoint source contributions, and natural background will be considered in Phase Two. It is anticipated that the mercury data generated from the point source contributors during the next few years will enhance the knowledge base on this issue.

The endpoints selected for this Phase One Mercury TMDL are based on MDEQ regulations. There are several mercury criteria to evaluate. The human health criterion is currently 153 ng/l of total mercury. The aquatic life support criteria are 12 ng/l fresh water and 25 ng/l salt water of total mercury II expressed as total recoverable. Recent EPA criteria guidance has suggested that each of these numbers be revised. The 153 ng/l criterion has been proposed to be reduced by 2/3. The aquatic life support numbers have been proposed to increase to a more representative value of 770 ng/l and 940 ng/l, respectively. However, these new numbers have not been adopted by the Mississippi Commission on Environmental Quality. MDEQ is therefore going to use the most protective of the currently available criteria.

By using the 12 ng/l criterion as the target, a large implicit margin of safety is created. However, to further account for the unknowns, an additional explicit margin of safety is included in this TMDL. This explicit margin of safety is set at 75%.

The implementation plan in this Phase One TMDL calls for a moratorium on any mercury discharge in Segments 1 and 2. It also calls for increased monitoring for dischargers in Segment 3. Although Segment 3 is downstream of the impaired segment, and, as mentioned above, no elevated levels of mercury have been found in fish, dischargers to Segment 3 should monitor their effluents for mercury.

1.0 INTRODUCTION

1.1 BACKGROUND

The identification of waterbodies not meeting their designated use and the development of total maximum daily loads (TMDLs) for those waterbodies are required by Section 303(d) of the Clean Water Act. This is also a requirement of 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 waterbodies through the establishment of pollutant specific allowable loads. The pollutant of concern for this TMDL is mercury. The purpose of this TMDL is to establish water quality objectives and best management practices to reduce the mercury levels currently found in fish flesh taken from the Escatawpa River.

Human exposure to inorganic mercury in large amounts can cause a variety of health effects. The two organ systems most likely affected are the central nervous system and the kidney. However, the most significant concerns regarding chronic exposure to low concentrations of methylmercury in fish are for neurological effects on the developing fetus and children.[1]

1.2 PHASED TMDL APPROACH

This document is Phase One of a multi-phase TMDL being developed for mercury in the Escatawpa River. This Phase One Mercury TMDL will determine the maximum load of mercury that should be introduced into the impaired segments based on Mississippi's current water quality criteria. Phase Two of this TMDL project, to be completed at a later date, will quantify the mercury load to the Escatawpa River that is directly related to atmospheric sources and other nonpoint sources. Phase Two will also attempt to include a fate and transport model for the river that will better characterize aquatic mercury cycling.

1.3 WATERBODY SEGMENT LOCATION

As summarized in Table 1, Segment 1 of the Escatawpa River begins at the Alabama - Mississippi State line and ends at the confluence with Spring Creek east of Hurley. Segment 2 starts at the confluence with Spring Creek and ends at the Interstate 10 Bridge. Segment 3 begins at the I-10 Bridge and continues to the mouth of the river into the Pascagoula River. The upstream segment located in Alabama is not included in this TMDL project.

The entire drainage area of the Escatawpa River (USGS Hydrologic Unit Code (HUC) 03170008) is approximately 1,031 square miles. The Escatawpa River Watershed has been divided into four subwatersheds for this TMDL study, representing the two impaired segments, the downstream segment, and the upstream segment located in Alabama. The watershed contains urban areas including Pascagoula and Moss Point, and a number of small suburban communities. A majority of the landuse is forest.

In an attempt to protect human health, Mississippi has issued a Fish Consumption Advisory for Segments 1 and 2 of the Escatawpa River. This advisory was issued due to elevated levels of mercury found in fish flesh collected in these segments. See Appendix B. There is no advisory for Segment 3. Data indicate there is no mercury impairment in Segment 3.

