State of Mississippi
Water Quality Assessment
2000 Section 305(b) Report

Pascagoula River Basin Supplement

MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

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Prepared by:
Office of Pollution Control, Surface Water Division
Water Quality Assessment Branch
Post Office Box 10385
Jackson, MS 39289-0385
(601) 961-5171

Introduction

The intent of 305(b) reporting is for Mississippi to describe the status of the quality of the state's surface and ground waters for EPA, Congress, and the public. This report is required pursuant to Section 305(b) of the Federal Clean Water Act and the Mississippi Department of Environmental Quality (MDEQ) is the state agency responsible for generating this document. For the 2000 305(b) Report, EPA has requested an abbreviated version of the existing 1998 document cataloging only the significant changes that have occurred since the last report. For more information about the contents of the Mississippi 1998 Water Quality Assessment Federal Clean Water Act Section 305(b) Report, refer to Appendix A of this document which contains the Table of Contents for that report.

Surface water quality data, ground water data, and other environmental information for the state are compiled and summarized in Mississippi's Section 305(b) Report. Monitoring data is collected by the MDEQ throughout the state through several different monitoring activities: Fixed Station Monitoring Network, Basin Monitoring Networks, intensive surveys and other special water quality studies. This data is used for many purposes, but is collectively analyzed and reported on biennially in the Section 305(b) Report. For this report, the water quality information collected by MDEQ, as well as data provided by other agencies and institutions, are assessed as to whether a waterbody meets its designated use or uses. Waters assessed as not fully supporting their uses in the 305(b) assessment process become candidates for listing on Mississippi's Section 303(d) List of Impaired Waterbodies.

Beginning with the 2000 305(b) Report, Mississippi is moving from a statewide 305(b) assessment approach to a more concentrated basin rotation approach which is implemented over a five year period. Water quality assessments will be conducted annually with each assessment rotating among the state's five basin groups, each of which represents approximately one-fifth of the state. This basinwide approach to water quality management allows the state to focus all of its resources in a smaller geographical area/basin in a given year in order to provide a more thorough assessment for that area. At the end of each five-year cycle, a comprehensive assessment of the state will have been completed. With the basin approach, Mississippi is able to integrate all types of water quality program activities on a basin level. As the development of this approach continues, program activities such as permitting, monitoring, modeling, point and non-point source programs, and basin management planning will be implemented on a basin level.

For the 2000 305(b) Report, the Pascagoula River Basin, MDEQ's first of the five rotating basin groups to receive focused monitoring, is assessed; therefore, only data that were collected in the Pascagoula River Basin is analyzed and presented in this report. The remaining four basin groups will be re-evaluated and assessed on an annual basis as Mississippi progresses through the five-year rotating basin phase.

Catalog of Changes from the 1998 Report

In compliance with the abbreviated format of the 2000 305(b) Report, the only changes that are being represented in the body of this report from the existing 1998 305(b) Report are in Part II: Background, Special State Concerns and Recommendations sections, and Part III: Surface Water Assessment, Chapter 2, Assessment Methodology and Summary Data, Chapter 7, Public Health and Aquatic Life Concerns, and Chapter 8, Basin/Waterbody Information.

Part II: Background

Special State Concerns

In the past, the major water quality problems in Mississippi have been the result of industrial and municipal point source discharges in the heavily populated Gulf Coast and Jackson Metropolitan areas, from nonpoint source pollution in the Mississippi Delta, and from the oil production industry. Impacts from waste discharges have been greatly reduced across the state due to point source control activities, which have resulted in significant improvements in water quality conditions in streams below these discharges. Improvements have also been realized in the Delta and other agricultural areas from better management of the use of pesticides, the development of less persistent chemicals, and the education of farmers in the installation of Best Management Practices. Many of the oil production related problems have also been resolved.

Control of nonpoint source pollution is generally regarded as one of Mississippi's greatest challenges in the future. MDEQ's water pollution control programs, to date, have been effective in correcting water quality problems caused by point sources. Current assessments of water quality in streams and lakes indicate that nonpoint sources of pollution, rather than point sources, are responsible for the majority of the State's impaired waters. Once the remaining needs for Publicly Owned Treatment Works are addressed, additional focus on nonpoint sources of pollution will be needed to attain further water quality improvements. Also, additional planning will be required to develop implementation strategies for nonpoint source control measures. To facilitate this goal, grants or cost-share programs will be necessary to implement controls for agricultural activities. Additionally, urban runoff must be addressed before water quality problems can be completely solved in highly populated areas, particularly along the Gulf Coast and other rapidly growing urban areas. Problems caused by failing septic systems along the Gulf Coast and the shorelines of many lakes must also be addressed.

The loss of the state's wetlands is another issue of concern for Mississippi. Wetlands provide many benefits including fish and wildlife habitat and natural control of erosion. Water quality functions of wetlands include floodwater retention, ground water recharge, sediment stabilization, and pollutant assimilation. Historically, Mississippi's wetland losses were due primarily to conversion to agriculture. However, now urban wetland areas are at higher risk due to increased pressure from residential and commercial development.

The issue of toxic pollutants is another major concern. To address this, Mississippi has adopted widely expanded toxics criteria into its water quality standards. Parameters of particular concern are some of the pesticides, mercury, and PCBs. Where necessary, biological screening and chemical monitoring will be used to assess the extent of contamination.

The rapid industrial growth occurring throughout the state and the demands this economic development may place on the State's environmental resources is another growing area of concern. Historically, Mississippi has always been characterized as a rural state, however, with the advent of the gaming industry as well as a favorable economic climate, this is gradually changing. Previously, only Jackson and the Gulf Coast served as the major population and industrial centers. In recent years, however, economic development and growth are being experienced not only in Jackson and the Gulf Coast, but also in Hattiesburg, Meridian, Tupelo and Northwest Mississippi.

Specific State Concerns

Mississippi Gulf Coast

In the past, elevated bacterial counts have caused concern in swimming and shellfish harvesting areas along the Mississippi Sound. This situation had developed over many years due to the lack of proper planning and the necessary ordinances or controls to ensure proper wastewater disposal. Developments had been allowed to install individual home disposal systems in areas where these systems do not work properly. Also, there were over one hundred fifty private sewage systems discharging wastewater to coastal streams. Improvements in water quality have occurred with the implementation of regional sewage treatment plants for the three-county area.

All publicly owned treatment works along the Gulf Coast have now completed the construction necessary to bring these facilities into compliance with current water quality standards. However, with the ongoing growth of the gaming industry, there have been some facility expansions. The Harrison County Wastewater and Solid Waste Management District completed expansion of the Keegan Bayou Facility (MS0023159). Also, they completed construction of a new facility to serve the Gulfport area, known as Gulfport North (MS0051756). The Mississippi Gulf Coast Regional Wastewater Authority also expanded the Escatawpa Facility (MS0021521). Growth will likely continue over the next several years.

An issue of concern over the past several years has been the increased growth of Hancock County and the resulting inadequate wastewater treatment facilities coupled with failing home disposal systems in that area of the state. Due to state and local cooperative efforts, there have been significant wastewater improvements in Hancock County over the past few years. Over 5,000 residences in and around the town of Waveland, that were previously on inadequate home systems, have been incorporated into a waste water management district which is undergoing a process of implementing a collection system composed of pressure sewers. Additional planning to evaluate the collection system needs of the satellite communities of Kiln, Pearlington, and Diamondhead are underway. The cost effectiveness along with the feasibility of the consolidation of these communities with the Southern Regional Waste Water Management District (SRWWMD), which is responsible for the treatment plant in Waveland that serves Waveland and Bay St. Louis, is ongoing. Installation of an adequate sewer system will provide environmental as well as public health improvements in the southern half of

Hancock County.

Another concern on the Gulf Coast has been sanitary sewer overflows (SSOs) from the publicly owned collection systems. The Environmental Protection Agency (EPA) has initiated a program called Management, Operation, and Maintenance directed toward such systems, abbreviated MOM. The program is asking for public wastewater systems to conduct management, operation, and maintenance self-audits of their own treatment and/or collection facilities problems or violations. EPA will audit facilities that choose not to conduct the self-audit. EPA used a ranking system in each state to determine the first systems selected for the MOM program. In Mississippi the public systems in the three Gulf Coast counties were selected. EPA conducted an introductory meeting with the selected systems in January 1999, and is currently working towards beginning the audit process.

Previously, due to the number of municipal and industrial discharges which enter the confined area of Back Bay, concerns existed regarding the overall water quality and environmental health of the bay. The OPC requested and received initial EPA funding for a study of the bay in 1992 and 1993. Field sampling for this study was completed in 1995 and a water quality model for the bay developed. Based on the study findings, with the exception of Bernard Bayou, Gulfport Lake, and the Industrial Seaway, the waters of the Back Bay and Biloxi Bay estuarine system are fully supporting of the aquatic life designated use.

After meeting the wastewater collection and treatment needs along the coast, the nonpoint source problems are the next priority. Pollutants in stormwater runoff from the heavily populated urban and industrial areas along the Gulf Coast are a special concern. The establishment of MDEQ's new Beach Monitoring Network in 1996 and the redesigned and expanded MDEQ Ambient Monitoring Network in 1997 provides an improved surveillance program for monitoring pollutant levels in the waters of the Gulf Coast.

Agricultural Impacts

A major water quality concern is the impact from agricultural activities, especially in Mississippi's Delta region. This fertile farmland has been subjected to intense tillage and use of agricultural chemicals over many years, with significant impacts to most of the lakes and streams in that area. Nutrients, siltation and pesticides are common pollutants indicated for water quality impacts reported in the Nonpoint Assessment Report for this agricultural region. In addition, DDT and its derivatives and toxaphene caused serious problems in the past, but levels have declined significantly since 1976. Although this area continues to have agrichemical-related fish kills; gradual improvements in water quality have been observed due to better management and the use of less persistent chemicals at optimum spraying times. Agrichemical educational efforts through the Nonpoint Source Program and other agricultural programs are resulting in the adoption of Best Management Practices. These include actions such as minimum tillage, filter strips, crop residue use, and safe pesticide container disposal.

Current nonpoint source assessment data also indicates concern in the Bluff Hills region of the state. High erosion rates have been experienced when this steeply sloping land has been deforested for row crop use. The Conservation Reserve Program (CRP) has been effective, however, in beginning to return this highly erodible land back to forests or pasture.

Escatawpa River near Moss Point

The Escatawpa River near Moss Point is currently assigned a dissolved oxygen criterion variance to 3.0 mg/l. Natural conditions, current industrial and past municipal discharges, in combination with the poor flushing action of the estuary have necessitated this variance. A Use Attainability study is underway by the EPA to determine if this variance is still appropriate.

Mercury Contamination in Fish Tissue from Surface Waters

OPC continues to commit significant resources to determining the status of mercury contamination in Mississippi's waters. Advisories were issued in 1995, 1997 and 1998 for black bass and catfish greater than 10 pounds for some segments of the Bogue Chitto, Escatawpa, Yockanookany and Pascagoula Rivers, and for Enid Reservoir and Archusa Creek Water Park. In addition, an advisory was issued for King Mackerel in all coastal waters. Resources are presently being divided between aggressive monitoring of sites where elevated levels have been found and the monitoring of new sites.

Lower Pearl River

A significant concern of MDEQ and the residents of the lower Pearl River Basin, Pearl River County, is the loss of flow in the historic channel of the lower Pearl River near Picayune, Mississippi. Since the turn of the century, Wilson Slough has progressively captured an increasing amount of flow from the Pearl River, diverting it to the West Pearl River via the Bogue Chitto River. This has greatly reduced the volume of water in the historic channel of the Pearl River passing Wilson Slough at all stages. Hydrographic models projected that, if unchecked, there would be no flow past Wilson Slough during periods of low flow by 1997. This reduction in flow caused the loss or degradation of many of the system's unique environmental features and several miles of aquatic habitat. This was of particular concern since much of the area is shallow, sandy or gravel bottom substrate with excellent mussel habitat. As this reduction in flow occurs at higher and higher stages, there is also concern that wetlands along the historic channel are dewatering. Also, water-oriented recreation and commercial fishing have been adversely affected or curtailed because of this condition.

MDEQ and the Vicksburg District of the Corps of Engineers (COE) worked cooperatively to evaluate the feasibility of restoring dependable flows during low-flow conditions from Wilson Slough, through Walkiah Bluff to Holmes Bayou. Restoration efforts consisting of a weir in the old channel of the Pearl River designed to push 50% of low flows down the historic channel around Walkiah Bluff, four distributary closures and a pilot channel were begun during the summer of 1998, and were completed in November of the same year. The project, while successful in restoring flow to the river has experienced some immediate problems and required additional work which was completed in 1999. Since that time, the State has experienced record droughts and flows in the river have been too low to produce the desired channel enlargement in the historic channel.

Tallahala Creek below Laurel

Tallahala Creek below Laurel is currently assigned a 28 mile dissolved oxygen (DO) criterion variance to 3.0 mg/1 from Highway 15 near Laurel to below Ellisville. This variance has been necessary due to the discharges from numerous city lagoons and the Masonite Corporation. The Masonite Corporation significantly upgraded its wastewater treatment facility in mid 1978. The City of Laurel upgraded its facilities to meet final effluent limits by February 1991. This upgrading offered the possibility of achieving the dissolved oxygen criterion of 5.0 mg/l in at least a larger portion of Tallahala Creek. Due to Tallahala Creek's inclusion on the state's 303(d) list of impaired waters, field studies were conducted in 1996 and 1997 to develop a TMDL for oxygen-demanding pollutants in Tallahala Creek at and below the city of Laurel and to investigate the feasibility of removing the dissolved oxygen water quality standards variance. From these studies, a TMDL has been developed and study findings have shown that the DO variance could be removed from the lower portion of Tallahala Creek. The DO variance for the upper portion of Tallahala Creek from Highway 15 to the confluence with Tallahoma Creek near Ellisville is still warranted.

DDT Contamination in the Delta

DDT contamination in the Mississippi Delta has been a concern ever since the harmful effects of pesticide contamination first became a national issue. DDT was banned for use in Mississippi in 1972; and, although DDT concentrations in fish tissue have decreased ten-fold since that time, the levels remain among the highest in the nation.

The Mississippi Fish Advisory Task Force was formed in order to address the protection of those who routinely consume fish from state waters. The task force consists of scientists and engineers from the MDEQ, Mississippi Department of Health, Mississippi Department of Agriculture and Commerce, and others. This group is charged with developing criteria for issuing fish consumption advisories for Mississippi. It will be responsible for customizing and refining a new risk-based methodology for Mississippi and issuing advisories based on the methodology. One of the goals of the task force is to balance the risks due to contaminants with the beneficial aspects of fish as a high protein, low fat food source.

Nutrient Criteria

According to the 1998 national summary of state 305(b) reports, nutrients represent the third leading cause of impairment of the nation's waters. President Clinton's Clean Water Action Plan, published in the Federal Register on March 24, 1998, requires EPA to establish nutrient criteria that are specific to waterbody types and to ecoregions across the nation. States then have 3 years after EPA publication to adopt the criteria or to propose their own scientifically defensible criteria.

EPA is working toward the adoption of nutrient criteria by the year 2000 and is expecting states to adopt criteria by 2003. In response, MDEQ has assembled a Nutrients Task Force. The task force is a group of academic professionals who have been charged with the task of proposing nutrient criteria appropriate for Mississippi waters. Before December of 2003, Mississippi must adopt nutrient criteria to protect state waters from impairments due to over-enrichment, and it is anticipated that the group will provide their recommendations before December of 2002. However, the State is concerned that the short time frame will not lend itself to valid scientific conclusions that would be appropriate for the varied ecoregional conditions across the state.

Other State Water Quality Issues

The State is concerned about the potential water quality impacts from and the regulation of confined animal operations (CAOs). EPA has issued guidance at the national level in addressing this issue. The State is currently evaluating this guidance.

The State has listed a large number of evaluated waters, many of which are identified as partial watersheds or drainage areas, on its 303(d) list for which no actual monitoring data exist indicating impairment. The State is committed to the monitoring of all these waters for the next few years to verify the potential impairment and the need for TMDL development.

Resource Concerns

Over the past several years, a significant decline in state and federal resources had affected the MDEQ's ability to conduct effective surface water assessment, standards, TMDL, permitting and protection programs. EPA's concerns about the decline in the State's assessment and permitting programs and their intervention and assistance in the OPC's surface water program in 1996, prompted the State's Legislative Budget Office (LBO) to perform a detailed review of the resource needs of the surface water program. The LBO concluded that 29 additional positions were needed in order for the Surface Water Division to conduct adequate surface water assessment and permitting programs. At the recommendation of the LBO, the State legislature in 1997 funded all 29 positions and provided funds for much needed equipment.

This action by the State legislature has provided the staff and equipment necessary to monitor and assess the water quality of more of the State's surface waters, to develop TMDLs, to conduct more extensive water quality testing and analyses, and to respond timely to fish kills and pollution incidents. The MDEQ has also been able to resume its historical role in the compliance, inspection, and enforcement of permits.

MDEQ has issued coverage for storm water projects under Phase I of the NPDES Storm Water Program since 1992. Unfortunately, since its inception the program has been handicapped by a lack of resources for permitting as well as compliance and enforcement. A recent internal reorganization helped this situation by creating an Environmental Compliance and Enforcement Division (ECED) creating more resources for the compliance and enforcement portion of the program. However, only the industrial facilities have compliance inspections. Construction storm water is still handled on a complaint basis only. Even with the creation of this new division, the lack of resources is evident because each ECED inspector has a backlog of construction storm water complaints to address.

Recommendations

1. Additional studies are needed on the Mississippi Gulf Coast to quantify the impacts of nonpoint source pollution and to develop BMPs for use in this area.

2. Educational and incentive programs are needed to promote the use of Best Management Practices to control nonpoint source pollution.

3. More complex non-point data gathering tools are needed for conducting additional assessments. They are needed for documenting NPS impacts from land use changes particularly from agriculture and construction activities.

4. Continued development and implementation of basinwide planning and watershed-based water quality management is needed.

5. Identification of crucial wetland resources in each watershed is needed to focus local, state and federal protection efforts.

6. Additional resources are needed to fund the State's stormwater program with specific emphasis on compliance and enforcement, education, and permit development.

7. In addition, resources are needed to implement and manage the State's Source Water Assessment and Protection Program and the Agricultural Chemical Groundwater Monitoring Program.

8. A greater emphasis on fish tissue contamination is needed. EPA and most other states have switched from action levels for the issuance of consumption advisories in favor of a risk assessment approach. Additional resources are needed to evaluate existing data, statewide and local consumption patterns, and to develop Mississippi specific risk

assessments. Additional resources are also required to increase analytical capabilities for tissue analysis.

9. Resources are needed to address beach monitoring in fresh water swimming areas similar to the existing Coastal Beach Monitoring Program on the Gulf Coast.

Part III: Surface Water Assessment
Chapter Two: Assessment Methodology and Summary Data

Assessment Methodology - Introduction

Surface waters in Mississippi are used for a number of purposes. Waters are used for drinking and food processing, shellfishing, recreation, fishing, and aquatic life support. Surface waters are classified and assigned various use classifications by MDEQ based on existing utilization of the waterbody along with any expected future uses. The use classifications used by the State of Mississippi are as follows:

Public Water Supply
Recreation
Fish and Wildlife
Shellfish Harvesting
Ephemeral

Most of Mississippi's waters are classified as Fish and Wildlife but there are several waters that fall under classifications in addition to or other than Fish and Wildlife. For each of the use classifications listed above, there are various water quality criteria or standards that apply to those waterbody uses and which are used in the assessment process. A waterbody (part or all of a stream, river, lake, estuary or coastline) is normally required to support one or more of these uses. A complete description of the Mississippi's waterbody use classifications and water quality standards can be found in Appendix B: *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 1995).

The Mississippi Department of Environmental Quality (MDEQ) comprehensively assesses the waters of the state on a routine basis to determine if their designated uses are supported. Each use assessed for a waterbody is determined to be either Fully Supported, Fully Supported but Threatened, Partially Supported, or Not Supported in accordance with the applicable water quality standards and EPA guidelines for assessments pursuant to Section 305(b) of the Clean Water Act. A waterbody's use is said to be impaired when, based on current and reliable site-specific data, it is only partially supported or not supported at all.

