

**Proposed  
September 2003**

# **Total Maximum Daily Loads For The Legacy Pesticides DDT and Toxaphene In The Pascagoula River Basin**

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**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 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 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.

**Prefixes for fractions and multiples of SI units**

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

**Conversion Factors**

<b>To convert from</b>	<b>To</b>	<b>Multiply by</b>	<b>To Convert from</b>	<b>To</b>	<b>Multiply by</b>
Acres	Sq. miles	0.001563	Days	Seconds	86400
Cubic feet	Cu. Meter	0.02832	Feet	Meters	0.3048
Cubic feet	Gallons	7.4805	Gallons	Cu feet	0.13368
Cubic feet	Liters	28.317	Hectares	Acres	2.4711
cfs	Gal/min	448.83	Miles	Meters	1609.3
cfs	MGD	.6463	Mg/l	ppm	1
Cubic meters	Gallons	264.17	μg/l * cfs	Gm/day	2.45

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## **Original Listing**

Mississippi conducted a survey of district conservationists (DC) in 1988 and 1989 to find candidate watersheds for future Section 319 funding opportunities. Questionnaires were mailed to each county requesting each DC identify the impaired watersheds in the county in part based on land use. Numerous DCs responded to the survey and Mississippi's Section 319 list was created based on these survey responses.

In 1992, MDEQ compiled a Section 303(d) list based, in part, on the Section 319 listed watersheds that were a concern. It is important to remember that these listings were based on speculation and not water quality monitoring. At the time, MDEQ considered the evaluated listings from the Section 319 survey as a placeholder for future monitoring to determine if there was indeed impairment in the watershed.

The questionnaires asked for the presence of agriculture, urban areas, or forestry in the watershed. MDEQ interpreted these land uses and listed several broad potential pollutant categories based on the survey results. Every watershed, for which agriculture was checked, was then listed for sediment, pesticides, organic enrichment / low dissolved oxygen, and nutrients.

Since the late 1980s and early 1990s, pesticide use and pesticide delivery technology has changed considerably. The chemicals used are too expensive to waste. Producers have greatly reduced over-spray and waste of these chemicals. Current use pesticides are not as persistent in the environment like the legacy pesticides DDT and Toxaphene.

## **Current Use Pesticides**

This TMDL is for DDT and Toxaphene. This represents the pesticide listings in the 1996 and 1998 Mississippi Section 303(d) List. The original listings were not specific, however, the listings were meant to represent pesticides for which Mississippi waters have impairment. Therefore, the current use pesticides are not included in the pesticide listings unless there are data indicating impairment. When current use pesticides are found impairing a water body segment, that segment will be listed on the next 303(d) list with the specific chemical pollutant identified.

## **Pollutant Source**

In the 1950s and 1960s, agricultural producers used pesticides that were chemically and environmentally different from the current use pesticides. DDT and Toxaphene have decades long half-lives rather than most of today's environmental half-lives of days or weeks. Today's competitive market of pesticide manufacturing is also encouraging production for more "natural" and "environmentally friendly" pesticides. In essence, effects of legacy pesticides are much different and require different evaluations than the current use pesticides. Even after 25 years of little or no use, DDT metabolites are being found that are degraded metabolites of the parent compound. DDT contamination has

been linked to problems with the reproduction rates of certain avian species such as eagles and pelicans. The eggs from these and other species were weakened due to contamination and reproduction was severely impacted.