Figure 1 **Area Map**

Table 1 Waterbody Identification for the Escatawpa River TMDL

Waterbody Name	*State Waterbody ID*	*Assessment type*	*Size*	*County*	*Listed Advisory*	*Advisory Cause*
Escatawpa River, Seg 1	MS107M1	Monitored	20 mi	George, Jackson	Fish Consumption Advisory	Mercury
Location – Near Agricola: from Alabama state line to confluence with Spring Creek east of Hurley						
Escatawpa River, Seg 2	MS107M2	Monitored	24 mi	Jackson	Fish Consumption Advisory	Mercury
Location – Near Orange Grove: from confluence with Spring Creek east of Hurley to I-10						
Escatawpa River, Seg 3	MS107M3	Monitored	10 mi	Jackson	No Advisories	None
Location – Near Escatawpa: from I-10 Bridge to mouth at Pascagoula River						

Table 2 Subwatersheds in HUC 03170008

Waterbody Segment Name	Waterbody Seg. ID	Subwtshd. ID Number
Escatawpa River, Alabama Segment	n/a	031700080a
Escatawpa River, Segment 1	MS107M1	0317000801
Escatawpa River, Segment 2	MS107M2	0317000802
Escatawpa River, Segment 3	MS107M3	0317000803

Table 3 Landuse Distribution in Escatawpa River Watershed (acres)

Watershed	Urban	Agricultural	Forest	Water	Wetland	Barren	Total
031700080a	657	33,757	304,719	204	409	1,356	341,102
0317000801	58	19,444	38,297	45	2,812	10	60,666
0317000802	4,981	74,077	121,792	3,615	5,790	482	210,737
0317000803	4,138	6,432	28,818	780	7,186	160	47,514
Total	9,834	133,710	493,626	4,644	16,197	2,008	660,019
Percent	1%	20%	75%	1%	2%	0%	100%

1.4 WATERBODY DESIGNATED USE

Designated beneficial uses and water quality standards are established by the State of Mississippi in the *Water Quality Criteria for Intrastate, Interstate and Coastal Waters* regulations. These regulations set the criteria concentrations for pollutants and methods for calculating loads based on the standards. MDEQ regulations require the use of these standards for establishing loads for Mississippi waters. The standards for this river have been established based on a designated use of Fish and Wildlife.

1.5 APPLICABLE WATER QUALITY STANDARDS

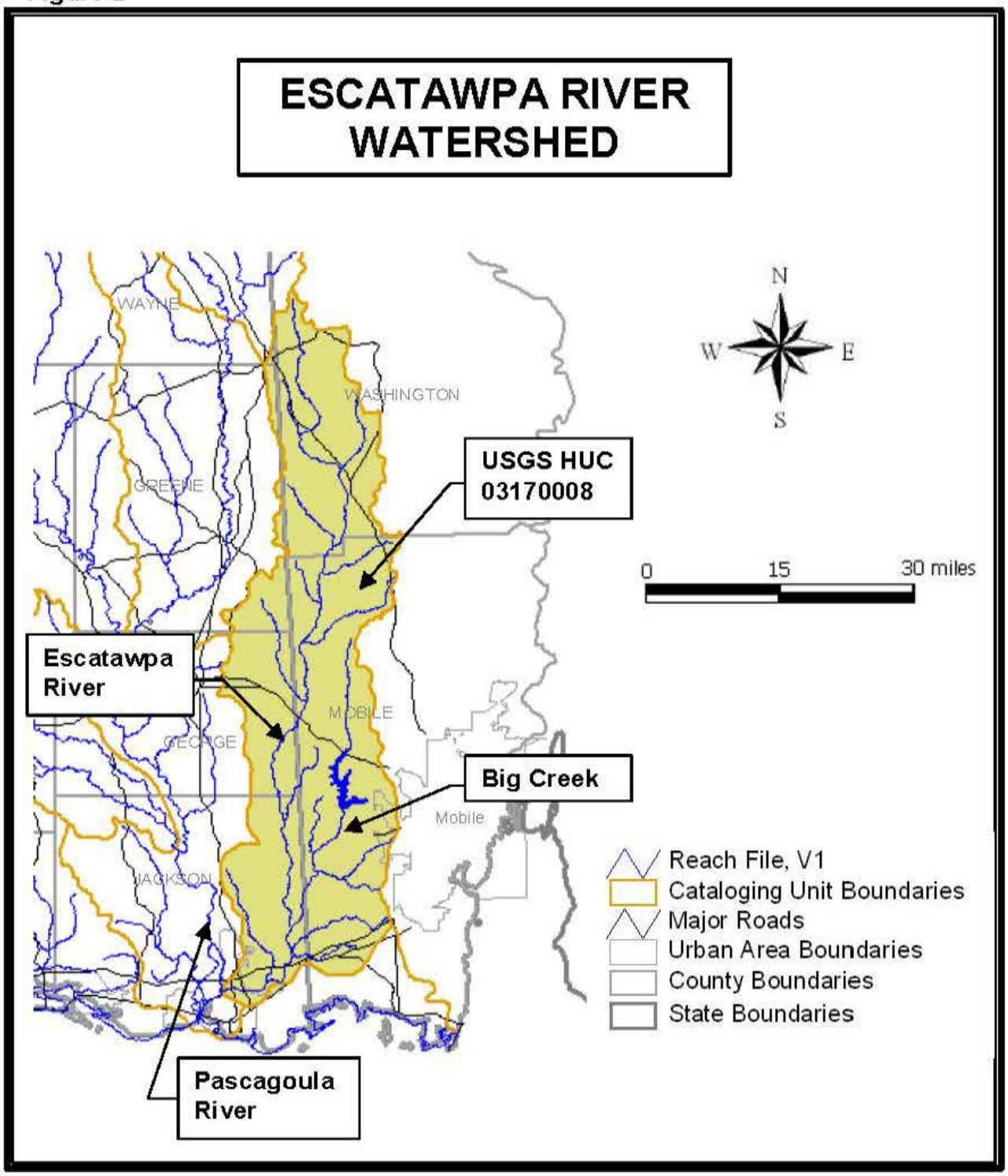
Mercury is included within MDEQ regulations as a toxic substance. The standards specifically set the numeric criteria and calculation methods for determining the loading from sources for this pollutant.