For 305(b) Water Quality Assessment Reports, MDEQ assesses the state's streams, rivers, lakes, estuaries and coastlines using all existing and readily available information. Water quality data and information can take many different forms, from intensive multi-parameter surveys detailing water chemistry, biology, and physical characteristics to simple observations. This broad spectrum of available data needs to be considered when making water quality assessments. Two types of assessments are made: "evaluated" assessments and "monitored" assessments. The EPA 305(b) guidance, *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Supplement* (USEPA, 1997), defines evaluated waters as "those waterbodies for which the use support decision is based on information other than current site-specific ambient data." When information such as observed conditions, water quality monitoring data over five years old (historical data), data of unknown quality assurance, land use information, incidences of spills or fish kills, monitoring data extrapolated from upstream or downstream of the waterbody, NPDES discharger self-monitoring data, data collected by volunteer programs, anecdotal information and limited water quality data are used as the basis for an assessment, the resulting assessment for that waterbody will be referred to as an evaluated assessment.

Monitored waters are defined by EPA guidance as "those waterbodies for which the use support decision is principally based on current, site-specific, ambient monitoring data believed to accurately portray water quality conditions" (USEPA, 1997). Current data is defined as data collected within five years of the assessment analysis. These assessments are based on one or more different types of monitoring data that has been grouped together by waterbody and then is analyzed collectively in order to determine water quality status or condition of the waterbody. Monitoring data can come in many different forms but primarily consist of one or more of the following data types: physical/chemical, biological, habitat, bacteriological, and/or toxicological. Assessments to determine use support of a waterbody are based either on monitoring data, on other evaluated information, or on both.

Assessment Methodology - Monitored Assessments

Whenever possible, assessments are made using current site-specific monitoring data. Current site-specific ambient monitoring data are believed to most accurately portray water quality conditions. A waterbody is considered monitored if sufficient (both in quantity and quality) physical, chemical, biological, bacteriological, and/or fish tissue data were collected on the waterbody at any time within the appropriate data window. The table below shows the data windows for each of the data types used to assess the Pascagoula Basin for this report.

Data Type	Data Window
Physical	Jan 1994 – Dec 1998
Chemical	Jan 1994 – Dec 1998
Biological	Jan 1994 – Dec 1998
Bacteriological	Jan 1994 – Dec 1998
Fish Tissue	Jan 1994 – Dec 1998

Physical and chemical data include such parameters as pH, temperature, dissolved oxygen, nutrients, suspended solids, turbidity, specific conductance, and certain water column toxicants. Biological data include the community structure of aquatic insects and other macroinvertebrates and the condition of biological habitat on the waterbody. Bacteriological data include water column surveys for fecal coliform bacteria or other bacteriological indicators. Fish tissue data include the analyses of fish flesh for the presence of toxic organic chemicals and metals. The length of record of the data, the type of data and the frequency at which the data is collected are considered when making use support determinations. For example, EPA 305(b) guidance states that for waterbodies to be considered monitored based on fixed station chemical/physical data, the data needs to have been collected quarterly or more frequently. In general, the data utilized in 305(b) assessments are collected, analyzed, and interpreted in a manner consistent with state/EPA guidelines.

MDEQ assesses all existing and readily available information on the quality of the State's waters including information from outside sources. Information and monitoring data are solicited from various resource agencies and institutions. Research conducted or reported by local, state, or federal agencies; members of the public; and/or academic institutions are considered. Agencies that contribute, or have contributed, information for 305(b) reports are the Mississippi Department of Environmental Quality (MDEQ), US Army Corps of Engineers (USACE), Tennessee Valley Authority (TVA), US Geological Survey (USGS), US Environmental Protection Agency (EPA), US Forest Service (USFS), Mississippi Department of Marine Resources (DMR), MS Department of Health, USDA Natural Resources Conservation Service (NRCS), University of Southern Mississippi - Gulf Coast Research Lab (GCRL), and the National Oceanic and Atmospheric Administration (NOAA). Most of the data are compiled and analyzed using EPA's STORET database. The remaining data are compiled and analyzed manually.

Chemical monitoring data are compared to applicable water quality numeric criteria as found in MDEQ's most current version of the Water Quality Standards document. This allows MDEQ to determine which pollutant specific numeric criteria are violated. In addition, for select water quality parameters having no specified numeric criteria, data are compared to target values which, based on best professional judgement, indicate threshold levels of water quality concern. These target values are based on "literature" or scientific "rules of thumb" and are used as potential indicators of water quality degradation with application to narrative water quality standards. The specific water quality criteria and target values used for various parameters are shown in Table III, 2-1.

For the 2000 305(b) assessment, biological data was assessed using a qualitative approach rather than the regional reference approach due to on-going refinement of MDEQ biological collection and analytical methods and the future development of an Index of Biological Integrity (IBI). A qualitative approach using detailed taxonomy, examination of selected multiple biological characteristics and habitat evaluation for benthic macroinvertebrates was used in the assessment process for freshwater wadeable streams. Due to use of a qualitative approach which is not as rigorous as other biological assessment techniques and the large amount of biological data collected by MDEQ using screening methods, it is recognized that the data is only sufficient to identify extremes such as severely degraded or very good conditions.

The size of a waterbody represented by a single monitoring site is determined based on EPA guidance. In general, data from a monitoring site on a wadeable stream represent no

TABLE III, 2-1
Target Levels and Water Quality Criteria for Use Support Decisions
Rivers, Streams, Lakes, and Estuaries

WATER QUALITY CATEGORY/PARAMETERS	UNITS	TARGET LEVEL	AQUATIC LIFE CRITERION (FRESH WATER)	AQUATIC LIFE CRITERION (SALT WATER)	COMMENTS
GENERAL					
Temperature	C		< 32.2	< 32.2	
pH	Standard		6.5 - 9.0	6.5 - 9.0	
DISSOLVED OXYGEN					
Dissolved Oxygen	mg/l		> 4.0	> 4.0	
OXYGEN DEMAND					
Biochemical Oxygen Demand	mg/l	< 5			
Chemical Oxygen Demand	mg/l	< 50			
Total Organic Carbon	mg/l	< 15			
NUTRIENTS					
Total Kjeldahl Nitrogen	mg/l as N	< 1.5			
Nitrate and Nitrite	mg/l as N	< 1			PWS < 10 (Nitrate)
Ammonia	mg/l as N	<1.3	<0.7	<0.7	
Total Phosphorus	mg/l as P	< 0.2			
WATER CLARITY					
Turbidity	NTU	< 100			Not >50 over backgrnd
Total Suspended Solids	mg/l	< 80			
Transparency, Secchi	meters	> 0.2			
Chlorophyll a	mg/cu mtr	< 10			<40 Lakes & Estuaries
DISSOLVED SUBSTANCES					
Conductivity	umhos/cm		< 1000		PWS < 500
Total Dissolved Solids	mg/l		< 1500		PWS <500, MS R. <400
Chlorides	mg/l		-		PWS , <230, MS R. <60
BACTERIA					
Fecal Coliform (upper limit)	#/100 ml		< 4000	< 4000	PWS, FW (Nov.-Apr.)
Fecal Coliform (lower limit)	#/100 ml		< 400	< 400	SHL < 43
WATER COLUMN TOXICANTS*					
Arsenic (III), Total	ug/l		< 360	< 69	(CMC) PWS < 0.0175
Cadmium, Total	ug/l		< 1.8	< 44	(CMC) PWS < 10
Chromium (III), Total	ug/l		< 984	-	(CMC)
Copper, Total	ug/l		< 9.22	< 2.5	(CMC)
Lead, Total	ug/l		< 34	< 235	(CMC) PWS < 50
Mercury (II), Total	ug/l		< 2.4	< 2.1	(CMC) PWS < 0.151
Nickel, Total	ug/l		< 789	< 75.2	(CMC)
Phenol, Total	ug/l		< 0.3	< 0.3	(CMC) PWS < 0.001
Selenium, Total	ug/l		< 21.7	< 325	(CMC) PWS < 10
Zinc, Total	ug/l		< 65	< 92	(CMC)

* Aquatic life criteria for metals was calculated by converting total dissolved CMC (acute) criteria as stated in the State of Mississippi Water Quality Standards (proposed amendments, August 1996), to total recoverable acute criteria using conversion factors published in the 1996 305(b) guidance document. Hardness-dependent criteria are based on a hardness less or equal to 50 mg/l as CaCO3.

Key:
- PWS-Public Water Supply
- FW-Fish & Wildlife
- SHL-Shellfish Harvesting
- CMC-Criteria Max. Conc.

more than ten to fifteen miles. Data from a monitoring site on a larger, non-wadeable stream/river represent about 25 miles. For large rivers, data from a monitoring site represent 50 to 75 miles. At times during the assessment process, these guidelines are modified slightly to account for point source outfalls, major tributaries and change in land cover. For lakes, data from a monitoring site are considered representative of the entire lake for small lakes. For larger lakes, data from a monitoring site are considered representative of part of the lake. In the absence of a specific guideline, best professional judgment is used to determine the portion of the lake represented by the monitoring site. In the case of estuarine and coastal waters, data from a monitoring site are considered to represent an area within a four-mile radius for open water stations. Radii of two miles and a half-mile are used for bay monitoring sites and sheltered bay sites, respectively.

Assessment Methodology - Evaluated Assessments

Evaluated assessments are based on information other than current site-specific ambient monitoring data. This type of information includes such things as land use surveys, location of potential pollution sources, volunteer monitoring data, limited monitoring data of lower confidence, monitoring data greater than five years old, and data that has been extrapolated from an adjacent monitored stream reach. For the current assessment, evaluated assessments were based primarily on land use information; however, the locations of fish kills, occurrence of spills, locations of point sources with significant NPDES non-compliance, data collected by volunteer monitors under the Adopt-A-Stream Mississippi program, available monitoring data greater than five years old, and extrapolated data from and upstream or downstream monitored reaches were used and considered to be evaluated assessments.

Waterbody Use Support Determination

Use support decisions were made based on a cumulative evaluation of all the monitoring data coupled with any other existing and readily available information. There are many different types of information used to make an overall water quality assessment for a waterbody. Water chemistry data that is collected and analyzed in a laboratory serves as a very important analysis tool due to the adoption of parameter specific numeric water quality criteria and helps to establish a use support determination. Increasingly, biological data is becoming a major tool for use in water quality assessment decision making. Since biological assessments reflect chronic, synergistic water quality effects, greater weight was given to the biological rating for the aquatic life support use support (ALUS) decision. When possible, MDEQ prefers to couple water chemistry data with any available biological data (i.e. macroinvertebrate community indices, fish tissue data, trophic status), and habitat data in order to make a more comprehensive assessment. In addition, bacteriological data, fish consumption advisories and shellfish harvesting closures are also used to help establish a waterbody’s use support determination.

The degree of use support determination was made based on 305(b) guidance provided by EPA (USEPA, 1997). Different guidelines were used for the categories of Designated

Use Fully Supported (FS), Designated Use Fully Supported but Threatened (T), Designated Use Partially Supported (PS) and Designated Use Not Supported (NS).

The only exception to the use of EPA 1997 guidance was for recreational use support. The EPA 1997 guidance states that a geometric mean should be used in order to make use support determinations for bacteriological indicators. MDEQ bacteriological water quality standards (MDEQ, 1995) are also written primarily based on the use of a geometric mean from five consecutive samples during a 30 day period. However, most bacteria data collected in the MDEQ ambient monitoring program is collected once per month; therefore, a comparison to the geometric mean of the standard is not possible. Consequently, a different approach was used by MDEQ for the 2000 305(b) assessment. MDEQ bacteria standards have, in addition to the geometric mean, a requirement that there shall be no more than 10% of the samples examined during any month to exceed 400 colonies/100 ml for contact recreation or 400/4000 colonies/100 ml for secondary contact recreation depending on the season. Therefore, MDEQ applied the designated 10% fecal coliform standard values of 400 colonies/100 ml for waterbodies that are listed for use as contact recreation and seasonal 400/4000 colonies/100 ml for secondary contact recreation waterbodies in accordance with the 1994 version of the EPA 305(b) guidance for determination of recreation use support for the 2000 305(b) assessment. In addition, for routine sampling data, a minimum of 12 samples in a year during the five-year assessment period will be required by MDEQ for a sampling location to be considered for bacteriological assessment.

The guidelines for each overall use support category are given below. The various uses for which criteria are shown are: drinking water supply (DW); propagation of shellfish, shellfishing and shellfish consumption (SHL); contact recreational activities (CR); secondary contact recreation (SR); fishing and fish consumption (FC); and aquatic life support (AQ).

Designated Use Fully Supported

DW No drinking water source restrictions or advisories in effect, and/or contaminants do not exceed water quality criteria

SHL Waters classified for shellfish harvesting listed as 'Approved' by DMR's Shellfish Sanitation Program; no shellfish restrictions or bans are in effect.

CR No bathing area closures or restrictions in effect during the reporting period; or not more than 10 percent of the fecal coliform samples examined exceed a density of 400 per 100 ml.

SR For the months of May through October, not more than 10 percent of the fecal coliform samples examined exceed a density of 400 per 100 ml; and for the months of November through April, not more than 10 percent of the fecal coliform samples examined exceed a density of 4000 per 100 ml.

FC No fish consumption restrictions or bans are in effect.

AQ The criterion exceeded in less than or equal to 10 percent of measurements for any one physical or chemical pollutant or stressor for which a state numerical water quality standard applies.

Reliable data indicate functioning, sustainable biological communities (e.g., fish, macroinvertebrates, or algae) representative of a stream considered to be in good condition.

Designated Use Fully Supported but Threatened

The criteria given above for each use for Fully Supported apply in the Fully Supported but Threatened category as well. However, this category is used for a waterbody when the potential for water quality degradation is known to be present in the immediate vicinity or watershed.

Designated Use Partially Supported

DW Drinking water use restrictions resulted in the need for more than conventional treatment and/or contaminant concentrations exceed water quality criteria intermittently.

SHL Waters classified for shellfish harvesting but listed as 'Restricted' by the Department of Marine Resources' (DMR) Shellfish Sanitation Program; or the presence of a 'Restricted Consumption' advisory; or a shellfish ban in effect for a subpopulation that could be at potentially greater risk, for one or more shellfish species.

CR On average, one bathing area closure per year of less than 1 week's duration; or fecal coliform exceed 400 per 100 ml in 11-25 percent of the samples examined.

SR For the months of May through October, fecal coliform exceed 400 per 100 ml in 11-25 percent of the samples examined; and for the months of November through April, fecal coliform exceed 4000 per 100 ml in 11 to 25 percent of the samples examined.

FC Waters used for fishing, but listed by the Commission on Environmental Quality as having a 'Restricted Consumption' advisory.

AQ The criterion exceeded in 11 to 25 percent of measurements for any one physical or chemical pollutant or stressor for which a state numerical water quality standard applies.

At least one biological assemblage (e.g., fish, macroinvertebrates, or algae) indicates less than full support but fair stream condition with slight to moderate modification of the biological community noted.

Designated Use Not Supported

DW Drinking water use restrictions resulted in closures and/or contaminants exceed water quality criteria consistently.

SHL Waters classified for shellfish harvesting but listed as 'Prohibited' by DMR's Shellfish Sanitation Program; or the presence of a 'No Consumption' ban in effect for the general population for one or more shellfish species; or commercial shellfishing ban in effect.

CR On average, one bathing area closure per year of greater than 1 week's duration; or more than one bathing area closure per year; or fecal coliform exceed 400 per 100 ml in more than 25 percent of the samples examined.

SR For the months of May through October, fecal coliform exceed 400 per 100 ml in more than 25 percent of the samples examined; and for the months of November through April, fecal coliform exceed 4000 per 100 ml in greater than 25 percent of the samples examined.

FC Waters used for fishing, but listed by the Commission on Environmental Quality as having a 'No Consumption' advisory; or a 'Commercial Fishing' ban.

AQ The criterion exceeded in greater than 25 percent of measurements for any one physical or chemical pollutant or stressor for which a state numerical water quality standard applies.

At least one biological assemblage (e.g., fish, macroinvertebrates, or algae) indicates non-support or poor stream condition with severe modification of the biological community noted.

Assessment Methodology – Assessment Database (ADB)

All information collected during the assessment process was placed in EPA's Assessment Database (ADB) which underwent customization to facilitate Mississippi's assessment and reporting needs. The ADB is EPA's replacement of the old Waterbody system (WBS) and was useful for maintaining the quality and consistency of our assessments. Some of the information placed in ADB for each waterbody included location and description, assessment types, assessment category (evaluated or monitored), use support determinations, causes of impairment, and sources of impairment. ADB allowed for the linking of impairment causes and sources, even though Mississippi did not have the resources to utilize this function for the 2000 report. ADB was used to generate the various required summary tables for each waterbody type. These tables include: Summary of Fully Supporting, Threatened, and Impaired Waters, and Individual Use Support Summaries. Because Mississippi has moved to a rotating basin approach to assessment, only the assessments that were made for the Pascagoula Basin are currently represented in the ADB. The ADB files for this assessment have also been submitted electronically to EPA.

Assessment Methodology – Discussion of Issues

Monitoring data, even at ambient fixed sites, often does not adequately take into account temporal variations such as seasonal variation and rain events. This is especially true at sites where the data collection is not frequent and the period of record is short-term and/or sporadic. This limited amount of data is also problematic for the assessment process when assessing criterion use support according to the EPA guidance if only the minimum amount of data to be considered monitored (quarterly for fixed stations) was collected. For example, only one violation of the criterion for a particular conventional pollutant will cause the overall percentage of measurements collected quarterly to equal 25%. Consequently, according to 305(b) assessment guidance, the waterbody would be considered partially supporting and therefore, impaired. MDEQ will not list a waterbody as impaired based on one violation of numeric criteria due to the possible occurrence of an anomalous event. We also recognize that most ambient data certainly does not take into account diurnal variations. An exception to this is intensive water quality studies for wasteload allocation and total maximum daily load development. This will significantly bias dissolved oxygen averages in waterbodies with considerable diurnal variation. Sufficient resources are not available to conduct the level of monitoring necessary to remove such biases.

Mississippi has a stream classification known as Ephemeral (see the State's water quality standards in Appendix A). This classification is listed on the Individual Use Support Summary tables in the following sections. An ephemeral stream is a natural or manmade conveyance that only flows in direct response to a rain event. The Commission on Environmental Quality formally assigns the Ephemeral classification. Waters in this classification do not support a fisheries resource and the criteria for fish consumption and aquatic life use support are therefore not applicable. Consequently, no use support determination screening criteria are listed in the guidelines above.

The main emphasis of the Water Quality Assessment Report is the use support status of Mississippi's surface and ground waters. However, attainment of Clean Water Act goals (fishable and swimmable) may also be implied from the use support information. Uses appropriate to Mississippi's waters include Aquatic Life Support, Fish Consumption, Shellfish Harvesting, Swimming, Secondary Contact, Drinking Water, and Ephemeral. Because the State has formal classifications of Fish and Wildlife, and Recreation, these are also shown as uses in the Individual Use Support Summary Tables found in the basin assessment section later in this report. All waters classified higher than Fish and Wildlife are also intended to adequately support fish and wildlife uses. Therefore, use support assessments for Aquatic Life Support are duplicated under the Fish and Wildlife use. Use support assessments for Contact Recreation and Secondary Contact are duplicated under Swimming. The fishable goal of the Clean Water Act is reported under, Fish Consumption, Shellfish Harvesting, and Aquatic Life Support uses. The swimmable goal is reported under the Swimming and Secondary Contact uses.

Section 303(d) Waters

Section 303(d) of the Clean Water Act and the implementing federal regulations at 40 C. F. R. § 130.7 require the State to:

> identify and list waterbody segments that are *known* to be water quality limited or that are otherwise expected to be water quality limited (40 C.F.R. § 130.2(j));
>
> establish a priority ranking for the impaired waters taking into account the severity of the pollution and the importance of the water's impaired use; and
>
> develop TMDLs for those pollutants impairing any use of the waterbody, establishing pollutant level reductions that will cause the impaired use to be fully supported.

In 1996, Mississippi's Section 303(d) List of Impaired Waterbodies included not only monitored segments, but also evaluated segments for which MDEQ lacked monitoring data. MDEQ had obtained some form of information, usually anecdotal information, not of water quality impairment, but of predominant land-use activities in an area from organizations and groups who were actively solicited for research they may be conducting or reporting. This information, received largely in the form of surveys returned to MDEQ by NRCS field personnel, previously had been used to compile Mississippi's Clean Water Act § 319 assessment. These evaluated segments were taken primarily from MDEQ's 1989 Nonpoint Source Assessment document that included numerous NRCS delineated watersheds. These segments were not (and are not) known to be impaired, but were (and remain) on the list based upon the information gleaned from the surveys and questionnaires completed in 1984. Placing these evaluated segments on the 1996 list produced a very long list that included both monitored waterbody segments with known impairment and merely evaluated segments (most of them entire watersheds) for which no known monitoring data indicated impairment and for which MDEQ was unable to perform any type of quality control analysis regarding the validity of the survey/questionnaire responses.