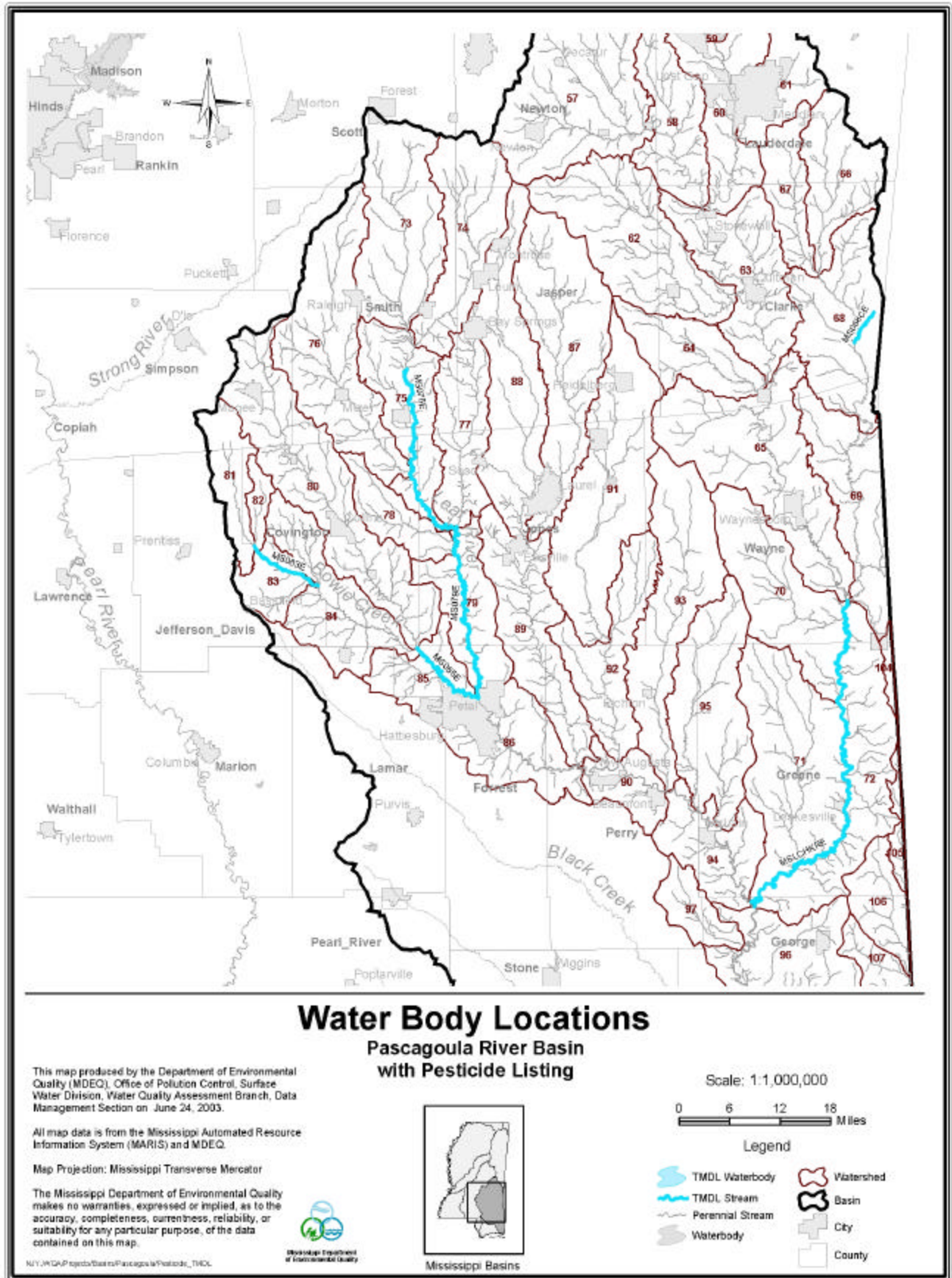
The use of DDT was prohibited in the United States in 1973, and Toxaphene was banned in 1982. Production of both has ceased in the United States. Unfortunately, the residues of the chemicals are still present in the environment. Elevated levels have been found in several fish species, and sediment tests show that the legacy pesticides are still present in the fields and streams. The good news is that the levels found are going down. The purpose of this TMDL document is to promote further reduction of the levels found in the aquatic species and to promote best management practices to keep the sediment on the fields and out of the streams.