Indications are apparent that the standard may soon be changing for each of the mercury species included in the criteria. However, until the stakeholders within Mississippi are allowed to partake in the process to change Mississippi criteria and the Mississippi Commission on Environmental Quality adopts any modification, using another concentration value for mercury or calculation method would be an arbitrary and capricious decision. The water quality standards applicable to the uses of the waterbody segments and the pollutant of concern are listed in Table 4 as defined by the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* regulations.

Table 4 State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters

Parameter	***Beneficial use***	***Water Quality Criteria***
Total Mercury	Public Water Supply	Concentration may not exceed 0.151 μg/l
Total Mercury	Fish Consumption	Concentration may not exceed 0.153 μg/l
Mercury (II) total dissolved Hg(II) expressed as total recoverable	Aquatic Life Support	*Fresh Water* Acute: instantaneous concentration may not exceed 2.1 μg/l Chronic: average concentration may not exceed 0.012 μg/l expressed as total recoverable *Salt Water* Acute: instantaneous concentration may not exceed 1.8 μg/l Chronic: average concentration may not exceed 0.025 μg/l expressed as total recoverable

Figure 2


ESCATAWPA RIVER WATERSHED
WAYNE
WASHINGTON
GREENE
MOBILE
GEORGE
JACKSON
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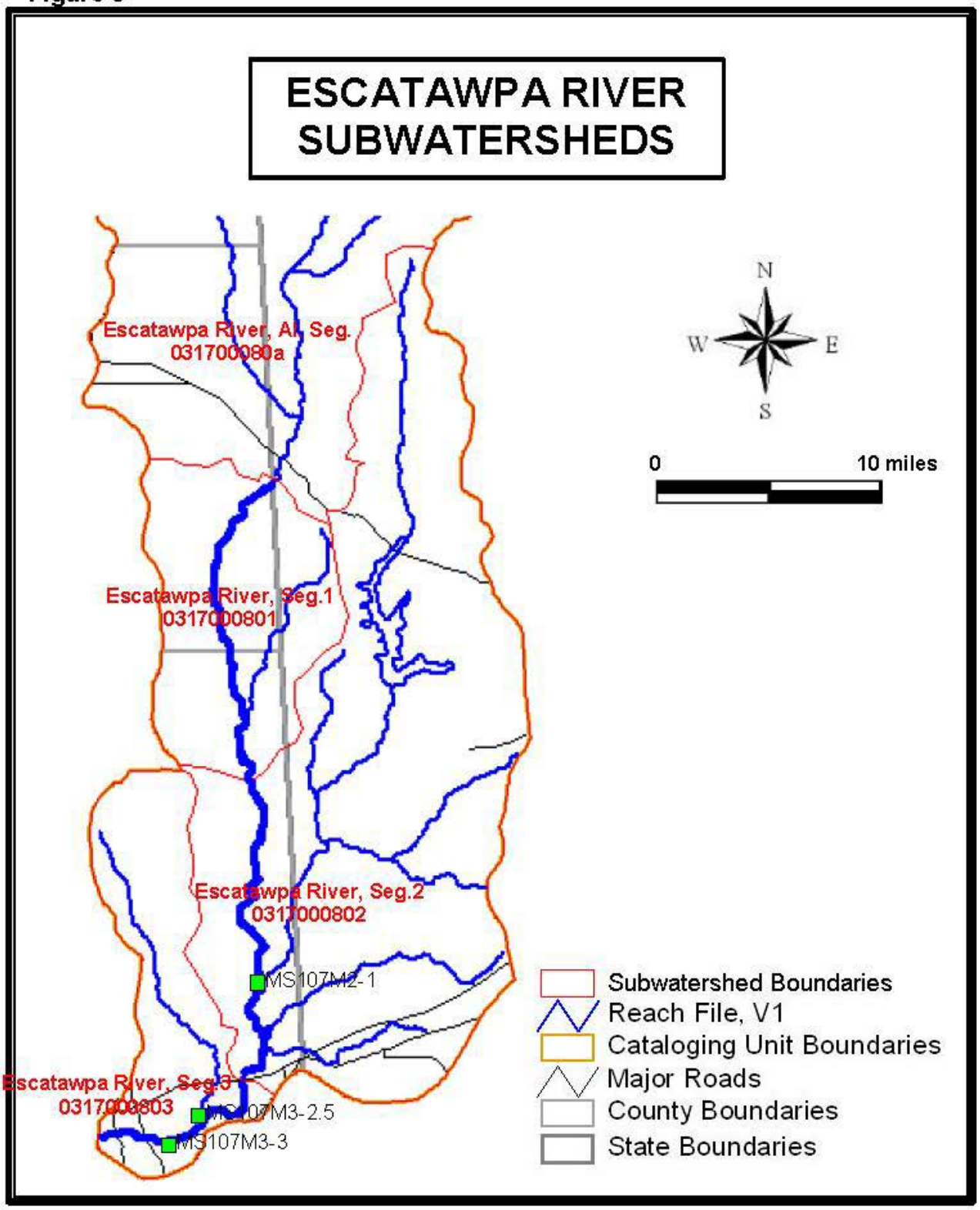
15
30 miles
USGS HUC 03170008
Escatawpa River
Big Creek
Pascagoula River
Reach File, V1
Cataloging Unit Boundaries
Major Roads
Urban Area Boundaries
County Boundaries
State Boundaries