In 1998, MDEQ again listed the evaluated segments on the Section 303(d) list. However, continued listing of a merely evaluated segment on the 1998 Section 303(d) list may lead to the assumption that a NPDES permit issued allowing a discharge of a pollutant into the listed segment would "cause or contribute to a violation of water quality standards" in violation of 40 C.F.R. § 122.4(i). This assumption is not valid for evaluated (unmonitored) segments. While it is appropriate to list segments based on anecdotal evidence and broad assumptions when the purpose of the list is to reflect a commitment to monitor the segment, it is not justifiable to use those assumptions regarding evaluated segments to deny a permit to which the applicant otherwise is entitled. This denial would be both an arbitrary and capricious decision of the Mississippi Environmental Quality Permit Board and a violation of the applicant's right to due process. This problem in "translation" between the commitment of an agency to monitor waters and that agency's permitting process causes MDEQ now clearly to distinguish the import of a segment's listing as either monitored or evaluated. In short, for permitting purposes no presumption of impairment arises due to a segment's listing as "evaluated". MDEQ, however, will use site-specific and application-specific data to determine whether any evaluated segment should undergo additional water quality modeling or monitoring prior to the issuance of any permit for discharge into that segment.

Because of the significant difference between monitored and evaluated segments, MDEQ no longer blends the monitored waters and the evaluated waters in its Section 303(d) list. For this reason, the 1998 list differs from the list developed in 1996; however, this modification has not caused the removal of any segment found on the 1996 list. For 1998, evaluated waters (based on evaluation only, no monitoring data) are now shown after the monitored waters in a second section of the list. If monitoring data indicates a waterbody segment is impaired, the segment will be moved to the State's monitored part of the list. Conversely, if monitoring indicates the water's uses are fully supported, the segment will be removed from the list.

Mississippi has fulfilled its obligation with respect to Section 303(d) of the Federal Clean Water Act. The document developed to meet the State's Section 303(d) requirements includes Mississippi's List of Waterbodies, and an identification of pollutants causing (or potentially causing for evaluated segments) the use impairment.

Impaired streams, rivers, lakes, estuaries, and coastlines, (where monitoring data indicate impairment) on the List of Waterbodies as well as the evaluated portion of the list are sorted according to Mississippi's ten major river or drainage basins. These are:

Big Black River Basin	Coastal Streams Basin
Mississippi River Basin	North Independent Streams Basin
Pascagoula River Basin	Pearl River Basin
South Independent Streams Basin	Tennessee River Basin
Tombigbee River Basin	Yazoo River Basin

MDEQ has included a location description within the 303(d) list for each waterbody segment. The drainage areas on the list are identified by the nearest community to the mouth of the watershed. Additionally, the 1998 Mississippi Section 303(d) List of Waterbodies includes a Priority Ranking of Waterbodies. The document also includes a discussion of the waterbodies that were targeted for TMDL development during 1998 and 1999. Also available is a companion document listing pollution causes delisted from the 1996 Section 303(d) list, along with the rationale for making the delisting decision.

The State submitted its draft Section 303(d) list to EPA in February 1998 at the beginning of the public notice period required for the list. MDEQ received comments from the public and EPA regarding the initial 1998 list. Also, during that review period, NPDES permitting in Mississippi began to be questioned in reference to the 303(d) list. These new ramifications for the list required additional time for EPA and Mississippi to work out the future NPDES permitting and the 303(d) list. Also, the lawsuit between EPA and Earthjustice was settled. In January, 1999, Mississippi submitted a revised Section 303(d) List of Waterbodies to EPA for approval. EPA's comments, which generally only requested clarification, have been reviewed and addressed. A final 1998 Section 303(d) list was submitted to EPA in April 1999. A copy of the 1998 Section 303(d) List of Waterbodies and the delisting package for 1996 are available by contacting MDEQ; they are not included in this report. The next update to Mississippi's Section 303(d) List of Waterbodies is scheduled for release in April 2002.

Part III: Surface Water Assessment
Chapter 7: Public Health and Aquatic Life Concerns

Surface Waters Affected by Toxicants

Toxic pollutants in our environment are a widespread and growing public concern. As MDEQ turns its attention more toward risk assessment and public health, levels of toxic pollutants in water, sediment and fish tissue become increasingly important. Contamination from agricultural, silvicultural, industrial and municipal sources has been documented in several areas of the state. This information was gathered through various monitoring activities of the MDEQ and some federal agencies.

In the past, monitoring for toxins in surface waters has been primarily confined to fish tissue collected by the MDEQ Office of Pollution Control (OPC) Laboratory through the ambient fixed station monitoring program and special studies. Historically, routine ambient monitoring by the MDEQ for water column and sediment toxicants was not conducted due to limited resources. However, in 1991, monitoring for water column toxicants was reintroduced in the OPC's ambient monitoring program for the first time since 1976. In 1997, sampling frequency on surface water was increased to quarterly for selected metals and phenols at fixed stations across the state.

Routine sampling of sediments has been incorporated into the MDEQ ambient monitoring program since 1997, with collections at a limited number of sites. Sediment collections are now included in the sampling regime for whole basin studies. Sediment sampling for toxicants is also conducted during special studies and investigations at pollution incidents (spills) or hazardous waste sites.

Bioassay information, concerning the potential acute and chronic toxicity of various industrial and municipal effluents to their receiving streams is being generated by a number of NPDES permitees required to perform Whole Effluent Toxicity tests as part of their permit or for monitoring purposes. In the past, the OPC lab also performed WET tests for compliance monitoring but due to budget constraints in 1994, this monitoring ceased. It was made aware to OPC by EPA that our requirement for WET tests are only 10% of the permitted facilities. Since the WET requirement is minimal throughout the NPDES permits in Mississippi only 3-4 tests are required per year. Other avenues of meeting this requirement by EPA are being discussed, one option is contracting out these 3 or 4 tests per year to an approved WET testing laboratory.

Toxicants in Fish Tissue

In Mississippi, numerous lakes and streams have been impaired in the past due to toxicants in fish tissue. Pesticides continue to be of concern in the Yazoo River Basin (Delta region). Recent MDEQ concern about mercury contamination in fish tissue was confirmed by fish tissue sampling from 1993-1998. Samples showed elevated mercury levels in fish tissue in several areas of the state.

Concern over dioxin has declined as the paper industry has virtually eliminated dioxin formation in its processes. The dioxin advisory on the Leaf River, which originated in 1989, was removed in 1995. Dioxin concentrations in the Escatawpa River declined as well, and the Limit Cosumption Advisory for fish was removed in 1996. A No Consumption Advisory, however, remains for Country Club Lake near Hattiesburg for dioxin and PCP.

Most of the waterbodies in Mississippi with elevated levels of toxicants have some form of the toxicant present in the fish tissue. The MDEQ's large fish tissue database substantiates concern that DDT and toxaphene levels should be closely monitored in future sampling efforts.

From 1993-1995, there were no fixed ambient fish tissue sites visited. The majority of the organo-chlorines and mercury data was obtained though the 1993-1995 Clean Lakes Program. There were 65 sites visited in the Clean Lakes Program and 143 fish tissue samples collected. DDT was found in 81 of these samples and toxaphene was found in nine. Total DDT levels continue to be highest in the Delta region with levels in composites of fish fillets exceeding FDA action levels for four samples. Toxaphene was also found in fish tissue in certain surface waters of the Delta. Levels of concern have been detected exclusively in the Yazoo River Basin. Samples exceeding the FDA Action Levels for the Toxaphene and DDT are listed in Table III, 7-1.

In 1996, the fixed ambient fish tissue network was modified and reinstated as part of the new Ambient Monitoring Network. From 1996-1998, there were 74 fish tissue sites visited and 159 samples collected. DDT was found in 86 of these samples and toxaphene was found in 11 samples. There were no samples that exceeded the FDA action levels for DDT or toxaphene from 1996-1998.

TABLE III, 7-1
Fish Tissue Exceeding FDA Action Levels for
Organo-chlorines

(Analyses Performed from 1993 through 1996)

Year Sampled	Location	Species	Contaminant	Level (ppm)
1994	Moon Lake	Buffalo SPP.	Total DDT	5.62
1994	Moon Lake	Channel Catfish	Total DDT	6.19
1995	Roebuck Lake	Bigmouth Buffalo	Total DDT	5.64
1995	Roebuck Lake	Bigmouth Buffalo	Toxaphene	11.50

Fish Consumption Advisories and Fishing Bans

The fish consumption advisories and commercial fishing bans presently in effect are listed in Table III, 7-2.

TABLE III, 7-2

Fish Consumption Advisories and Fishing Bans

11/30/00

WATERBODY	LOCATION	CONTAMINANT	AREA AFFECTED	TYPE RESTRICTION	START DATE
Yockanookany River	near Kosciusko	PCBs	12 Miles	Commercial Fishing Ban No Consumption" Advisory All Species	1987
Conehoma Creek	near Kosciusko	PCBs	0.3 Miles	Commercial Fishing Ban No Consumption" Advisory All Species	1987
Country Club Lake	near Hattiesburg	PCP & Dioxins	66 Acres	No Consumption" Advisory All Species	1990
Old Little Tallahatchie River & Lake Suzie	near Batesville	PCBs	8 Miles	Commercial Fishing Ban No Consumption" Advisory All Species	1989
Escatawpa River	southeast Mississippi	Mercury	30 Miles	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1995
Enid Reservoir	near Enid	Mercury	28,000 Acres Full Pool	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1995
Bogue Chitto River	southwest Mississippi	Mercury	Entire Length 70 Miles	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1995
Pascagoula River	southeast Mississippi	Mercury	Entire Length	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1996
Archusa Creek Lake	near Quitman	Mercury	371 Acres	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1996
Yockanookany River	near Ofahoma	Mercury	Entire Length	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1995
Yocona River	near Enid	Mercury	Enid Spillway to Confl. w/ L. Tal. R.	Limit Consumption" Advisory Catfish > 10 lbs & Bass	1996
Gulf Of Mexico	Gulf Coast	Mercury	Entire Mississippi Gulf	<33 inches: No Restrictions 33-39 inches: Limit Consumption >39 inches: No Consumption **King Mackerel Only**	1998

Statewide Mercury Contamination Study

Because of regional and national concern over mercury contamination in fish, the MDEQ began intensively monitoring the state's fisheries for mercury in 1993. From 1994-1998, 865 fish tissue samples from 155 sites have been analyzed. Based on results obtained in 1993 and 1994, an interagency task force was convened to address mercury contamination in Mississippi. Members of the task force are from the MDEQ, the Mississippi Department of Health, and the Mississippi Department of Wildlife, Fisheries and Parks. In May 1995, advisories were issued for four waterbodies having fish with average levels of at least 1 part per million of mercury. In 1996, three additional advisories were issued. In 1997, the Department of Marine Resources began working with the task force, and in 1998, an advisory was placed on King Mackerel in the Mississippi Gulf. A list of the advisories is given in Table III, 7-2. Advisories will be added or modified as needed.

When monitoring a fishery for mercury, a two phased approach is utilized. The first phase is a screening phase in which a site is sampled for bass or large catfish, both of which tend to accumulate high levels of mercury. If elevated levels of mercury are found, a second, more intensive phase is initiated. The site is revisited and several species and size classes are sampled. Based on the levels of mercury found, a determination is made as to the necessity of an advisory.

The majority of the scientific community believes that elemental mercury is widely distributed in the environment due to a combination of natural geologic conditions, old industrial sources, and atmospheric deposition from coal fired power plants and incinerators. It is further believed that water quality or sediment quality conditions in certain waterbodies favor the conversion of this elemental mercury, which is relatively inert, through a process known as methylation to the more toxic methyl mercury. Methyl mercury is much more bioavailable, and therefore enters the food web more readily.

Dioxin Studies

Introduction

Dioxin below bleach kraft pulp facilities has been a concern in Mississippi since the initial results of EPA's Bioaccumulation Study were received in 1989. Since that time, DEQ has undertaken an aggressive fish tissue monitoring program below these facilities and has issued a series of advisories on the Leaf, Pascagoula, and Escatawpa Rivers. The paper companies responded to the situation by modifying their processes to prevent the formation of the unwanted byproduct in their effluent. Once these changes were made, MDEQ documented a corresponding steady decline in dioxin in the fish tissue, and the advisories were rescinded as the fish tissue concentrations declined. The last of these advisories were removed from the Escatawpa River in July 1996.

Escatawpa River Study

A similar advisory was issued for the lower Escatawpa River in 1990, and intensive fish tissue monitoring began on the Escatawpa River in 1991. This monitoring documented a similar decline in dioxin, and in July 1996, all fish consumption advisories were lifted from the lower Escatawpa River. Fish tissue was collected in 1996, 1997 and 1998. Tables III, 7-3a, III, 7-3b, and III, 7-3c show all of the data collected from 1996-1998.

International Paper continues to collect fish tissue data as required in their NPDES permit.

Leaf River Study

MDEQ conducted intensive fish tissue monitoring on the Leaf River annually from 1990 through 1996. This monitoring showed a steady decline in dioxin concentrations in Leaf River fish, and in April 1995, all fish consumption advisories were removed from the Leaf River. Additional sampling in 1996-1997 was conducted, but on a smaller scale than during previous years. Sampling was conducted on the three sites closest to the mill. DEQ concentrated sampling efforts on Channel Catfish, but Flathead Catfish were collected when available. Tables III, 7-4a, III, 7-4, and III, 7-4c show all of the data collected in 1996-1998.

Tombigbee River

Weyerhauser, Inc. began operation of a new bleach kraft facility near Columbus in May of 1990. Their discharge enters the Tennessee-Tombigbee Waterway in southern Lowndes County. Weyerhauser participated in the 1989 "MS Cooperative Study", and the results were used to establish background levels. A condition of their NPDES permit requires the collection and analysis of fish tissue for TCDD and TCDF on a yearly basis. Data from the 1996-1998 study are given in Tables III, 7-5a, III, 7-5b, and III, 7-5c. There have been no dioxin problems observed in this system to date.

TABLE III, 7-3a
Dioxin In Fish Tissue
Escatawpa River
1996

SITE	COMMON NAME	# SAMPLE	WEIGHT (LBS.)			DIOXIN (ppt)		
			MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ
2	Blue Catfish		6.6	5.5	5.9	1.11	1.26	1.24
2	Flathead Catfish	11	11.5	6.6	8	0.252	0.004	0.38
2	Smallmouth Buffalo	10	15.5	11.9	13.15	1.2985	15.674	2.866
3	Blue Catfish	8	10.2	6.2	7.58	1.138	0.7947	1.22
3	Flathead Catfish	10	22	6.3	10.96	3.3287	1.6147	3.49
3	Smallmouth Buffalo	1	11.6	11.6	11.6	1.54	8.5	2.39

TABLE III, 7-3b
Dioxin in Fish Tissue
Escatawpa River
1997

SITE	COMMON NAME	# SAMPLE	WEIGHT (LBS.)			DIOXIN (ppt)		
			MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ
2	Smallmouth Buffalo	5	15.6	12	13.9	0.72	4.4	1.16
2	Smallmouth Buffalo	5	11.5	9.4	10.5	0.53	7.1	1.24
2	Flathead Catfish	4	14.5	11.1	12	<0.51	0.33	0.03
2	Flathead Catfish	5	10.3	8.3	9	0.3	0.34	0.334
3	Smallmouth Buffalo	2	20.8	16.1	18.4	<1.3	15	1.5
3	Smallmouth Buffalo	3	14.9	11.9	13.3	1.1	22.9	3.39
3	Flathead Catfish	3	10.7	9.5	10	1.5	0.97	1.6
3	Flathead Catfish	4	8.9	8.2	8.4	<0.56	<0.73	0
3	Blue Catfish	2	15.2	12.5	13.8	<1.3	<0.78	0
3	Blue Catfish	3	11	10	10.5	1.4	1.4	1.54

TABLE III, 7-3c
Dioxin in Fish Tissue
Escatawpa River
1997

SITE	COMMON NAME	# SAMPLE	WEIGHT (LBS.)			DIOXIN (ppt)		
			MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ
2	Blue Catfish	3	14.9	13.0	14.2	<0.7	1.1	<0.80
2	Smallmouth Buffalo	3	12.0	10.4	11.3	1.3	19.4	3.20
3	Flathead Catfish	3	10.8	10.4	10.6	1.1	0.83	1.20
3	Smallmouth Buffalo	3	17.0	10.8	13.0	1.3	26.0	3.90

TABLE III, 7-4a
Dioxin in Fish Tissue
Leaf River
1996 Sample Summary

OPC # DF96-	SITE	COMMON NAME	# SAMPLE	WEIGHT (LBS)			% LIPIDS	DIOXIN (ppt)		
				MIN	MAX	MEAN		TCDD	TCDF	TEQ
5	0.5	Flathead Catfish	5	9.2	12.2	10.6	6.55	0.981	0.420	1.023
6	0.5	Flathead Catfish	3	5.5	6.7	6.1	2.15	0.295	0.356	0.3306
7	1.5	Flathead Catfish	2	18.5	22.9	20.7	3.6	1.280	<0.210	1.28
8	1.5	Flathead Catfish	5	9.4	12.0	10.7	2.35	0.666	0.174	0.6834
9	1.5	Flathead Catfish	4	6.3	7.9	6.9	1.4	0.391	0.353	0.4263
10	2	Flathead Catfish	2	6.9	7.5	7.2	0.79	0.417	0.042	0.4212
11	2	Flathead Catfish	3	5.5	6.2	5.9	0.7	0.508	0.225	0.5305
12	2	Channel Catfish	5	1.0	1.5	1.2	1.35	0.273	<0.0036	0.273
13	4	Flathead Catfish	1	22.0	22.0	22.0	17.05	1.150	0.140	1.164
14	4	Flathead Catfish	1	9.7	9.7	9.7	3.6	1.130	<0.202	1.13
15	4	Flathead Catfish	4	5.3	6.0	5.7	1.23	0.502	0.089	0.5109
16	4	Channel Catfish	5	1.3	1.8	1.6	1.36	<0.351	<0.055	0
17	5	Flathead Catfish	1	22.5	22.5	22.5	3.44	10.200	0.292	10.2292
18	5	Flathead Catfish	3	8.6	11.7	9.9	2.01	1.480	<0.096	1.48
19	5	Flathead Catfish	5	6.1	7.9	6.8	1.84	1.210	0.126	1.2226

TABLE III, 7-4b
Dioxin in Fish Tissue
Leaf River
1997 Sample Summary

SITE #	OPC #	SPECIES	WEIGHT			2,3,7,8 TCDD	2,3,7,8 TCDF	TEQ (ppt)
			MIN	MAX	AVG			
1.5	DF97023	Channel Catfish	1.2	1.5	1.3	<1.00	<1.00	0
1.5	DF97024	Channel Catfish	1.0	1.2	1.2	1.3	<1.00	1.3
2	DF97021	Channel Catfish	1.2	1.6	1.4	ND	ND	0
2	DF97022	Channel Catfish	1.0	1.2	1.1	<1.00	<1.00	0
4	DF97018	Channel Catfish	1.8	2.3	2.1	ND	ND	0
4	DF97019	Channel Catfish	1.4	1.7	1.5	ND	<1.00	0
4	DF97020	Flathead Catfish	4.5	6.3	5.2	ND	<1.00	0

Table III, 7-4c
Dioxin in Fish Tissue
Leaf River
1998

Site #	OPC #	Species	# In Sample	Weight (lbs)			Dioxin (ppt)		
				MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ
1.5	DF98003	Channel Catfish	5	1.49	1.16	1.31	ND	ND	0.00
1.5	DF98004	Channel Catfish	5	1.12	0.97	1.04	ND	ND	0.00
2.0	DF98005	Channel Catfish	4	1.70	1.30	1.51	ND	ND	0.00
2.0	DF98006	Channel Catfish	5	1.19	1.06	1.12	ND	ND	0.00
4.0	DF98001	Channel Catfish	5	2.42	1.79	2.10	<1.00	ND	0.00
4.0	DF98002	Channel Catfish	5	1.59	1.43	1.50	<1.00	ND	0.00