### **Identification of Waterbody**

This TMDL has been prepared because the federal consent decree between EPA Region 4 and the Mississippi Sierra Club contains specific requirements for TMDL development throughout the state. The consent decree is based on the 1996 Section 303(d) list. This TMDL was prepared for the remaining pesticide listings in the Pascagoula River Basin. Table 1 lists the water body name, identification number, and location information for each water body included in this TMDL Report. The map following the table shows the locations of the water bodies.

**Table 1. Waterbody Locations**

<b>Name</b>	<b>Identification</b>	<b>County</b>	<b>Location</b>
Bowie Creek	MS083E	Jefferson Davis	Near Deen from Confluence with Dry Creek to confluence with Terrible Creek
Bowie River	MS085E	Lamar, Forrest	Near Hattiesburg from confluence with Okatoma Creek to mouth at Leaf River
Cedar Creek	MS068CE	Clarke	Near Theadville from headwaters to mouth at Buckatunna River
Chickasawhay River	MSLCHKRE	Wayne, Greene	From confluence with Buckatunna Creek to confluence with Leaf River
Leaf River	MS075E	Smith, Covington	From HUC boundary 74 to HUC boundary 79
Leaf River	MS079E	Jones, Covington, Forrest	Near Hattiesburg from confluence with Big Creek to confluence with Bowie River







## Priority Ranking

Prioritization of these TMDLs is based on compliance with the federal consent decree. The consent decree calls for all of the TMDLs for water bodies listed as evaluated on the Mississippi 1996 Section 303(d) list in the Pascagoula River Basin be developed by MDEQ before December 2004.

Water body pollutant combinations that are shown not to need a TMDL based on monitoring or good cause justification are not required to be completed by EPA or MDEQ. The water bodies in Table 1 show the listings included in the TMDL report.

## Water Quality Standards and Numeric Target

Typically, MDEQ selects a target for TMDL development that corresponds to the standard for the pollutant. In this case, the target for DDT and Toxaphene are based on water column concentrations shown in Table 3. The target for the DDT TMDL is the human health water and organism concentrations and the target for the Toxaphene TMDL is the fresh water chronic concentration, shown in Table 3. While it is understood that it will take many years for these pollutants to dissipate, fish flesh monitoring does indicate a declining trend. The TMDL target is water column concentrations below the standard for the pollutants.

**Table 2. Mississippi Fish Advisory Criteria for DDT and Toxaphene**

Consumption	Fish Tissue Concentration (mg/kg) DDT	Fish Tissue Concentration (mg/kg) Toxaphene
No Limit	<1.0	<0.4
2 meals/month	1.0 – 5.9	0.4 – 1.9
No Consumption	>6.0	>2.0

**Table 3 Numeric Criteria for All Waters**

Parameter	Fresh Water Acute	Fresh Water Chronic	Human Health Organisms	Human Health Water and Organisms
4,4 DDT	1.1 µg/l	0.001 µg/l	0.00059 µg/l	0.00059 µg/l
Toxaphene	0.73 µg/l	0.0002 µg/l	0.00075 µg/l	0.00073 µg/l

To gage the declining trend, the Mississippi Fish Advisory Task Force selected the levels shown in Table 2 for issuance of fish consumption advisories. It is important to note these levels and continued monitoring is needed to track future declining trends for these pollutants.

## Load Allocation

DDT and Toxaphene are prohibited from use currently and have been for some time now. Declining trends shown in monitoring fish flesh indicate that the environment is heading toward recovery. The TMDL target is commensurate with the human health water an organism standard for DDT 0.59 ng/l, and the fresh water chronic standard for Toxaphene 0.2 ng/l shown in Table 3. The load allocation can be determined by multiplying the flow by the concentration standard. This is shown as:

$$LA = Q * \text{standard} * \text{conversion factor}$$

These will work in conjunction as BMPs are installed to reduce the sediment load in the streams.