Figure 3


ESCATAWPA RIVER SUBWATERSHEDS
Escatawpa River, AL Seg. 0317000801a
Escatawpa River, Seg.1 0317000801
Escatawpa River, Seg.2 0317000802
Escatawpa River, Seg.3 0317000803
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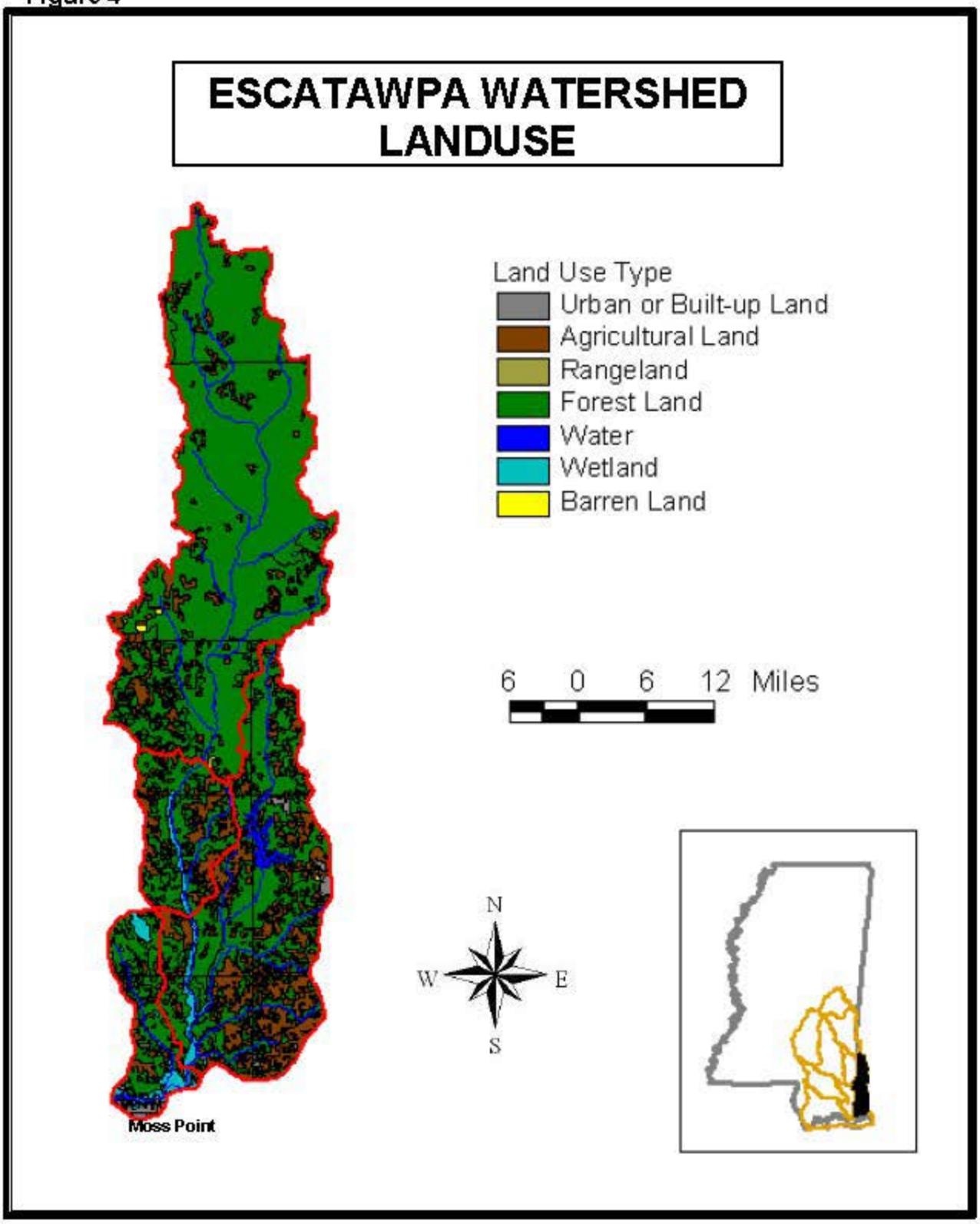
Subwatershed Boundaries
Reach File, V1
Cataloging Unit Boundaries
Major Roads
County Boundaries
State Boundaries

Figure 4


ESCATAWPA WATERSHED
LANDUSE
Land Use Type
Urban or Built-up Land
Agricultural Land
Rangeland
Forest Land
Water
Wetland
Barren Land
6 0 6 12 Miles
N
W
E
S
Moss Point

6.0 CONCLUSION

MDEQ will not approve any NPDES Permit application for Segments 1 and 2 that does not comply with the moratorium for mercury discharges into Segments 1 and 2. In addition, this TMDL requires all NPDES Permitted dischargers in Segment 3 to monitor for mercury using clean techniques and accurate testing methods.

Phase Two of this TMDL will include nonpoint sources of mercury, atmospheric deposition, and will consider the effects of mercury cycling in the river. The TMDL calculations from Phase One may be revised in Phase Two of this TMDL since more will be known about the percentage of mercury contributions from point and nonpoint sources.

6.1 FOLLOW-UP MONITORING

Additional ambient mercury monitoring for all species of mercury will be needed for development of Phase Two. Additional information is required to facilitate the understanding of the methylmercury process and the linkage between mercury in the water column and mercury in fish flesh. Specialized monitoring approaches will also be needed to determine the atmospheric deposition contribution to mercury in the watershed.

MDEQ has adopted the Basin Approach to Water Quality Management, a plan that divides Mississippi's major drainage basins into five groups. During each yearlong cycle, MDEQ resources for water quality monitoring are focused on one of the basin groups. During the next monitoring phase in the Pascagoula Basin, the Escatawpa River will receive additional monitoring to identify the improvements in water quality gained from the implementation of the Phase One strategy included in this TMDL.

6.2 PUBLIC PARTICIPATION

This Phase One TMDL project will be published for a 30-day public notice. During this time, the public will be notified by publication in the statewide newspaper and a newspaper in Pascagoula. The public will be given an opportunity to review the TMDL and submit comments.

All comments received during the public notice period and at any public hearings become a part of the record of this TMDL. All comments will be considered in the ultimate approval of this TMDL and for submission of this TMDL to EPA Region 4 for final approval.