TABLE III, 7-5a
Dioxin in Fish Tissue
Tombigbee River
1996

Site	Common Name	# In Sample	Weight(LBS)			DIOXIN(ppt)			Weight		
			MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ	MAX	MIN	MEAN
1	Channel Catfish	6	1.23	0.78	0.93	0.19	ND	0.19	560	356	424
1	Largemouth Bass	5	0.94	0.46	0.71	ND	ND	0	428	210	320
2	Channel Catfish	5	2.69	0.52	1.66	0.24	ND	0.24	1220	238	752
2	Channel Catfish	5	2.69	0.52	1.66	0.21	0.079	0.22	1220	238	752
2	Largemouth Bass	4	1.21	0.63	0.81	ND	0.26	0.026	548	288	368
3	Channel Catfish	4	1.15	0.57	0.88	ND	0.27	0.027	522	258	400
3	Largemouth Bass	5	1.58	0.65	0.91	ND	ND	0	716	296	414
4	Channel Catfish	4	0.86	0.66	0.79	0.16	ND	0.16	390	301	358
6	Largemouth Bass	6	0.86	0.40	0.72	ND	ND	0	392	182	327

TABLE III, 7-5b
Dioxin in Fish Tissue
Tombigbee River
1997

Site	Common Name	# In Sample	Weight(LBS)			DIOXIN(ppt)			Weight		
			MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ	MAX	MIN	MEAN
1	Channel Catfish	5	0.87	0.58	0.78	ND	ND	0	395	265	352
1	Largemouth Bass	6	1.00	0.67	0.82	ND	ND	0	455	305	372
2	Channel Catfish	6	1.30	0.61	0.82	ND	ND	0	590	275	373
2	Channel Catfish	6	1.30	0.61	0.82	ND	ND	0	590	275	373
2	Largemouth Bass	2	1.11	0.47	0.65	ND	ND	0	505	215	296
3	Channel Catfish	3	0.91	0.46	0.72	0.18	0.05	0.19	415	210	328
3	Largemouth Bass	3	0.93	0.57	0.75	ND	ND	0	420	260	339
4	Channel Catfish	4	1.14	0.49	0.75	ND	0.06	0.006	515	220	341
4	Largemouth Bass	4	0.89	0.61	0.80	ND	ND	0	405	275	365

TABLE III, 7-5c
Dioxin in Fish Tissue
Tombigbee River
1997

Site	Common Name	Weight (LBS)			DIOXIN(ppt)			Weight		
		MAX	MIN	MEAN	2378 TCDD	2378 TCDF	TEQ	MAX	MIN	MEAN
1	Channel Catfish	2.05	0.67	1.23	ND	ND	0.00	928	304	556
2	Largemouth Bass	1.09	0.35	0.64	0.32	0.61	0.92	494	161	290
3	Channel Catfish	0.86	0.45	0.73	ND	ND	0.00	388	204	332
4	Channel Catfish	0.68	0.36	0.50	ND	ND	0.00	310	162	228

Country Club Lake

A fish consumption advisory was issued for this lake in 1987 following several fish kills due to spills of wood treating material including pentachlorophenol. Dioxin contamination has been documented in this lake, and fish have been analyzed for dioxin on four occasions, the most recent of which was September and October 1997. MDEQ is considering removal of the Dioxin advisory, however a PCP advisory is still in effect. Right side fillets collected for the dioxin study will be used to determine what levels of PCP's persist in the fish. The results are given in Table III, 7-6 and indicate that dioxin is declining in fish in the lake.

Table III, 7-6
Dioxin in Fish Tissue
Country Club Lake
1997

OPC #	Species	Weight (lbs)			Dioxin (ppt)
		Max	Min	Mean	TEQ PCDD & PCDF
DF97025	Largemouth Bass	0.41	0.51	0.46	1.27
DF97026	Largemouth Bass	0.73	0.86	0.80	0.72
DF97029	Channel Catfish	7.33	7.33	7.33	21.01

Fish Kills

From January 1996 through December 1998, the OPC investigated 59 fish kills. Thirty-nine percent of these were associated with naturally occurring low dissolved oxygen levels. In twenty-five percent of the investigations the cause could not be determined and 17% were associated with pesticides. The remaining 19% were those related to runoffs, sewage leaks and other unpermitted discharges. Fish kills investigated for this period and since January 1990 are listed in Table III, 7-7. Since 1990, the OPC Biological Services Section has investigated a total of 167 fish kills for an average of 18.5 kills per year with 74% occurring during the spring and summer. For each kill, the number of fish, area affected, and cause and source of the kill are given, if known. The annual or monthly precipitation is not indicated in the table, however, a direct correlation between summer rain events and pesticide related fish kills, particularly in the Mississippi Delta Ecoregion has been noted.

Many fish kills investigated were the result of natural causes such as low dissolved oxygen in backwater areas, or parasites and diseases. In these cases the cause is listed as "natural". By the time many kills are reported the dead fish have deteriorated to the point that the cause is difficult to discern. When the cause can not be determined the kill is categorized as "unknown".

TABLE III, 7-7
Reported Fish Kills
1990-1998

WATERBODY	DATE	# FISH	AREA AFFECTED	CAUSE	SOURCE
Escatawpa Rvr, Jackson Co	12-Feb-90	>2000	unknown	Temp. Shock	N/A
Buelow Pond, Warren Co	13-Feb-90	113	<1 acre	unknown	N/A
Recon League Lake, Bolivar Co	22-Mar-90	>300	unknown	unknown	unknown
Long Lake, Bolivar Co	29-Mar-90	>50	unknown	oil	Janoush Bro.Marine
Brickyard Bayou, Harrison Co	17-Apr-90	>50	unknown	unknown	unknown
Private Pond, Hinds Co	19-Apr-90	~150	unknown	Low D.O.	unknown
Ross Barnett Res., Hinds/Rankin Co	29-Apr-90	~250	unknown	Spawning Stress	natural
Gum Branch, Perry Co	18-Jun-90	>100	1.5 miles	Sodium Sulfite	G.P.
Lead Bayou, Bolivar Co	08-Jul-90	12	<0.25 acres	Low D.O.	Cleveland WWTP
Lynch Creek, Hinds Co	16-Jul-90	~100	1.3 miles	Low D.O.	Jackson WWTP
Deer Creek, Washington Co	25-Jul-90	>50	1.25 miles	Low D.O.	nonpoint
Roosevelt Lake, Scott Co	02-Aug-90	unknown	unknown	unknown	unknown
Buck Haven Rest, Leflore Co	02-Aug-90	~500	unknown	Low D.O.	natural
Greenbrook Subdivision, Desoto Co	17-Aug-90	>1000	unknown	Low D.O.	natural
Pearl River, Pearl River Co	24-Aug-90	~6500	unknown	Low D.O.	low flow
Crossgates Lake, Rankin Co	04-Sep-90	>5000	unknown	Low D.O.	natural
Bayou Pierre, Claibourne Co	16-Sep-90	unknown	1.5 miles	unknown	unknown
Escatawpa Rvr, Jackson Co	08-Oct-90	unknown	unknown	unknown	unknown
Sunflower Rvr, Coahoma Co	09-Oct.-90	<35	unknown	unknown	unknown
Escatawpa Rvr, Jackson Co	15-Oct.-90	unknown	unknown	stress	natural
Tchoutacabouffa River, Harrison Co	16-Oct-90	<10	unknown	natural	unknown
Tchoutacabouffa River, Harrison Co	16-Oct-90	>200	~1 acre	unknown	unknown
Beaver Creek, Amite Co	20-Nov-90	~100	unknown	unknown	unknown
Pearl River, Pearl River Co	20-Apr-91	unknown	unknown	parasite	natural
Blue Lake, Leflore Co	23-May-91	unknown	unknown	Low D.O.	natural
Old Pearl River, Hinds Co	14-Jun-91	unknown	unknown	drainage	flood control
Townsend Lake, Humphreys Co	14-Jun-91	>30	unknown	Low D.O.	natural
Williams Lake, Rankin Co	14-Jun-91	>100	~3 acres	ammonia	Poultry Farm
Six Mile Lake, Bolivar Co	20-Jun-91	<50	~2 miles	herbicide	nonpoint
Whittington Lake, Bolivar Co	24-Jun-91	>3750	1.5 miles	unknown	unknown
Sardis Lake, Panola Co	30-Jun-91	>2000	unknown	Disease	natural
Little Copiah , Copiah Co	18-Jul-91	15	unknown	Low D.O.	WWTP
Private Pond, Quitman Co	30-Jul-91	~150	~0.5 acres	Low D.O.	natural
Eagle Lake, Issaquena Co	05-Sep-91	~750	unknown	Low D.O.	Draw Down
Purple Creek, Hinds Co	05-Sep-91	unknown	unknown	Muncpl runoff	nonpoint
Dabbs Creek, Rankin Co	03-Oct-91	<50	unknown	unknown	unknown
Big Canal, Scott Co	15-Oct-91	unknown	unknown	unknown	unknown
Diamond Head, Hancock Co	28-Feb-92	242	Entire Lake	Pesticide	Runoff
Pearl River, Pearl River Co	29-May-92	unknown	Sm. Lake	Low D.O.	Natural
Deer Creek, Sharkey Co	19-Jun-92	unknown	unknown	Low D.O.	Natural
Leaf River, Perry Co	24-Jul-92	117929	~15 Miles	Sus. Part.	G.P. Mill

WATERBODY	DATE	# FISH	AREA AFFECTED	CAUSE	SOURCE
Coleman's Bayou, Jackson Co	01-Aug-92	unknown	unknown	Low D.O.	Natural
Deer Creek, Washington Co	10-Aug-92	>152352	~12 Miles	Insecticide	Agric. Runoff
Airplane Lake, Warren Co	11-Aug-92	unknown	unknown	unknown	unknown
Bunker Hill Lake, Marion Co	02-Sep-92	>1000	Entire Lake	Low D.O.	Natural
Pelahatchie Crk, Rankin Co	04-Jan-93	unknown	Sm. Area	unknown	unknown
Quitman's Ind. Pk., Clarke Co	23-Mar-93	<20	Sm. Area	unknown	unknown
Pearl River, Lawrence Co	02-Jun-93	unknown	~25 Miles	Disease	unknown
Pearl River, Copiah Co	07-Jun-93	unknown	unknown	Disease	unknown
Cassidy Bayou, Coahoma Co	30-Jun-93	unknown	unknown	unknown	unknown
Denman's Lake, Tallahatchie Co	04-Jul-93	>5000	Entire Lake ~50 acres	Pesticides Guthion	Agric. Runoff
Nolan Pond, Rankin Co	13-Jul-93	~80	Entire Lake	Low D.O.	Natural
Moore's Pond, Hinds Co	22-Jul-93	unknown	Entire Lake	Low D.O.	Natural
Lk Jackson, Washington Co	05-Aug-93	unknown	Entire Lake	Low D.O.	Natural
Steele Bayou, Issaquena Co	13-Aug-93	~3000	Entire Lake	Suspctd Pesticide	unknown
Black Bayou, Washington Co	10-Aug-93	~1200	~1 Mile	unknown	unknown
Hurricane Creek, DeSoto Co	25-Aug-93	~150	unknown	Suspctd Pesticide	unknown
Lake Washington, Washington Co	27-Aug-93	>50	unknown	Low D.O.	Natural
Sunflower River, Coahoma Co	03-Sep-93	unknown	unknown	Suspctd Pesticide	unknown
Lk Albermarle, Issaquena Co	05-Sep-93	unknown	unknown	Low D.O.	Natural
McGuffe Lake, Hinds Co	20-Sep-93	unknown	unknown	unknown	unknown
Twentymile Creek, Lee Co	25-Sep-93	unknown	unknown	unknown	unknown
Indian Bayou, Sunflower Co	28-Sep-93	unknown	unknown	Low D.O.	Natural
Shaw Pond, Hinds Co	07-Nov-93	unknown	Entire Lake	Low D.O.	Natural
Woodward Creek, Noxubee Co	13-Jan-94	~10,000	unknown	unknown	unknown
"The Port" nr Grand Gulf, Claiborne Co	18-Feb-94	~1000	unknown	unknown	unknown
King's Creek, Lawrence Co	23-Jan-94	150-200	unknown	Disease	Natural
Lk Ferguson, Washington Co	01-Mar-94	undetermined	unknown	Temperature	Natural
Lakeside Villa, Hinds Co	25-Mar-94	8-10	unknown	Low D.O.	Natural
Bay Point Golf Club, Rankin Co	19-Apr-94	undetermined	unknown	Chlorpyrifos	Construction runoff
Eagle Lake, Warren Co	28-Apr-94	ca 300	unknown	Low D.O.	Natural
Ross Barnett, Rankin Co	28-Apr-94	12	unknown	Bowfishing	Bowfishing
Shady Grove, Jones Co	02-June-94	50	unknown	Chicken Feces	Agric. runoff
Tchula Lake, Holmes Co	20-June-94	60-70	unknown	Pesticides	Agric. runoff
Lake Washington, Washington Co	21-June-94	unknown	unknown	Low D.O.	Natural
Tchula Lake, Holmes Co	18-July-94	ca 75000	unknown	Profenofos (34-51 ppb)	Agricultural runoff
Lake Roebuck, Leflore Co	21-July-94	300+	unknown	Profenofos (6.09 ppb)	Agricultural runoff
Deer Crk. nr Hollandale (6 miles), Washington Co	25-July-94	300-500	unknown	Profenofos (1.11-2.23 ppb)	Agricultural runoff
Deer Crk @ Scott (4 miles), Bolivar Co	25-July-94	420-625 2 dead birds	unknown	Profenofos (1.05-3.41 ppb)	Agricultural runoff

WATERBODY	DATE	# FISH	AREA AFFECTED	CAUSE	SOURCE
Fourmile Lake, Leflore/Humphreys	28 July-94	500-600	unknown	Profenofos (.38-.71 ppb)	Agricultural runoff
Cane Cr @ Barnett Res, Rankin Co	12-Aug-94	3054	unknown	(*)Profenofos (.6-36.4 ppb)	Agricultural runoff
Eagle Lake, Warren Co	16-Aug-94	650	unknown	(H)unknown	unknown
Lk Ferguson, Washington Co	22-Aug-94	2000-3000	unknown	unknown	unknown
Perry Cr @ Grenada L, Grenada Co	28-Aug-94	^?	unknown	unknown	unknown
Tallahala Crk, Jones Co	03-Sept-94	<100	unknown	unknown	unknown
1st Chem. Indust. Canal, Jackson Co	06-Sept-94	Blue Crabs	unknown	Low pH	Chemical spill
Private Pond, Madison Co	12-Dec-94	~400	0.5 acres	disease	natural
Compress Lake, Marion Co	23-Jan-95	unknown	unknown	Ammonia NH4	refrigerant disposal
Private Pond, Union County	21-Mar-95	~25	unknown	unknown	unknown
Wasp Lake, Humphreys Co	12-Apr-95	>400	unknown	unknown	unknown
Woodgate Lake, Rankin Co	29-Apr-95	>5000	~10 acres	disease	natural
Pearl River, Hinds County	01-Jun-95	unknown	unknown	unknown	unknown
Mullato Bayou, Hancock Co	16-Jun-95	unknown	unknown	ferrous sulfate	barge spill
Ross Barnett Reservoir, Madison Co	16-Jun-95	unknown	unknown	low D.O.	natural
Broadwater Marina, Harrison Co	19-Jun-95	~10,000	unknown	low D.O./turbid	tugboat turbidity
Lake Archer, Arkansas	29-Jun-95	~500	unknown	low D.O.	natural
Private Pond, Grenada Co	07-Jul-95	42	~1 acre	low D.O.	natural
Big Black River, Webster Co	14-Jul-95	unknown	unknown	sewage/low D.O.	broken sewage line
Burney Branch, Lafayette Co	17-Jul-95	~100	unknown	unknown	unknown
McKinley Crk, Monroe Co	28-Jul-95	~1000	3 miles	pesticide/ Curacron	agricultural run-off
Porters Bayou, Bolivar Co	02-Aug-95	unknown	unknown	unknown	unknown
Porters Bayou, Sunflower Co	02-Aug-95	unknown	unknown	unknown	unknown
unnamed stream, Newton Co	10-Aug-95	unknown	unknown	sewage/ low D.O.	overflowing manhole
Private Pond, Covington Co	14-Aug-95	~2000	~1 acre	pesticide/ chlorpyrifos	unknown
unnamed bayou, Quitman Co	02-Sep-95	~1000	~.25 miles	unknown	unknown
unnamed bayou, Yazoo Co	20-Sep-95	unknown	unknown	low D.O.	natural
Lead Bayou, Bolivar County	19-Oct-95	~2100	~.5 miles	lack of water	homeowner irrigation
Bogue Chitto River, Lincoln County	14-Dec-95	~<50	unknown	unknown	unknown
Old River Chute, Issaqueena County	16-Jan-96	~200	unknown	unknown	unknown
Private Pond, Rankin County	06-Mar-96	>100	entire pond	low D.O.	natural
Tallahala Creek, Jones Co	29-Mar-96	~50	~2 miles	low D.O.	natural
Private Lake, Panola County	12-Apr-96	~700-1000	unknown	unknown	unknown
Sardis Res, Lower Lake, Panola Co	02-May-96	~200,000	entire lake	low D.O.	natural
Private Pond, Rankin County	02-May-96	500-600	entire pond	low D.O.	Castlewoods lagoon
Yazoo Lake, Yazoo County	02-May-96	~300	n. section	ammonia	Helena Corp. runoff
Private Pond, Lincoln County	14-May-96	~500	entire pond	low D.O.	unknown
Private Pond, Desoto Co	22-May-96	unknown	entire pond	low D.O.	natural
Private Pond, Smith County	13-May-96	~1000	entire pond	low D.O.	natural

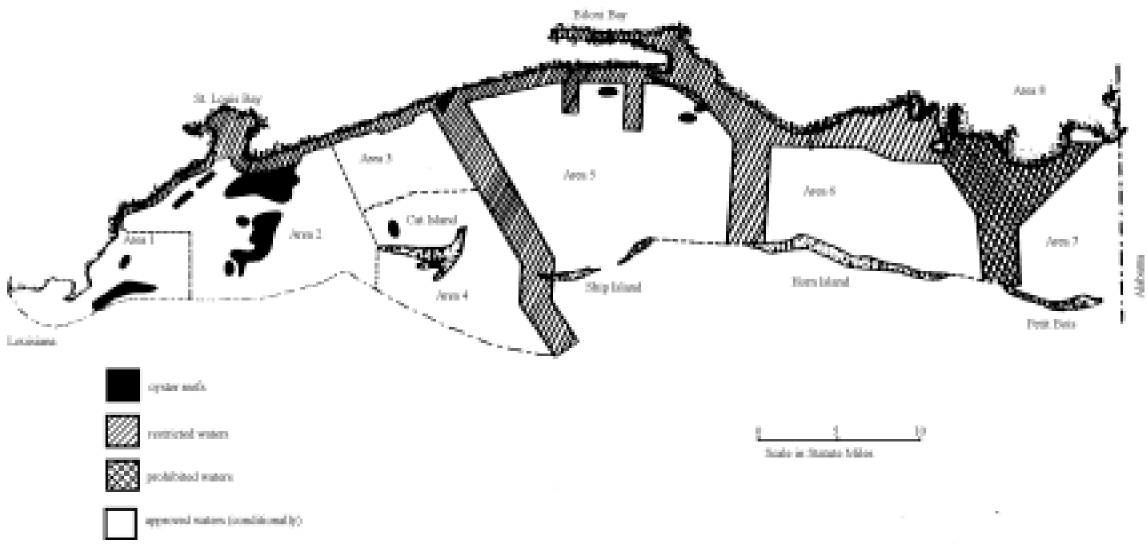
WATERBODY	DATE	# FISH	AREA AFFECTED	CAUSE	SOURCE
Eastover Lake, Hinds Co	31-May-96	~2000	entire lake	low D.O.	natural
Tallahala Creek, Jones Co	05-May-96	unknown	unknown	unknown	unknown
North Pointe Lk, Madison Co	21-June-96	~4000	entire lake	Chlorpyrifos	construction runoff
Steele Bayou, Issaqueena Co	03-July-96	unknown	at control structure	low D.O.	natural
Private Pond, Issaqueena Co	05-July-96	~50	entire pond	low D.O.	natural
Un-named Trib. @ Ceres Ind. Park Lagoon, Warren County	20-July-96	50-100	500 yards	unknown possbly low D.O.	lagoon runoff
Compress Lake, Marion Co	22-July-96	~500	entire lake	ammonia	refrigerant disposal runoff
Broad Lake, Yazoo County	30-July-96	~500	~entire lake	suspect Curacron	agricultural runoff
Pearl River-Backwater @Fortification St., Hinds Co	02-Aug-96	75-100	entire area	unknown	unknown
Private Pond, Washington Co	08-Aug-96	unknown	unknown	unknown	unknown
Private Pond, Madison Co	23-Aug-96	40-60	entire pond	unknown	unknown
Clear Creek, Madison Co	29-Aug-96	unknown	unknown	unknown	unknown
Horn Lake, Desoto Co	06-Sept-96	~50	unknown	unknown	unknown
Eastover Lake, Hinds Co	17-Sept-96	25-30	unknown	low D.O.	natural
Private Pond, Scott County	11-Oct-96	<10	entire pond	low D.O.	sewage runoff- Morton WWTP
American Legion L, Chickasaw Co	22-May-97	~300	entire lake	low D.O.	natural
Private Pond, Lincoln Co	28-May-97	>50	entire pond	low D.O.	runoff related
Bayou Portage, Harrison Co	2-June-97	200-300	unknown	unknown	unknown
Private Pond, Desoto Co	17-June-97	~200	entire pond	Chlorpyrifos	runoff- home termite trtmnt
Private Pond, Jackson Co	09-July-97	~400	entire pond	low D.O.	natural
Private Lake, Desoto Co	15-July-97	unknown	unknown	possible low D.O.	possible stormwater runoff
Main Canal, Washington Co	18-July-97	>1000	3 miles	low D.O.	surfactants
Desoto Lake-Sherman Chute, Coahoma County	24-July-97	unknown	3 miles	low D.O.	natural
Hennessey Bayou, Warren Co	31-July-97	3,000-5,000	unknown	low D.O.	natural
Eagle Lake, Warren Co	03-Aug-97	~1,000	Muddy Bayou nr mouth	low D.O.	unknown
Un-named Trib. of Stinson Creek, Lowndes County	05-Aug-97	10-12	unknown	low D.O.	natural
Eagle Lake, Warren Co	10-Aug-97	~2,000	AFloat Row@ vicinity	possible pesticides	unknown
Cassidy Bayou, Tallahatchie County	14-Aug-97	1,000-4,000	near Webb, MS	possible pesticides	unknown
Snake Creek, Bolivar Co	18-Aug-97	8-9	unknown	unknown	unknown
Tchula Lake, Holmes Co	20-Aug-97	100	unknown	possible pesticides	unknown
Deer Creek, Washington Co	25-Aug-97	~1,000	7 stream	Profenofos	drift from aerial