## Wasteload Allocation

The WLA factor for this TMDL is zero. There are no known permitted sources for DDT or Toxaphene in Mississippi.

## Margin of Safety

The margin of safety is implicit because the TMDL does not allow for loading from point sources.

## TMDL Calculation

The TMDL is calculated with the following:

$$TMDL = WLA + LA + MOS$$

where  $WLA = 0$  and  $MOS$  is implicit. Therefore, the TMDL equals the LA, which is determined by the flow multiplied by the standard and a conversion factor.

## Seasonal Variation

Since the WLA and LA apply at all times, the TMDL provides for year-round protection of water quality standards for pesticides. Therefore, the TMDL adequately accounts for seasonal variability.

## Critical Condition

The TMDL represents all flows at all times, and is based on levels of the pollutants found in monitoring fish flesh. The nature of DDT and Toxaphene causes them to have year-round impacts in the fish flesh. Since the WLA and LA apply at all times, the TMDL

provides for year-round protection of the water quality standard for these pesticides, including periods when critical conditions occur.

## **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 and newspapers in the area of the watersheds. The public will be given an opportunity to review the TMDL 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. TMDL mailing list members may request to receive the TMDL reports through either, email or the postal service. Anyone wishing to be included on the TMDL mailing list should contact Greg Jackson at (601) 961-5098 or [Greg\\_Jackson@deq.state.ms.us](mailto:Greg_Jackson@deq.state.ms.us). At the end of the 30-day period, MDEQ will determine the level of interest in the TMDL and make a decision on the necessity of holding a public meeting.

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

## **Technical Analysis**

Elimination of DDT and Toxaphene in the environment is a worthy goal for this TMDL Report. However, it is easier said than done. By proposing this TMDL, MDEQ makes these watersheds eligible for additional Section 319 nonpoint source pollution funding. The Section 319 Grant, which addresses nonpoint source pollution, was increased two years ago. MDEQ made the decision to use these additional funds on nonpoint source projects that directly deal with TMDL issues. Ongoing agricultural efforts such as CRP, WRP, and EQUIP support improved water quality through installation of best management practices. The 2002 Farm Bill has an increase in conservation practices also aimed at improving water quality. Therefore, it is hoped that the use of best management practices in these watersheds will be accelerated.

Prior to receiving these funds, watershed plans need to be produced and prioritized by the Pascagoula River Basin Team. It is also important to include local input on each of these pollutant problems.

It is not the task of the TMDL to create new best management practices or to implement any actions. However, it is important to note that BMPs installed in these watersheds that keep the sediment on the fields and out of the stream will also keep DDT and Toxaphene out of the streams and ultimately reduce the levels available for the fish flesh. The result of implementing these BMPs will achieve dual improvements for the watershed that is sediment reduction and legacy pesticide reduction.

## **Supporting Documentation**

Mississippi Department of Environmental Quality. 2001. Mississippi Delta Fish Tissue Study 2000 Final Report October 31, 2001, Mississippi Department of Environmental Quality. Jackson, MS.

United States Environmental Protection Agency (USEPA). 1995. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1: Fish Sampling and Analysis, Second Edition. U.S. Environmental Protection Agency, Office of Water. Washington, D.C. EPA 823-R-95-007.

United States Fish and Wildlife Service (USFWS). 1990. Schmitt, C.J., J.L. Zajicek, and P.L. Peterman. National Contaminant Biomonitoring Program: Residues of organochlorine chemicals in freshwater fishes of the United States, 1976-1984. Archives of Environmental Contamination and Toxicology. 10:748-782.

United States Geological Survey (USGS). 1997. Kleiss, B.A. and B.G. Justus. U.S. Geological Survey. Proceedings of the 1997 Mississippi Water Resources Conference. Preliminary results of fish tissue analysis from the Mississippi Embayment of the NAWQA Program. Raymond, MS.