WATERBODY	DATE	# FISH	AREA AFFECTED	CAUSE	SOURCE
			miles		applicator
Private Pond, Desoto County	12-Sept-97	~1,000	entire pond	Chlorpyrifos	runoff- home termite trtmnt
Eagle Lake, Warren Co	29-Sept-97	~3,000	Winthrop Chute	low D.O.	natural
Un-named Trib., Copiah Co	24-Nov-97	12	unknown	unknown	unknown
Eastover Lake, Hinds County	04-May-98	~100	entire lake	Chlorpyrifos	construction runoff
Private Pond, Hinds County	05-May-98	>500	entire lake	low D.O.	natural
Keegan=s Bayou nr. Biloxi Bay, Harrison County	09-May-98	>40,000	s. shore of Keegan=s Bayou	ammonia	unknown
Pascagoula Beach on Beach Blvd.	29-May-98	>300	2 mile of beach	trawl nets	fishermen
Private Lake, Simpson Co	21-June-98	5632	entire lake	unknown	unknown
Deer Creek, Warren County	12-June-98	unknown	unknown	low D.O.	natural
Deer Creek, Warren County	23-June-98	unknown	unknown	low D.O.	natural
Tallahala Creek, Hinds Co	30-June-98	>200	unknown	low D.O.	natural
Private Pond, Neshoba Co	17-July-98	~100	entire pond	low D.O.	natural
Private Pond, Harrison Co	22-July-98	unknown	entire pond	low D.O.	sewage leak
Cassidy Bayou, Tallahatchie County	28-July-98	unknown	unknown	unknown	unknown
Yazoo Pass nr. Moon Lake, Coahoma Co	14-Aug-98	~100	Confl. Yazoo Pass / Moon Lk.	low D.O.	natural
Horsehoe Lake, Holmes Co	17-Aug-98	~5,000	4 mile stretch	pesticides	pesticide runoff
Lake Whittington Bolivar Co	09-Oct-98	~1,000	Confl. Lk. Whittington / MS Rvr.	unknown	unknown
Biloxi Bay Harrison Co	09-Oct-98	~3,000	Canal btwn Palace Casino & boat yard	low D.O.	Industrial discharge

Shellfish Restrictions

Most of the major shellfish harvesting areas in Mississippi waters are classified as conditionally approved or restricted. The restrictions are due primarily to the effects of nonpoint source pollution from urban runoff and unsewered communities. A map of shellfish growing areas and their classifications is given in Figure III, 7-8. Fecal coliform studies have shown wide fluctuations in fecal counts (MPN) due to rainfall and/or high river stages. This continues despite improvements in wastewater treatment and collection. These fluctuations are likely a result of private septic systems located in each area's watershed. However, coliform levels are frequently above water quality standards, and oyster harvesting is halted until approved conditions are met.

FIGURE III, 7-8



Shellfish Growing Areas

Sediment Contamination

At present, limited data are available from Mississippi waterbodies on sediment contamination due to toxicants. However, elevated levels of agrichemicals would be expected in sediments of lakes in the Delta region due to past agricultural activities. Likewise, contamination in sediments of waterbodies in certain industrial areas of the state could also be expected.

Routine ambient sampling of sediments has only recently become incorporated into the monitoring program at MDEQ. Beginning in 1996, sediment samples were specified for collection as the MDEQ Surface Water Ambient Monitoring Network was re-designed. Actual sampling began in 1997 with sediments analyzed for heavy metals and organics at selected Primary Ambient Network sites. By far the most intensive sediment sampling done to date by OPC has occurred as a part of the Mississippi Mercury study, and has involved collection of sediments for mercury analysis from nearly 140 sites throughout the state.

OPC's Hazardous Waste Division and Field Services Division periodically conduct emergency response or hazardous waste sampling investigations in which sediment samples may be taken. When such investigations are done, they may typically include the collection of on-site soil or water samples, groundwater samples from temporary monitoring wells or nearby potable water wells, and sediment and/or surface water samples from ditches or streams in close proximity to the site.

The MDEQ Office of Geology is participating in a regional sediment and soil geochemical sampling program with the state geological surveys of Alabama, Georgia, and Florida and the U.S. Geological Survey (USGS). During 1997 and 1998, staff in the Office of Geology collected 1,462 samples throughout the state. These samples will be analyzed by USGS for over 50 major, minor, and trace elements from aluminum to zinc. The Office of Geology will publish the results of this study, when completed, in digital and print formats. This information will be invaluable for mineral exploration and for environmental applications such as determining background levels of many elements.

Additional available ambient sediment information is provided mainly by the federal agency nearshore coastal monitoring efforts of the National Oceanic and Atmospheric Administration (NOAA) and EPA's Environmental Monitoring and Assessment Program (EMAP). Another source of sediment information, which provides additional site-specific data, is special project monitoring such as that carried out by the U.S. Army Corps of Engineer (USACE) Districts and the USGS.

Sampling from NOAA's Status and Trends Program has revealed past sediment contamination from total PAH (polynuclear aromatic hydrocarbons) at a site in Biloxi Bay. EPA's EMAP sampling in 1991 and 1992 has indicated potential low-level sediment toxicity at a few stations in the Mississippi Sound.

The USACE Vicksburg District conducted sediment monitoring for the Big Sunflower River Maintenance Project in 1992-1995, in Steele Bayou in 1995 and in the Little Sunflower River in 1998.

During 1994-1995, the USACE Mobile District evaluated sediments from Pass Christian Harbor and Bayou Casotte/Upper Mississippi Sound following procedures outlined in the EPA/CE Inland and Ocean Disposal Testing Manuals. Results of these evaluations, which included bulk sediment chemistry, toxicity, and bioaccumulation analyses indicated that disposal of materials dredged from these projects would not violate applicable standards. As compared to a reference site in the Grand Bay, Alabama area, sediments from the Bayou Casotte showed some enrichment in heavy metals including arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and silver. However, values were within one order of magnitude of the reference station concentrations. In addition, analyses at one Bayou Casotte station revealed low levels of several PAH compounds.

For the 10-day bioassay, survival of the amphipod, Ampelisca abdita, was between 94 and 100 percent for the test stations, 95 percent for the reference, and 99 percent for the control. For Nereis virens, survival in both 10-day and 28-day tests was at least 96 percent for all test, reference, and control samples. Twenty eight-day bioassays performed using Macoma nastuta showed survival between 98-99 percent for the Bayou Casotte samples, 89 percent for the reference, and 90 percent for the control. Tissue samples of M. nastuta and N. virens, exposed in 28-day bioaccumulation tests, were analyzed for ten metals and cyanide. With two minor exceptions, tissue concentrations detected in organisms from the Bayou Casotte exposure were not significantly different from tissue concentrations in animals from the reference sediments. Only lead was shown to be significantly different from the reference in Macoma tissue from two test sediment locations. Concentrations (in mg/kg) were 1.8 and 1.6 as compared to 1.1 in the reference.

Sediments from seven locations within Pass Christian Harbor were analyzed for priority pollutants. These sediments were found to have relatively low concentrations of PAH compounds and metals. Most chemicals on the target list were below detection limits. PAH compounds were within an order of magnitude of the laboratory minimum detection level (MDL). Most metal concentrations were within an order of magnitude of the reference values. An elutriate study was performed on beryllium, which was detected at concentrations of 0.63-1.8 mg/kg. Results of the elutriate analyses indicated that the potential for beryllium release during dredging was minimal. Elutriate concentrations ranged from <0.1 ug/L (laboratory MDL) to 0.13 ug/L.

Closures of Surface Drinking Water Supplies

No surface drinking water supplies were temporarily or permanently closed during the 1992 through 1997 reporting period due to toxic or conventional pollutants. All surface waters (three river segments and two reservoirs) currently used for public water supplies fully support this use according to finished water monitoring data. There are no Maximum Contaminant Level exceedances, no advisories, and no closures. All water treatment systems use only conventional treatment practices.

Closures of Bathing Areas

Until recently, on-going routine bathing beach monitoring in Mississippi has mostly been confined to several U.S. Army Corps of Engineers (USACE) and U.S. Forest Service (USFS) lake recreational areas. Beginning in 1997, in response to increased concern over the lack of routine bacteriological monitoring on Mississippi's coastal bathing beaches, MDEQ cooperated with the Gulf Coast Research Laboratory (GCRL) and EPA's Gulf of Mexico Program to reestablish a coastal beach monitoring program to address this concern. Sampling is occurring weekly to monthly along the entire length of Mississippi's Gulf Coast public beaches. In addition, a multi-agency task force was created composed of representatives from MDEQ, Mississippi Department of Health, Mississippi Department of Marine Resources, GCRL and the EPA Gulf of Mexico Program to address public health issues regarding the program.

The USACE Mobile District bathing beach monitoring began in 1990. Sampling occurs weekly to monthly during the recreation season at all USACE managed beaches on Okatibbee Lake and on the Tennessee-Tombigbee Waterway. The frequency of testing is determined by prior site history, location, use, and site manager preference.

The USFS presently monitors recreational lakes on National Forest Service lands weekly during the summer for total and fecal coliform bacteria. Results to date from these programs have yielded no fecal coliform levels of concern.

For the period 1992-1997, no incidents or closures of bathing areas have been reported at any public lake or along the beaches of the Gulf Coast based on sampling. One lake voluntarily closed following a cluster of at least 14 shigellosis cases in persons using the facility.

Incidents of Waterborne Disease

The only documented incidents of waterborne disease were the shigellosis cases sited above and vibrio infections. These vibrio cases were wound infections from exposure to waters along the Gulf Coast or from the ingestion of raw or undercooked shellfish. Vibro species reported included V. vulnificus, and V. parahaemolyticus. No V. vulnificus cases were reported from consumption of raw shellfish harvested from Mississippi costal waters. The State averages 6-9 cases of all noncholera Vibrio cases annually with about one-half wound related and the other half from ingestion of raw or undercooked shellfish.

Part III: Surface Water Assessment
Chapter Eight: Basin/Waterbody Information

<u>Mississippi's Plan for Comprehensive Assessment</u>

Mississippi's Basin Management Approach is an effort to conduct comprehensive water quality planning and assessment and to foster the implementation of practices that will result in water quality protection on a basinwide scale. This approach recognizes the interdependence of water quality on the many related activities that occur in a drainage basin. Some of these activities include monitoring, assessment, problem identification, problem prioritization, planning, permitting, water use and land use. In Mississippi's Basin Management Approach, these activities and their associated information will be integrated by basin, resulting in basinwide water quality assessments, basin management plans and implementation strategies that will serve to focus water quality protection efforts.

The purpose of Mississippi's Basin Management Approach is to restore and protect the quality of Mississippi's water resources by developing and implementing effective management strategies that address water quality issues while fostering sound economic growth. MDEQ is beginning to manage its water programs on a basinwide scale and intends to develop basin management plans for each of Mississippi's major drainage basins. These basins will serve as the hydrological boundaries that guide MDEQ's water quality activities. The waters of Mississippi are divided into ten major drainage areas or basins. These ten basins are the Big Black River Basin, Coastal Streams Basin, North Independent Streams Basin, Mississippi River Basin, Pascagoula River Basin, Pearl River Basin, South Independent Streams Basin, Tennessee River Basin, Tombigbee River Basin and Yazoo River Basin and their boundaries are shown in Figure III, 8-1.

The majority of water quality management activities in Mississippi will be based on a repeating five-year management cycle. This management cycle is composed of five annual activity phases that are sequenced and repeated throughout the five-year interval (Figure III, 8-2). Because of the five-year rotation, Mississippi's ten drainage basins have been placed into five basin groups, thereby allowing all of the basins to receive equal focus. Each of these basin groups is configured to represent one-fifth of the state. At the end of the five-year rotational period, Mississippi should reach its goal of comprehensive statewide assessment. A listing and map of the basin groups as well as a description of the basin cycle activities are given in this report.

The Basin Management Approach strategy is supported by various water quality monitoring activities. One major activity is a basin fixed-station monitoring network which augments the statewide primary fixed station network with supplemental monitoring sites in the large drainage basins. One objective of the basin monitoring network is to increase the total aerial coverage of waters monitored in Mississippi and fill

Figure III, 8-1

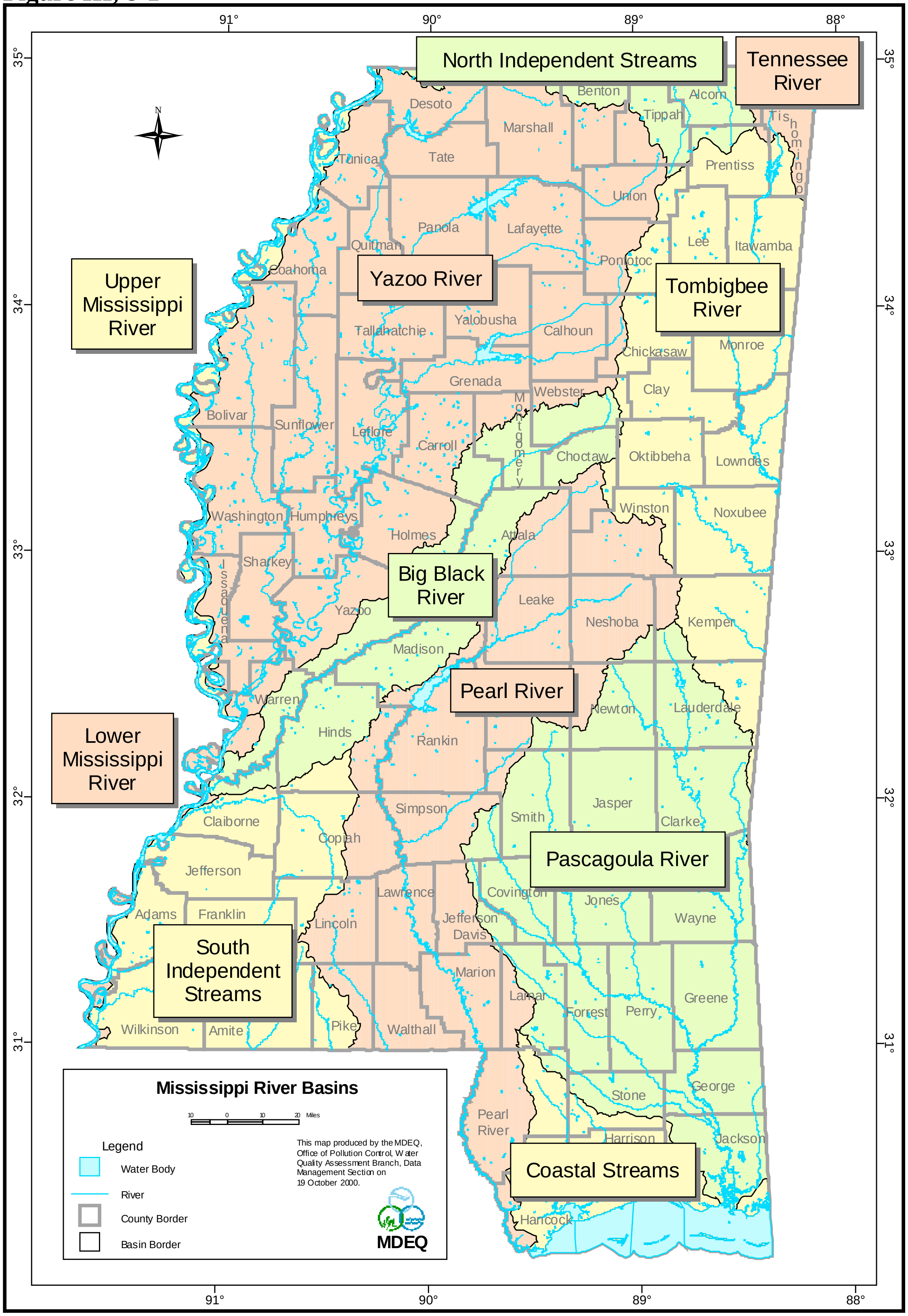
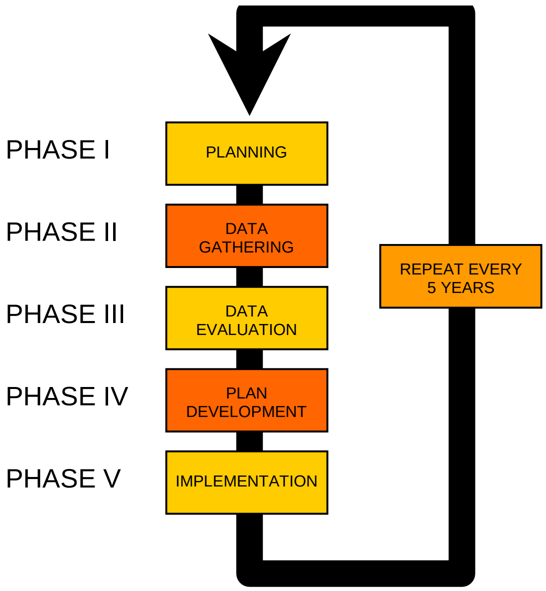


Figure III, 8-2

Basin Management Cycle



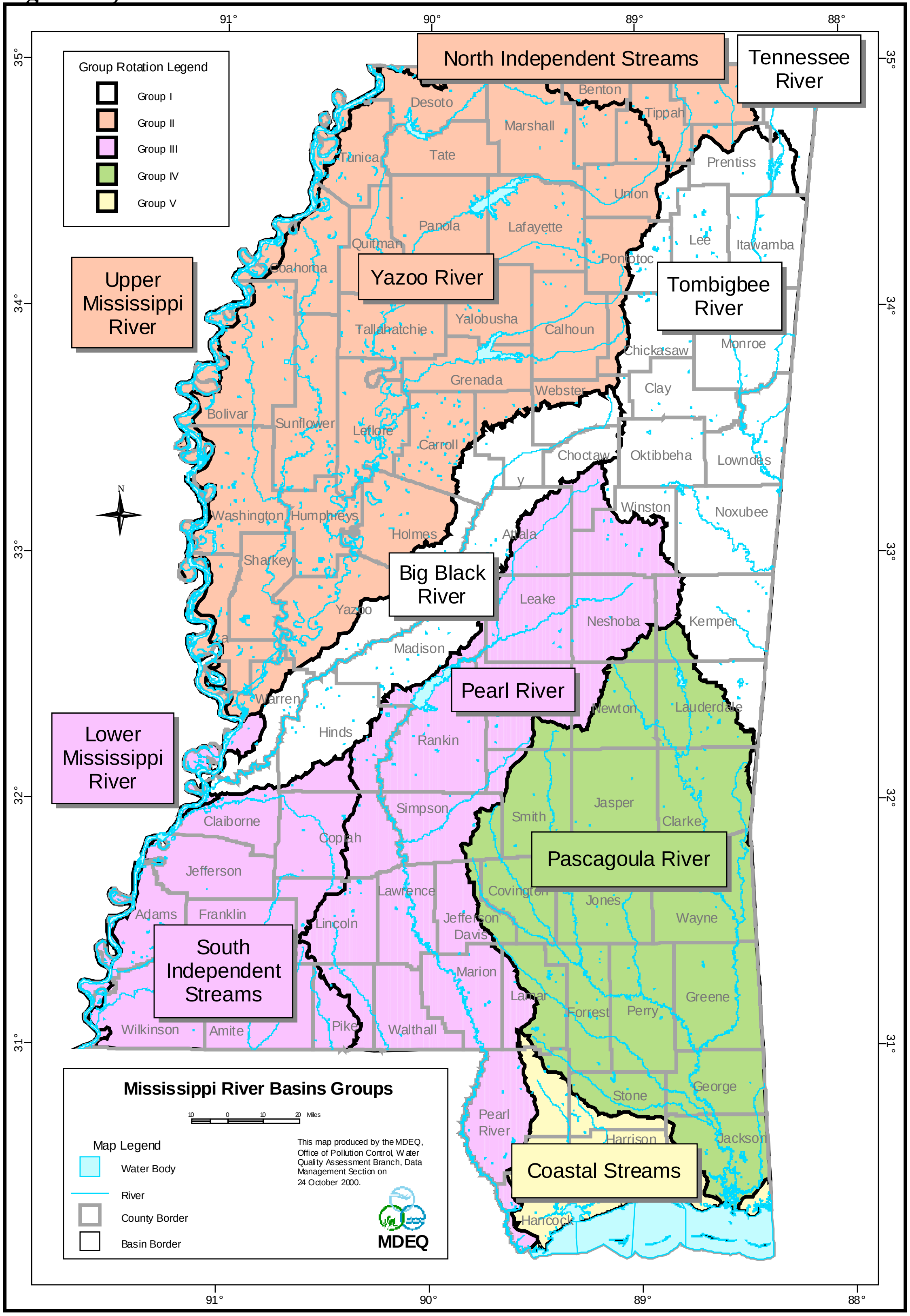
data gaps identified in the planning phase of the basin cycle. This objective is achieved by concentrating monitoring and assessment resources in specific drainage basins thereby maximizing sampling efficiency. As a consequence, basin management plans and implementation strategies, as well as comprehensive basinwide assessments, may be developed. Another major objective of the basin network is to verify the actual water quality of waters assessed as "potentially period, in cases where these assessments were based on evaluations rather than actual monitoring data. Such verification by monitoring ultimately confirms the accuracy of the state's list of impaired waterbodies that is required pursuant to Section 303(d) of the Clean Water Act.

Basin sampling is rotated annually among the five major basin groups in the state resulting in each basin group being monitored every five years. This monitoring takes place during the data gathering phase of the basin management cycle. The predominant sampling tool chosen for the basin stations is biological assessment monitoring for benthic macroinvertebrates using modified EPA rapid bioassessment protocols. In addition, the basin monitoring effort utilizes multi-media sampling involving limited water chemistry, bacteria, algae, fish and/or sediment sampling as needed to address basin data collection needs. Primary selection criteria for basin stations to achieve basinwide geographic coverage are the mainstem tributaries in each of the NRCS 11-digit watersheds in the targeted basin.

Basin Information

In 1997, MDEQ targeted the Pascagoula River Basin for monitoring as a pilot project for the Basin Management Approach strategy. The basin network for the Pascagoula River Basin consisted of a total of 197 stations at 102 locations across the basin. For the 2000 305(b) Report, MDEQ has moved to a rotating basin approach to water quality assessment and management. The Pascagoula River Basin, which represents one-fifth of the state of Mississippi, is the only basin for which assessments have been updated/changed from the 1998 report. The remaining four basin groups will be reported on and updated as the basin cycle continues. Figure III, 8-3 depicts the five rotating basin groups. The schedule for basin group re-evaluation is as follows: Group I: 2002, Group II: 2003, Group III: 2004, Group IV: 2005, and Group V: 2001and again in 2005.

Figure III, 8-3



In the following section, a brief description of the hydrology and the general water quality of the Pascagoula River Basin are given. Use support status for the basin is summarized by waterbody type with causes and sources of impairment also presented. In addition, special waterbody classifications, permitted major sources, noteworthy items, recent environmental damage assessments and recent water quality surveys by MDEQ and other agencies are given. Individual Use Support Monitoring tables listing monitoring stations used for the current assessment (Pascagoula River Basin) and showing use support information based on the type of data collected are included along with maps showing the locations of the monitoring stations. Also, maps geo-referencing use support determinations, land use coverage, special classification waters, and an ecoregional map of the basin are included in this chapter. Comparable information for the nine remaining basins, can be found in Part III, Chapter 8, of the 1998 305(b) Report.

PASCAGOULA RIVER BASIN

Description

The Pascagoula River Basin is the second largest basin in Mississippi at approximately 164 miles long and 84 miles wide and comprises most of southeastern Mississippi with a small part extending into southwestern Alabama. Two main/largest headwater streams in this system are the Leaf and Chickasawhay Rivers which eventually join to form the Pascagoula River. The Pascagoula River system drains an area of about 9,700 square miles and eventually empties into the Gulf of Mexico.

Much of the Pascagoula River drainage basin, along with the adjacent coastal area, is forested and drains directly into the Gulf. Near the coast, drainage areas are typically low-lying flatlands, forested wetlands, and marshlands. Farther inland however, the basin consists primarily of low, rolling hills and broad, flat, flood plains. The main land uses in this basin are primarily composed of silviculture and agriculture, however, oil production, industrial facilities, and urban sprawl also have significant impacts on land use (Figure III, 8-4). Most major waterbodies in this system are deep to moderately deep, fast-flowing perennial streams primarily consisting of the Leaf, Chickasawhay, and Escatawpa Rivers. Other significant tributaries in the basin include Tallahala Creek, Okatibbee Creek, Okatoma Creek, Bowie River, Red Creek, Chunky River, Black Creek and Bogue Homa. Stream conditions are usually natural, or unmodified, in appearance with clear water although some streams in this area are considered as "blackwater streams" because they are stained by tannic acid leached from vegetation. The primary ecoregions found in the Pascagoula River Basin are depicted in Figure III, 8-5. Water quality is generally good to excellent with only localized pollution problems. Historically, industrial point sources and urban runoff near major population centers such as Meridian, Laurel, Hattiesburg, and Pascagoula have caused water quality problems.

Figure III, 8-4

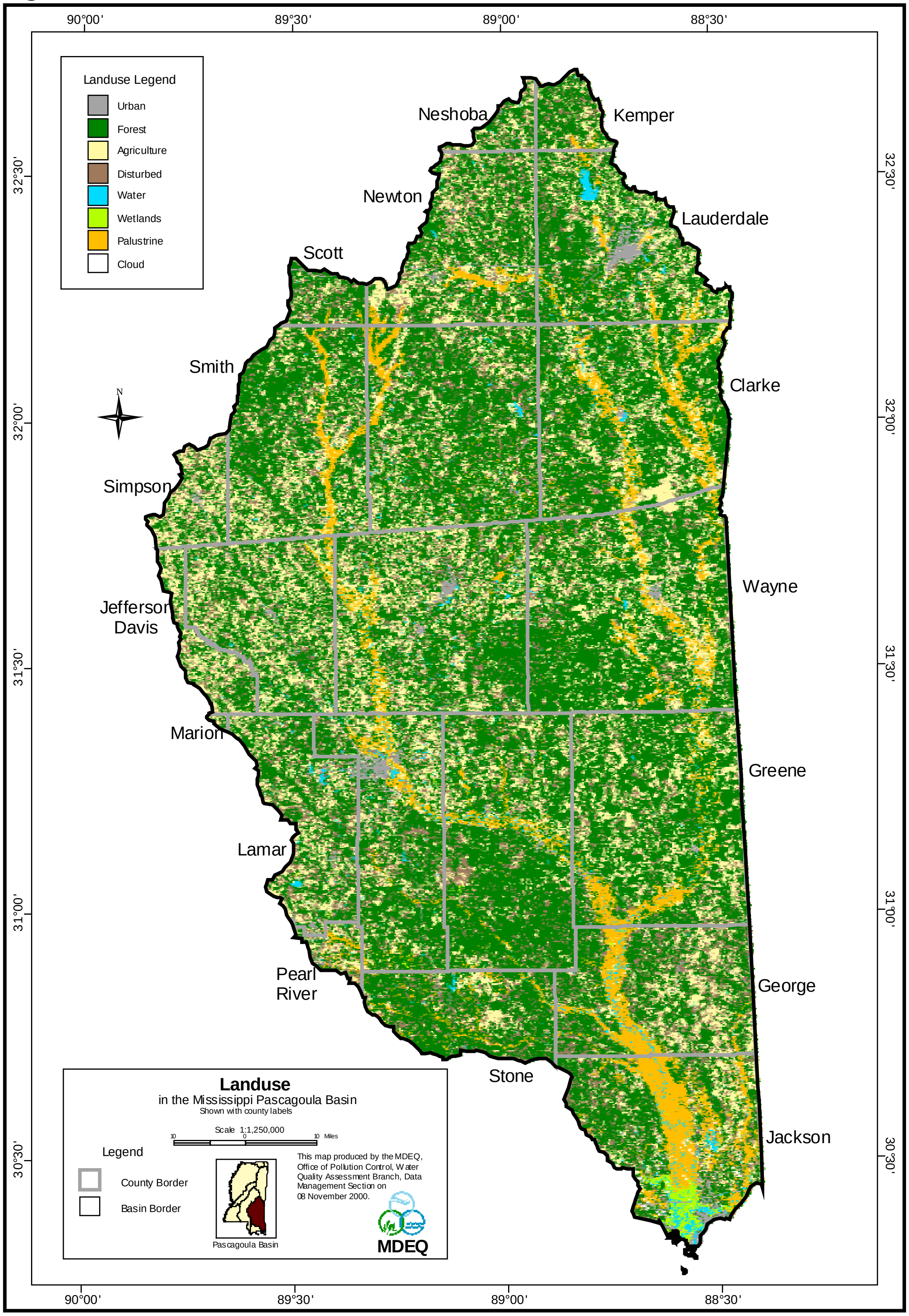
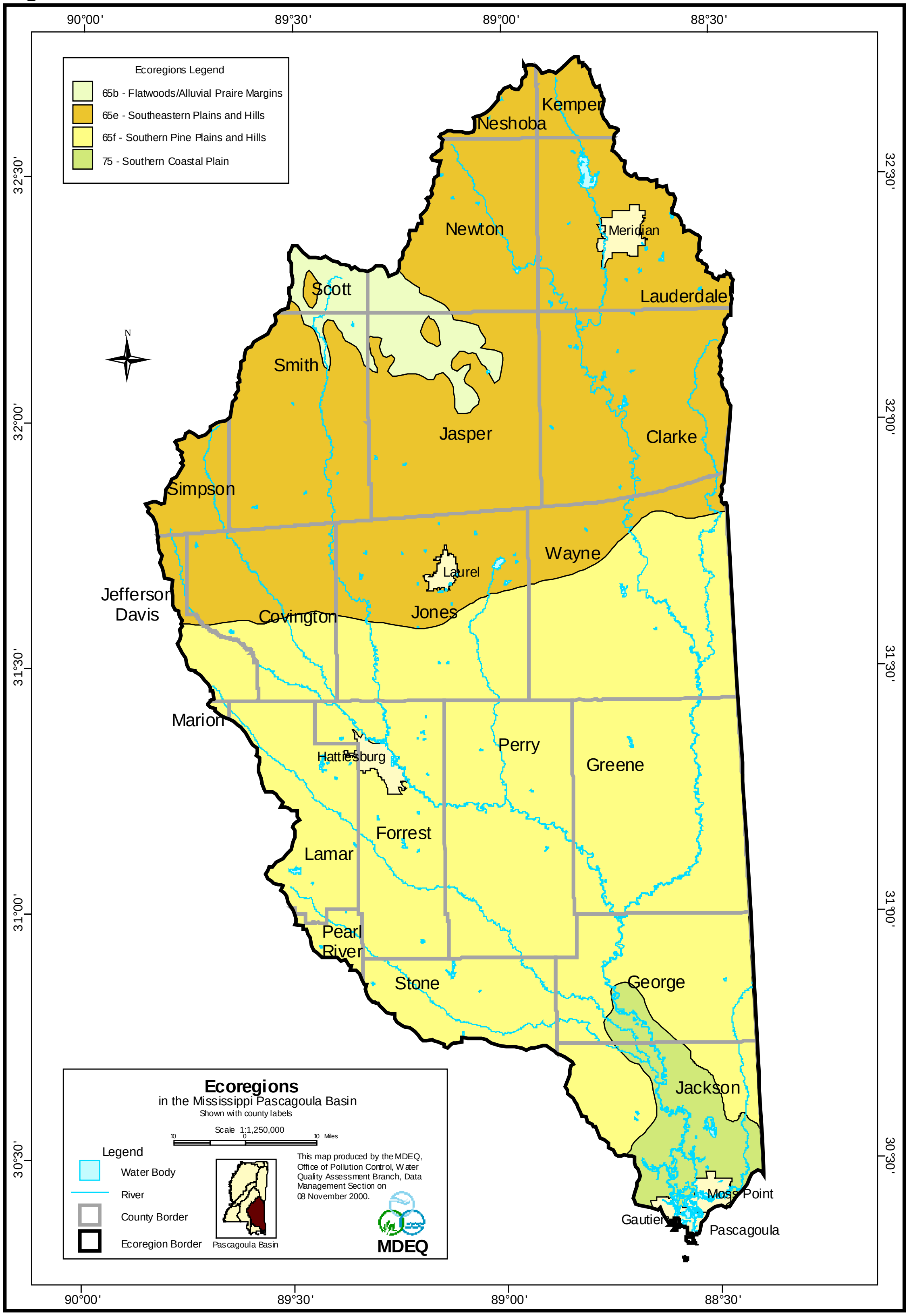


Figure III, 8-5



Designated Use Support

For the current Water Quality Assessment Report, the Mississippi Department of Environmental Quality (MDEQ) assessed approximately 34% (5,158 miles) of the total 15,045 miles of streams and rivers in the Pascagoula River Basin. The status of water quality on the remaining 66% (9,886 miles) of the basin's rivers and streams is unknown. Of the amount assessed, evaluated assessments made up approximately 78%, while monitored assessments made up the remaining 22%. However, most of the miles (56%) in the basin are composed of intermittent streams and therefore are not readily assessable.

A summary of use support for the basin's assessed rivers and streams is found in Table III, 8-1. For waterbodies with multiple assessed uses, the EPA Assessment Database (ADB) summary for this table can under- or over-represent the actual amount of fully supporting mileage assessed. For multiple use waterbodies, the ADB utilizes, for this summary report table, only the fully supporting use support mileages for the one use within that waterbody with the greatest importance. For the other fully supporting uses assessed in that waterbody, their mileages are not reported by the ADB in this table. Table III, 8-2 gives a summary of use support according to the individual uses assessed.

Of the Pascagoula River Basin's assessed stream and river miles, approximately 90% fully support all assessed uses; while about 10% are partially or not supported for one or more uses and are considered to be impaired.

DEQ assessed approximately 32% of its estimated 23,775 acres of freshwater lakes in the Pascagoula River Basin. Of the assessed lake acres in this basin, approximately 93% fully support all assessed uses while only about 6% are partially or not supporting for only one or more uses. In this basin, none of the use support determinations were based on evaluated assessments. The water quality status of the remaining 68% of the lake acres in the basin is unknown.

A summary of use support for the Pascagoula River Basin assessed lakes is found in Table III, 8-3. For waterbodies with multiple assessed uses, the EPA Assessment Database (ADB) summary for this table can under- or over-represent the actual amount of fully supporting mileage assessed. For multiple use waterbodies, the ADB utilizes, for this summary report table, only the fully supporting use support mileages for the one use within that waterbody with the greatest impairment. For the other fully supporting uses assessed in that waterbody, their mileages are not reported by the ADB. Table III, 8-4 gives a summary of use support according to the individual uses assessed.

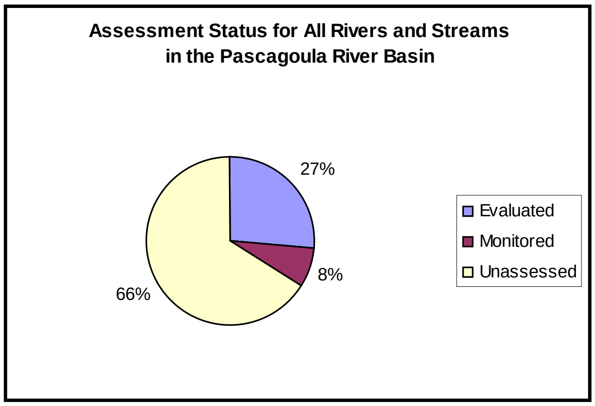
Beginning with the 2000 305(b) Report, MDEQ is providing geo-referenced coverages of the use support assessments. Maps displaying Aquatic Life Use Support, Recreational Use Support, and Fish Consumption Use Support for the Pascagoula River Basin waterbody segments are shown in Figures III, 8-6, 8-7, and 8-8.

TABLE III, 8-1
Summary of Pascagoula River Basin Use Support Assessments
Rivers and Streams

(All size units are in miles)

Degree of Use Support	Assessment Basis		Total Assessed Size
	Evaluated	Monitored	
Size Fully Supporting All Assessed Uses	3948.40	654.80	4603.20
Size Fully Supporting All Assessed Uses but Threatened for At Least One Use	0.00	14.60	14.60
Size Partially Supporting All Assessed Uses	46.60	332.20	378.80
Size Not Supporting All Assessed Uses	28.20	133.80	162.00
Total Assessed	4023.20	1135.40	5158.60

Total River/Streams Miles in Basin	15045.10
Size Not Assessed	9886.50



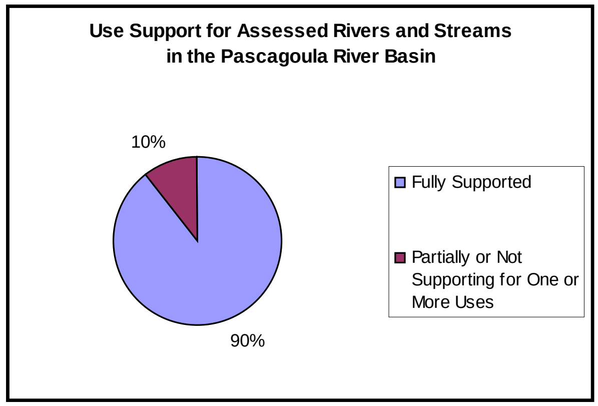


TABLE III, 8-2
Individual Use Support Summary for Pascagoula River Basin
Rivers and Streams

(All size units are in miles)

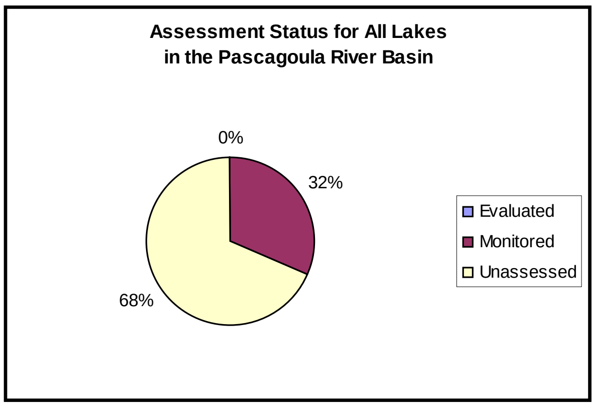
Use	Total Miles	Size Fully Supporting	Size Fully Supporting but Threatened	Size Partially Supporting	Size Not Supporting	Size not Attainable
Aquatic Life Support	5,118.40	4,875.60	82.50	51.00	109.30	0.00
Fish/Wildlife	5,118.40	4875.60	82.50	51.00	109.30	0.00
Fish Consumption	910.90	613.70	0.00	297.20	0.00	0.00
Contact Recreation	123.70	0.00	0.00	71.00	52.70	0.00
Primary Contact (Recreation)	123.70	0.00	0.00	71.00	52.70	0.00
Secondary Contact (Recreation)	270.60	196.10	0.00	74.50	0.00	0.00

TABLE III, 8-3
Summary of Pascagoula River Basin Use Support Assessments
Lakes

(All size units are in acres)

Degree of Use Support	Assessment Basis		Total Assessed Size
	Evaluated	Monitored	
Size Fully Supporting All Assessed Uses	0.00	7048.40	7048.40
Size Fully Supporting All Assessed Uses but Threatened for At Least One Use	0.00	0.00	0.00
Size Partially Supporting All Assessed Uses	0.00	458.50	458.50
Size Not Supporting All Assessed Uses	0.00	44.00	44.00
Total Assessed	0.00	7550.90	7550.90

Total Lake Acres in Basin 23775.80
Size Not Assessed 16224.90



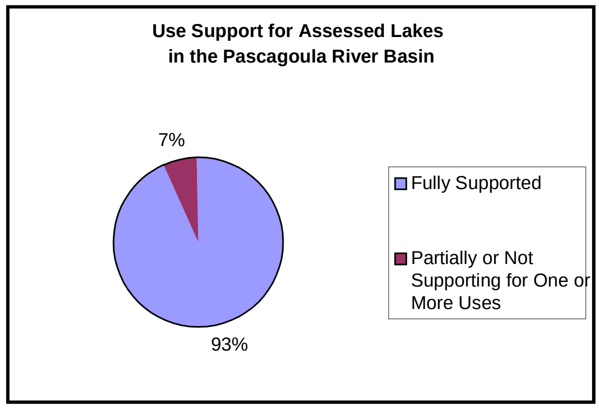


TABLE III, 8-4
Individual Use Support Summary for Pascagoula River Basin
Lakes

(All size units are in acres)

Use	Total Acres	Size Fully Supporting	Size Fully Supporting but Threatened	Size Partially Supporting	Size Not Supporting	Size not Attainable
Aquatic Life Support	4,243.00	4,243.00	0.00	0.00	0.00	0.00
Fish/Wildlife	4,243.00	4,243.00	0.00	0.00	0.00	0.00
Fish Consumption	7,550.90	7,550.90	0.00	458.50	44.00	0.00
Drinking Water Supply	5,038.60	0.00	0.00	0.00	0.00	0.00

Causes and Sources of Impairment of Designated Uses

Causes and sources of impairment were evaluated for streams, rivers, and lakes having one or more uses impaired. Total assessed sizes of streams, rivers, and lakes affected by various cause categories are given in Tables III, 8-5, and 8-7. For the majority of miles of assessed rivers not meeting their designated uses, impairment is caused by pathogens, metals, and unknown pollutants contributing to biological impairment. In these latter cases, actual monitoring has detected biological impairment but the exact pollutant cause has yet to be determined. To a lesser extent, impacts are also attributed to organic enrichment, low dissolved oxygen, and total dissolved solids. All of the stream miles with the presence of metals indicated as the cause of impairment are the result of mercury fish consumption advisories. For lake acreage, metal contamination serves as the major cause of impairment and again is attributed to the presence of mercury fish consumption advisories. Priority organics and dioxins are also indicated as impairments due to fish consumption advisories for these pollutants.

Total sizes of rivers, streams, and lakes affected by various source categories are given in Tables III,8-6, and 8-8. Currently unknown sources contribute pollutants to the majority of river miles. As above, the majority of impairment was determined to be biological and therefore causes and sources are yet to be determined. Lesser numbers of miles have pollutants contributed by urban runoff, industrial and municipal point sources, and natural sources. For the current assessment, the natural sources category is utilized in the southern most part of the basin where lower D.O. levels have been noted and is considered to be a naturally occurring condition due to the influx of saline waters and the presence of tidal marshes and wetlands. For lakes, the source of impairment is unknown due to the uncertainty of the origin of the mercury causing the fish consumption advisories. The presence of dioxins and priority organics originate from the occurrence of spills and run-offs from industrial wood treating facilities.

TABLE III, 8-5
Summary of Impairment Causes for Pascagoula River Basin
Rivers and Streams
(All size units are in miles)

Cause Categories	Total Size
Metals	297.20
Mercury	297.20
Organic Enrichment/Low DO	47.40
Organic Enrichment	4.00
Low DO	47.40
Salinity/TDS/Chlorides	1.00
Pathogens	198.20
Other (Bio Impairment)*	116.90

* Note: Definitive cause identification is not possible at the time of assessment. Category used to relate to waters where biological indicators (macroinvertebrates) were used and impairment was indicated but further investigation needed to quantify pollutant.

TABLE III, 8-6
Summary of Impairment Sources for Pascagoula River Basin
Rivers and Streams

(All size units are in miles)

Source Categories	Total Size
Industrial Point Sources	9.30
Municipal Point Sources	16.70
Urban Runoff/Storm Sewers	12.60
Resource Extraction	4.40
Petroleum Activities	4.40
Spills	4.40
Natural Sources	42.40
Source Unknown*	510.80

* Note: Definitive source identification is not possible at the time of assessment. Category used to relate to waters where mercury advisories are in place and/or biological indicators (macroinvertebrates) were used and impairment was indicated but further investigation needed to quantify source.

TABLE III, 8-7.
Summary of Impairment Causes for Pascagoula River Basin
Lakes

(All size units are in acres)

Cause Categories	Total Size
Priority Organics (PCP)	44.00
Dioxins	44.00
Metals	458.50
Mercury	458.50

TABLE III, 8-8
Summary of Impairment Sources for Pascagoula River Basin
Lakes

(All size units are in acres)

Source Categories	Total Size
Spills	44.00
Other	44.00
Source Unknown*	458.50

* Note: Definitive source identification is not possible at the time of assessment. Category used to relate to waters where mercury advisories are in place.

Figure III, 8-6

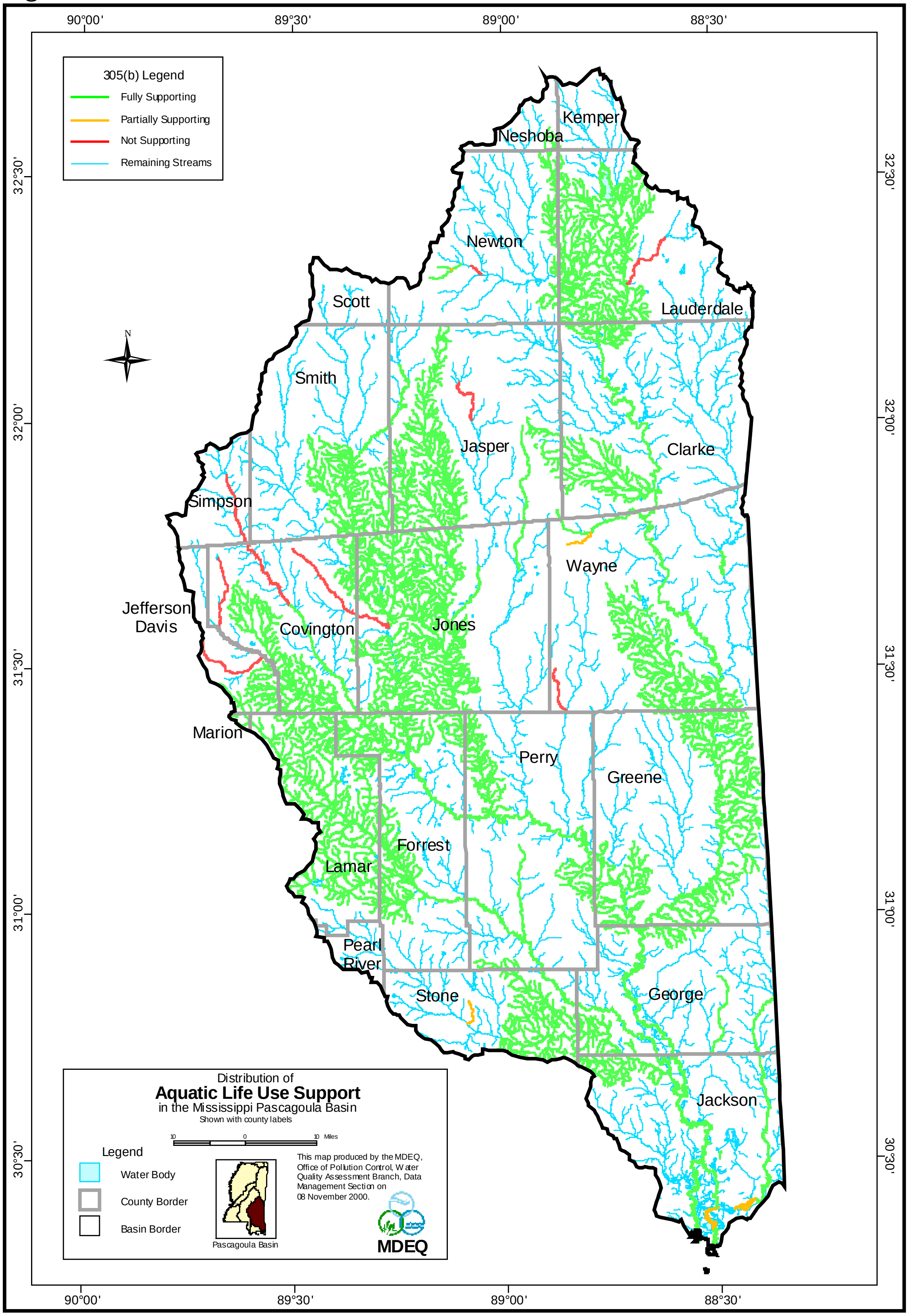


Figure III, 8-7

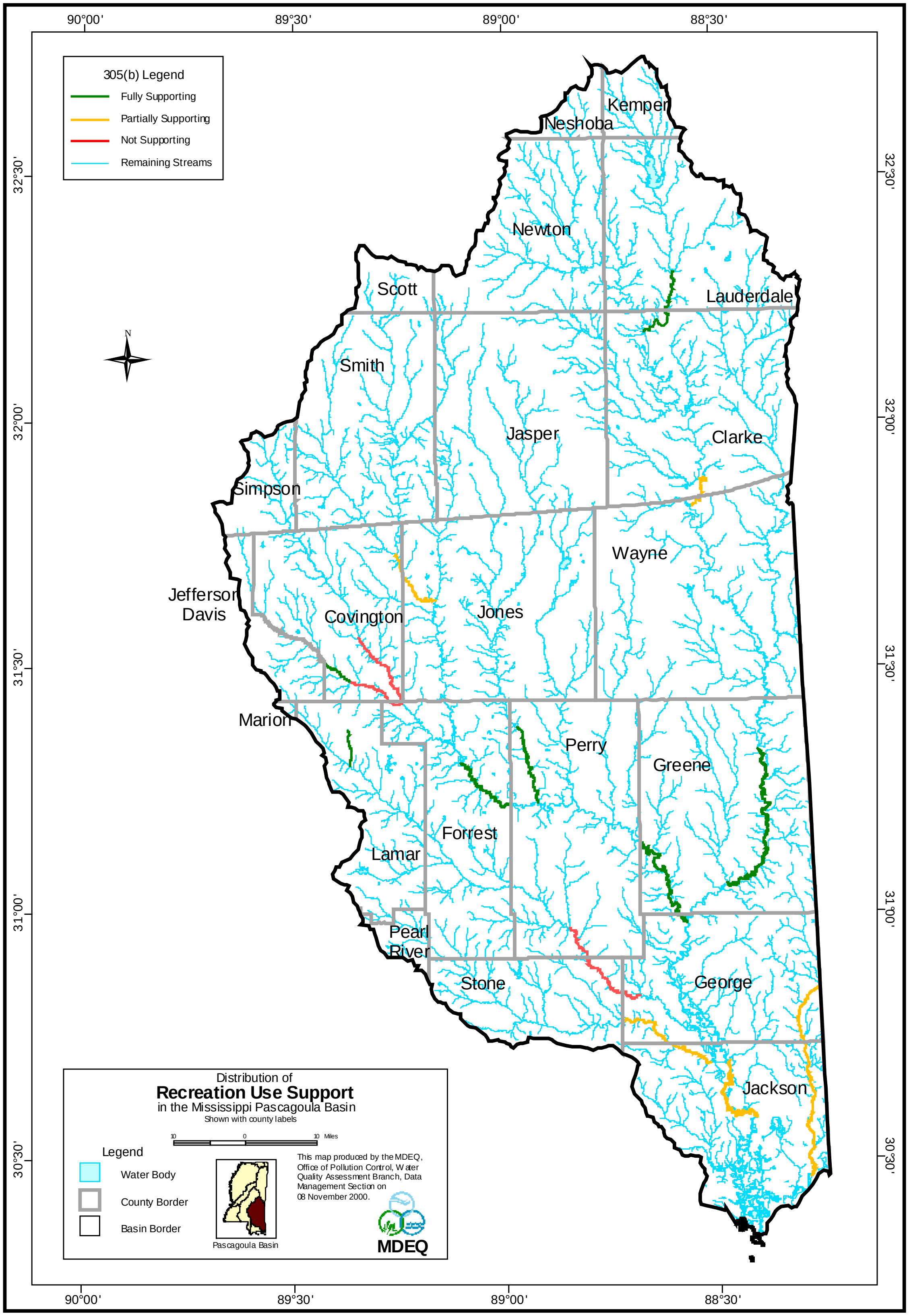
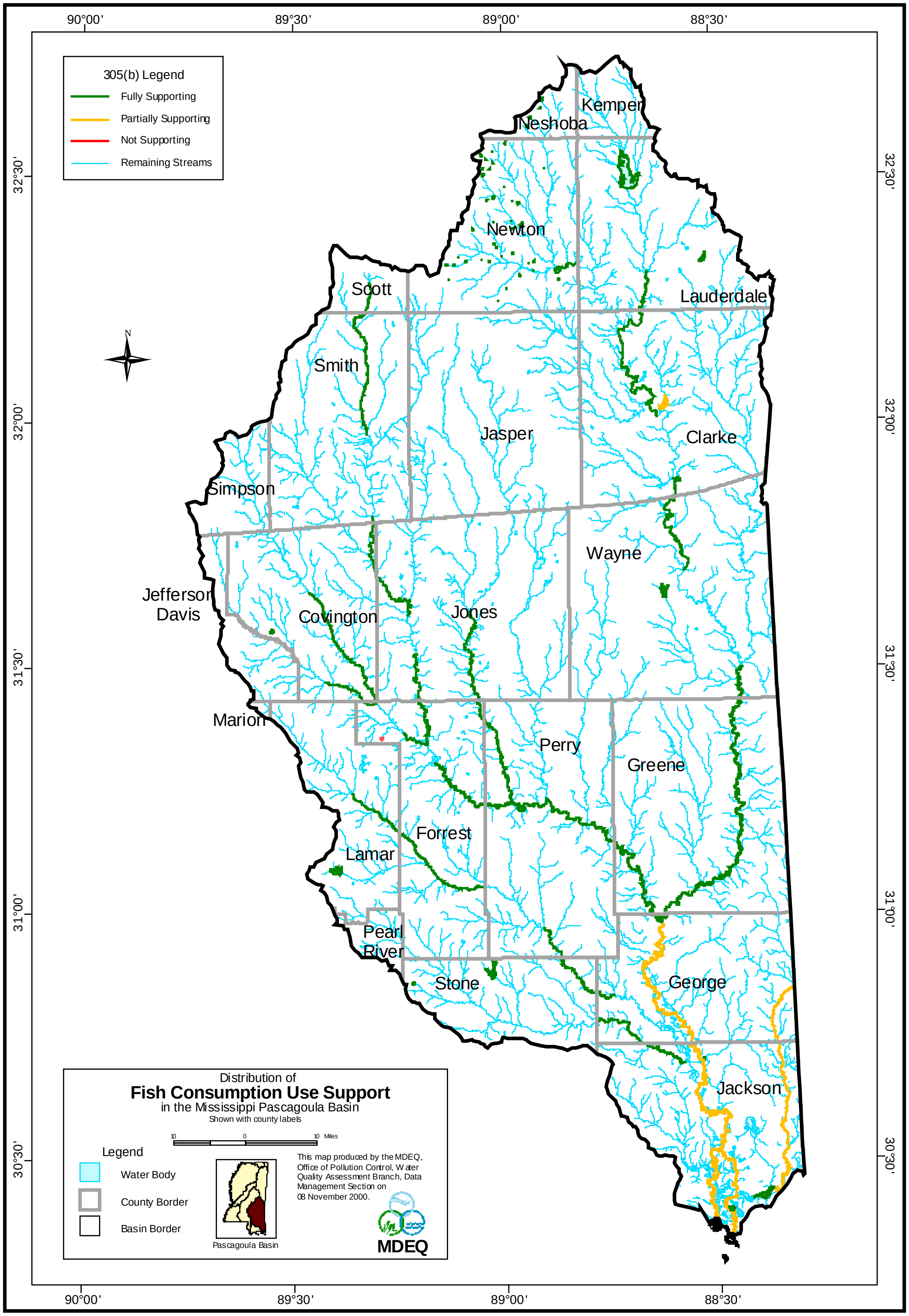


Figure III, 8-8

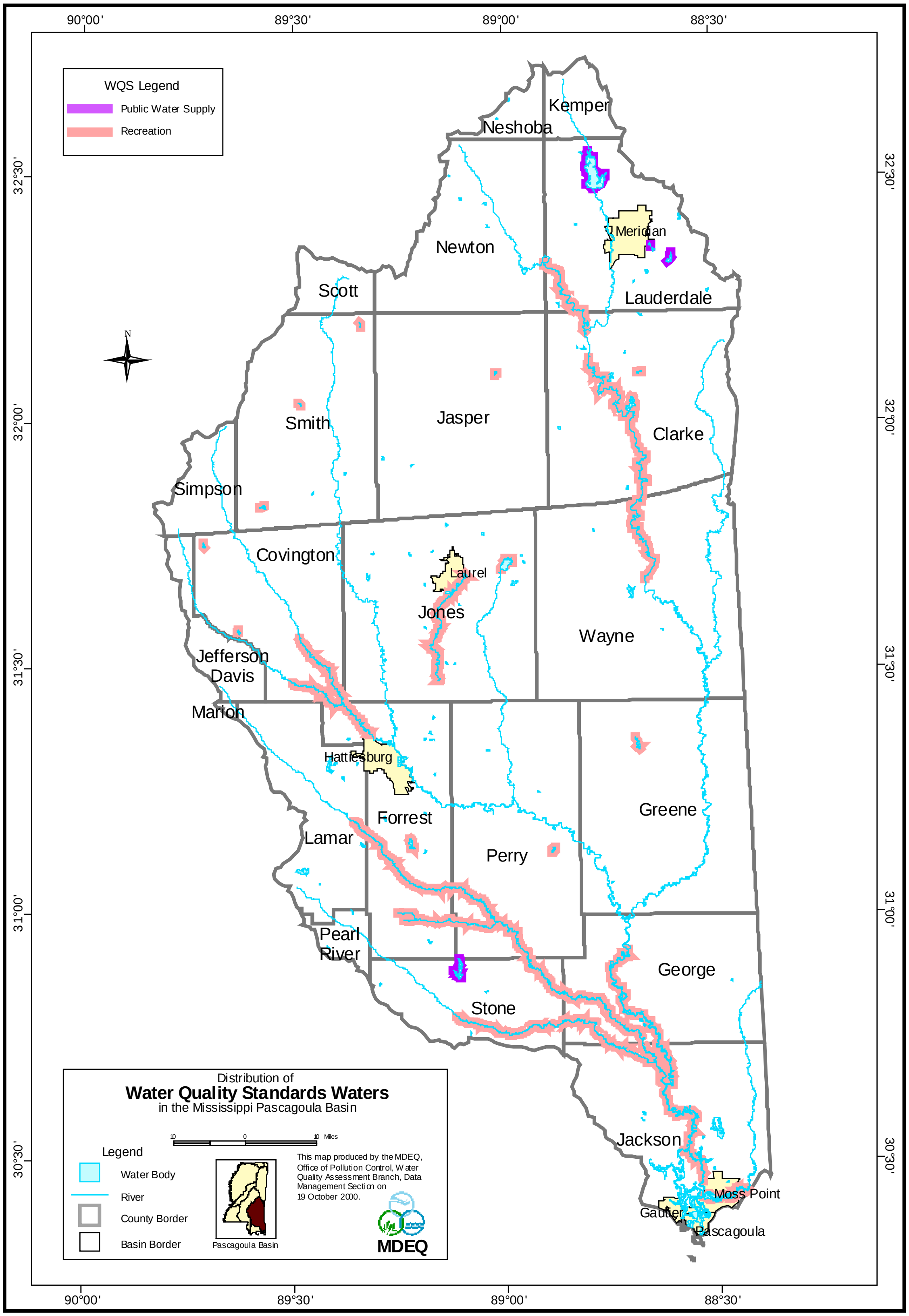


Water Quality Standards Waters

All of the basin waters not specifically listed below are classified as Fish and Wildlife. Pascagoula River Basin waters with special water quality standard classifications are listed below and are shown in Figure III, 8-9.

Archusa Reservoir	Recreation	Clarke County
Beaverdam Creek	Recreation	From Hdwtrs to Black Creek
Black Creek	Recreation	From Hwy 11 to Pascagoula River
Bonita Reservoir	Public Water Supply	Lauderdale County
Bowie Creek	Recreation	From Hwy 589 to Bowie River
Bowie River	Recreation	From Bowie Creek to I-59
Chickasawhay River	Recreation	From Stonewall to Hwy 84
Chunky River	Recreation	From Hwy 80 to Chickasawhay River
Clarke Lake	Recreation	Clarke County
Dry Creek W/S NRCS	Recreation	Covington Co Lake Site #3
Escatawpa River	Fish/ Wildlife (DO Variance)	From Mile 10 to Pascagoula River
Flint Creek Reservoir	Public Water Supply and Recreation	Stone County
Lake Bogue Homa	Recreation	Jones County
Lake Claude Bennett	Recreation	Jasper County
Lake Geiger	Recreation	Forrest County
Lake Marathon	Recreation	Smith County
Lake Mike Conner	Recreation	Covington County
Lake Perry	Recreation	Perry County
Lake Ross Barnett	Recreation	Smith County
Lake Shongelo	Recreation	Smith County
Lakeland Park Lake	Recreation	Wayne County
Long Creek Reservoir	Public Water Supply	Lauderdale County
Okatibbee Reservoir	Public Water Supply and Recreation	Lauderdale County
Okatoma Creek	Recreation	From Hwy 590 to Bowie River
Pascagoula River	Recreation	From 6 Mi. North of Hwy 26 to Cumbest Bluff
Pascagoula River	Recreation	Cumbest Bluff to Smear Bayou
Red Creek	Recreation	Hwy 49 to Big Black Creek
Tallahala Creek	Fish/Wildlife (DO Variance)	From 1 Mi. North of Hwy 15 to Sholars
Turkey Fork Reservoir	Recreation	Greene County

Figure III, 8-9



Permitted Major Point Sources

Burlington Industries Inc.	MS0001848	Bostic Branch	Stonewall
GC/Escatawpa - Act. Sludge	MS0021521	Robertson L./Escatawpa R.	Escatawpa
GC/Gautier POTW	MS004301	West Pascagoula River	Gautier
GC/Pascagoula POTW	MS0020249	Pascagoula River	Pascagoula
Georgia Pacific Corporation	MS0031704	Leaf River	Perry County
Hattiesburg - North Lagoon	MS0020826	Bowie River	Hattiesburg
Hattiesburg - South Lagoon	MS0020303	Leaf River	Hattiesburg
Hercules Incorporated	MS0001830	Bowie River	Hattiesburg
Jackson Co. Port Authority	MS0002674	Escatawpa River	Pascagoula
Laurel - POTW #1	MS0024163	Tallahala Creek	Laurel
Laurel - POTW #2	MS0020176	Tallahala Creek	Laurel
Masonite Corp-Int'l Paper	MS0003042	Tallahala Creek	Laurel
Meridian POTW	MS0020117	Sowashee Creek	Meridian
Morton International Inc.	MS0001775	Escatawpa River	Moss Point
South MS Electric Power Assn.	MS0028258	Black Creek	Purvis
Waynesboro POTW	MS0024228	Chickasawhay River	Waynesboro
Zapata Protein (USA) Inc.	MS0002950	Escatawpa River	Moss Point

Noteworthy Items

* Fish consumption advisory lifted on Leaf River; dioxin monitoring continues

* Sand and gravel dredging impact of concern for Bowie and Leaf Rivers

* Pascagoula River study for Jackson County water supply

* Black Creek, Mississippi's only Designated Wild and Scenic River, threatened by urban sprawl

* Fish "no consumption" advisory, due to PCP and dioxin, remains in effect for Country Club Lake

* Fish “limit consumption” advisory due to dioxin lifted on Escatawpa River; "limit consumption" advisory due to mercury remains in effect

* Fish “limit consumption” advisory due to mercury issued for Archusa Creek Water Park

* Fish “limit consumption” advisory due to mercury issued for Pascagoula River

* MDEQ Ambient Basinwide Monitoring conducted in 1997

* A total of 33 TMDLs have been completed in the Pascagoula Basin

MDEQ Environmental Damage Assessments

1. Country Club Lake and Mineral Creek near Hattiesburg (1990-1997)

A wood preserving facility was located in the watershed of this 60-acre impoundment in a subdivision northwest of Hattiesburg, Mississippi. From 1974 to 1987, the lake was severely impacted by discharges of pentachlorophenol (PCP). In 1987, a fish consumption advisory was issued for the lake. Fish were sampled from Mineral Creek (tailwaters of Country Club Lake) in June 1990. In June 1991, biologists from MDEQ returned to Mineral Creek just below the spillway of Country Club Lake. Three composite fish samples were collected. The samples were comprised of slightly larger fish than those collected in 1990 and dioxin levels were higher than those detected in the 1990 samples.

MDEQ/OPC biologists returned in 1993 and collected nine fish tissue samples, three each from the following sites: (1) Country Club Lake; (2) Dr. Phillip's Lake, on Mineral Creek downstream from Country Club Lake; and (3) the Bowie River below the confluence with Mineral Creek. Full congener analysis of these samples revealed that dioxin levels were very low or absent at the two downstream sites, but levels of concern persist in Country Club Lake. An advisory warning the public not to consume fish from Country Club Lake remains in effect and signs to that effect are posted on the shoreline.

MDEQ is considering removal of the dioxin advisory, however the PCP advisory will remain in effect. Right side fillets remaining from the dioxin study will be used to determine what levels of PCP's persist in the fish.

2. Little Eucutta Creek - Oil Spill (1994)

An Environmental Damage Assessment was conducted to determine if Big and Little Eucutta Creeks had been damaged after an accidental discharge of crude oil into Little Eucutta Creek on June 16, 1994. The spill occurred in Clarke and Wayne counties east of Eucutta, Mississippi. After a brief tour of the impacted area, water samples were collected from five sites (four sites on Little Eucutta Creek and an off-site control) for analysis for total petroleum hydrocarbons (TPHs) and VOCs. Other physical and chemical parameters, as well as habitat quality, were measured at each site. At three of the sites, rapid bioassessments were performed. Because the upper reaches of Little Eucutta Creek were markedly dissimilar to the segments affected by the oil spill, background biological conditions were defined by a biological assessment conducted at the off-site control. Results from this site were compared to biological assessments done at the point of heaviest oil contamination, and then downstream at Big Eucutta Creek, just below the confluence with Little Eucutta Creek (total distance of approximately 1 mile).

It was determined that a severe impairment had occurred where the oil contamination was greatest. However, a rapid recovery had taken place at the confluence of Big and Little Eucutta Creeks, as evidenced by a fauna nearly identical to that collected at the control sites. This rapid recovery, such a short distance downstream from the accident, was likely due to the rapid and thorough cleanup by the party responsible for the spill. Rain and natural decomposition should cleanse the affected segments of the stream, and a full recovery of the biota is likely.

3. Big Bogue Homo Creek - Oil Spill (1995)

A broken pipe resulted in the discharge of an undetermined amount of oil into Bogue Homo Creek in Heidleberg (Jasper County) on March 24, 1995. Reconnaissance revealed oil sheens on the water's surface at several sites along Big Bogue Homo Creek, so an EDA was conducted. A collection of water column samples was taken to test for toxicity, TPHs and chloride levels. On March 29, rapid bioassessments were conducted by MDEQ at four sites covering nearly 4.5 miles of stream. Additional water samples for chloride levels were also collected. These samples were not analyzed for TPHs nor subjected to toxicity testing because the previously collected samples showed no evidence of either.

Taxonomic analysis of the sampled fauna indicated that no adverse impacts had occurred in the system. As an interesting aside, an uncommon genera of caddisfly in Mississippi (Rhyacophila) was collected from the control site during this study. This record extends the known distribution of this genera within the state a considerable distance southward.

4. Oil Spill on West Tallahala Creek (1996)

On May 17, 1996 MDEQ/OPC Biological Section staff responded to a request for an Environmental Damage Assessment on West Tallahala Creek and the upper Leaf River near Silverena. An initial site reconnaissance was made on this date for site selection and preliminary water samples were collected. It was decided that both macroinvertebrate-based bioassessments and fish community structure work were appropriate methods to assess the damage in this case. Biological assessments and fish collections were done several days later at 5 sites in West Tallahala Creek and the upper Leaf River. A diverse assembledge of fishes were collected. The macroinvertebrate community showed only minimal stress in relation to this spill event. No additional remedial action on the part of the responsible party was recommended.

5. Big Bogue Homo Creek Oil Spill EDA (1997)

An EDA was conducted on 3 June 1997 on four sites along Big Bogue Homo and Beaver creeks near Heidelberg in response to an oil spill that had occurred several days earlier. Chloride levels and TPHs were not elevated, and only a slight elevation was noted in specific conductance. All other physical and chemical parameters measured appeared normal.

Biological assessments were conducted at two of the four sites. The fauna of both sites was nearly identical, indicating that little if any damage had been done to the community as a result of the spill. No additional remedial action on the part of the responsible party was recommended.

MDEQ Intensive Water Quality Surveys and Special Studies

1. Pascagoula River Water Supply Study (1994)

During October 1994, MDEQ/OPC Water Quality Assessment Branch staff assisted the MDEQ's Office of Land and Water Resources (OLW) in a study on the Lower Pascagoula River. This study was a joint effort by the MDEQ; U.S. Geological Survey; Mississippi Department of Wildlife, Fisheries, and Parks; Mississippi Department of Marine Resources; and the Pat Harrison Waterway District. Data obtained in the study were used in the calibration of a DYNHD hydrodynamic model developed by Harza Engineering Company of Chicago, Illinois.

The study focused on an area of the river in Jackson County from Cumbest Bluff south to the Mississippi Sound. The purpose of the study was to determine the effect, on the ecosystem, of the upstream migration of the salt-water wedge during water withdrawal at low-flow conditions. To determine this effect, hydrodynamic and water quality monitoring data were collected at approximately 20 stations throughout the tidally influenced portions of the East and West Pascagoula Rivers. Hydrodynamic data included current velocity/direction using a Doppler acoustic flowmeter, water level, conductivity/salinity, and temperature. Water quality data included dissolved oxygen, temperature, conductivity/salinity, and pH.

The results of the study after model calibration showed there would be no apparent effect on the ecosystem during low-flow conditions due to flow characteristics or the upstream migration of the salt water wedge under the current permitted withdrawals.

2. Upper Leaf River near Moselle Complaint Investigation (1995)

A citizen complaint in September 1995 initiated this investigation to determine if effluent from a chicken processing facility was impairing the waters of the upper Leaf River. A control site was selected above the effluent; the second site was located at the outfall; and the final site was located approximately 100 yards below the confluence of the effluent with the river. Low water levels also allowed samples of the effluent to be collected just prior to entering the river.

Field determinations of pH and residual chlorine indicated that the effluent was in violation of its NPDES permit. However, all parameters measured had returned to ambient levels at the most downstream site. This indicates that the effluent is rapidly mixing with the river water or is rapidly being assimilated. Additionally, collections of several leaf pack accumulations just below the effluent outfall revealed an abundance of aquatic insect larvae known to be sensitive to pollution. Consequently, MDEQ/OPC staff concluded that the effluent did not adversely affect the biota.

3. Leaf River - Background Study of Conditions Prior to the Beginning of Sand and Gravel Mining (1995-1996)

The MDEQ/OPC Surface Water Division requested that an upstream/downstream biological survey be done prior to the onset of in-stream sand and gravel mining in the Leaf River below Petal, MS. The OPC Biological Services Section is performing, under contract with the mining company, both a pre- and post-dredging biosurvey. The pre-dredging survey was completed in July 1995 with the follow-up originally scheduled for July 1996 (after the dredging operation has been in place for some time). In addition to the biological survey, water samples were also collected at both sites and tested for oil and grease, pH, dissolved oxygen, visible sheen, and turbidity. Results of the chemical and biological data indicate that no measurable difference existed between the upstream and downstream sites prior to the onset of mining activities at the proposed site. As of this writing, the follow-up study has not been completed due to a delay in start-up of the mining operation.

4. Tallahala Creek near Laurel TMDL Study (1996-1997)

During the summer of 1987, a water quality and biological study was conducted on Tallahala Creek near Laurel. The purpose of the study was to further document water quality conditions in those reaches of Tallahala Creek below the Laurel and Masonite wastewater discharges. The special focus of the study was to gather baseline biological data prior to the Laurel wastewater treatment system upgrade. Information about periphyton, macroinvertebrates, and phytoplankton was gathered. The pre-upgrade phase of this study was completed in 1989. Subsequent upgrades to the City of Laurel sewage treatment systems and improvements to Masonite's wastewater treatment system were completed in the early 1990's.

Tallahala Creek is on the Mississippi 1996 Section 303(d) List of Impaired Waterbodies and was targeted for Total Maximum Daily Load (TMDL) development beginning in 1996. In October 1996, the Tallahala Creek TMDL intensive low-flow synoptic survey was conducted by the Water Quality Assessment Branch (WQAB) with analytical support provided by the OPC laboratory. The purpose of the study was two-fold. The first was to develop a TMDL for oxygen-demanding pollutants in Tallahala Creek at and below the city of Laurel. The second purpose of this study was to investigate the feasibility of removing the dissolved oxygen (DO) water quality standards variance presently in place for an approximately 28 mile stretch of the stream. Data from the 1996 intensive survey was used to provide the hydrodynamic and water quality data for calibration of MDEQ's wasteload allocation model, AWFWUL1, for Tallahala Creek. AWFWUL1 is a model that has been used extensively by MDEQ and is promulgated in MDEQ regulations. It is a steady state, daily average computer model that utilizes a modified Streeter-Phelps DO sag equation. Wastewater facilities investigated during the study included the City of Laurel POTW #1 and POTW #2, City of Ellisville South POTW, and the Masonite Corporation paper mill in Laurel.

Field activities included stream discharge measurements, a time-of-travel dye study, photosynthesis/respiration measurements, diurnal profiling for DO, temperature, pH, TDS, and specific conductance. Both semi-continuous monitoring with Hydrolab datasondes and spot profiling measurements were utilized. Sample collection was conducted for water chemistry analysis of nutrients, BOD5, BOD ultimates, solids, and chlorophyll a. A total of approximately 14 stream locations and 5 wastewater outfalls were monitored during the study. Laboratory analyses were completed and the data compiled, analyzed, and input into the model for model calibration.

A model verification study on Tallahala Creek was conducted in September 1997. The purpose of this study was to gather an additional data set under slightly different temperature and flow conditions to validate the computer model. Station locations and parametric coverage were very similar to that collected in 1996. Data from the 1997 study was used to validate, verify, and recalibrate the model so that it best represented the stream response to both sets of conditions.

Results from the intensive surveys and model development indicate that water quality has substantially improved in Tallahala Creek since the wastewater upgrades as compared to the pre-1990 data. The calibrated model was used to predict water quality at worst case conditions, which are low flow, high temperatures, and maximum loads of BOD allowed under existing permits. The minimum DO predicted by the model was approximately equal to that allowed by the variance. Therefore, the TMDL for BOD is the current load of BOD allowed by existing permits for the upper segment of Tallahala Creek into which the City of Laurel and Masonite discharge. However, monitoring and modeling in the lower segment of Tallahala Creek showed that the impairment has been sufficiently eliminated and that no TMDL for BOD was necessary. Consequently, removing the variance for the lower segment of Tallahala Creek is a possibility that will be addressed in the triennial review of water quality criteria conducted by MDEQ.

In addition, at the request of the WQAB, the biological sites visited in the pre-upgrade study were revisited in 1996 by the Biological Services Section and the majority of this study (excluding phytoplankton parameters) was repeated to further document the water quality of Tallahala Creek. Results collected by the Biological Services Section at this time confirmed that several of the sites that were most adversely affected prior to the upgrades showed improved water quality. Two sites used in these studies continue to be a part of the MDEQ's ambient biomonitoring network, Tallahala Creek at Runnelstown and Tallahala Creek at Ellisville, and are monitored on an annual basis.

5. Escatawpa River Water Quality Model Calibration Study (1997)

The Escatawpa River near Moss Point is a stratified estuarine river with historic water quality impairment. A dissolved oxygen (DO) water quality standards variance is also in place for this portion of the river. As a result of this sustained impairment, the EPA is supporting MDEQ in composing a Use Attainability Analysis (UAA) of the Escatawpa River. Within that estuary are several discharges including the largest and most significant, the Jackson County Port Authority release which includes the industrial wastewater from International

Paper Company. The issue of present and future wasteload allocation is of crucial importance to any remediation plans to improve water quality.

In September 1997, a intensive survey was conducted on the Escatawpa River by EPA with assistance from MDEQ OPC Water Quality Assessment Branch, OPC Field Services Division - South Regional Office and OPC laboratory, and MDEQ Office of Land and Water Resources. The primary objective of this survey was to collect a calibration data set for the development of a water quality model for the Escatawpa River.

A total of 14 stations were established in the study area which included the Escatawpa River, Pascagoula River, West Pascagoula River and a station in the Mississippi Sound. Monitoring activities during the nine day study period included tide-phased water quality sampling for BOD5, ultimate BOD, nitrogen series, and total and ortho-phosphorus and in-situ profiling of DO, salinity and temperature. Other study components included effluent monitoring, continuous DO monitoring with Hydrolab multiparameter dataloggers, production and respiration measurements, sediment oxygen demand, diffusion/reaeration measurements, a dye dilution study as well as hydrological and meteorological monitoring.

A second intensive survey was conducted in Spring 1999. The purpose of this study was to collect an additional set of data for model calibration/verification.

6.   Basin Management Approach Monitoring - Pascagoula River Basin

As a pilot project to support the development of MDEQ's Basin Management Approach, an effort to gather baseline physical/chemical and biological information on the Pascagoula River Basin was carried out during 1997. A basin fixed network of monitoring stations consisting of approximately 100 stations was established and monitored by MDEQ in 1997 in addition to the Primary Ambient Fixed Network stations already existing in the basin. Basin station selection criteria included at least one site at the outlet of each of the NRCS 11-digit watersheds in the basin as well as a site on all 303(d)-listed waters assessed as monitored in 1996. Biological assessment consisted of screening level techniques on macroinvertebrates, fish sampling for fish tissue analysis and chlorophyll analysis. Chemical sampling for conventional pollutants was also conducted twice a year during a high flow and a low flow period at most stations. Due to the limitations of the biological screening method used during the basin process, only extremes such as gross impairment or very good stream conditions were identified. For this reason, a significant amount of data was deemed inconclusive in regards to impairment for this assessment and further monitoring for these sites is scheduled in 2001.

Summary of Waterbody Segment Monitoring Data

Figure III, 8-10 displays the MDEQ monitoring stations for which data was used in the Pascagoula River Basin assessment. A summary of the water quality monitoring data used in the 2000 305(b) Report for the Pascagoula River Basin is shown in Table III, 8-9. This table lists monitoring stations used in the current assessment by waterbody segment. It also lists the type of data collected and used in the assessment, the use support rating given to the individual data by parameter, and the use support rating given to the segment as a whole. For a more in depth explanation of the processes used to develop the following summary tables, see Part III of this document, "Chapter 2: Assessment Methodology" (pages 12-23).

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Figure III, 8-10

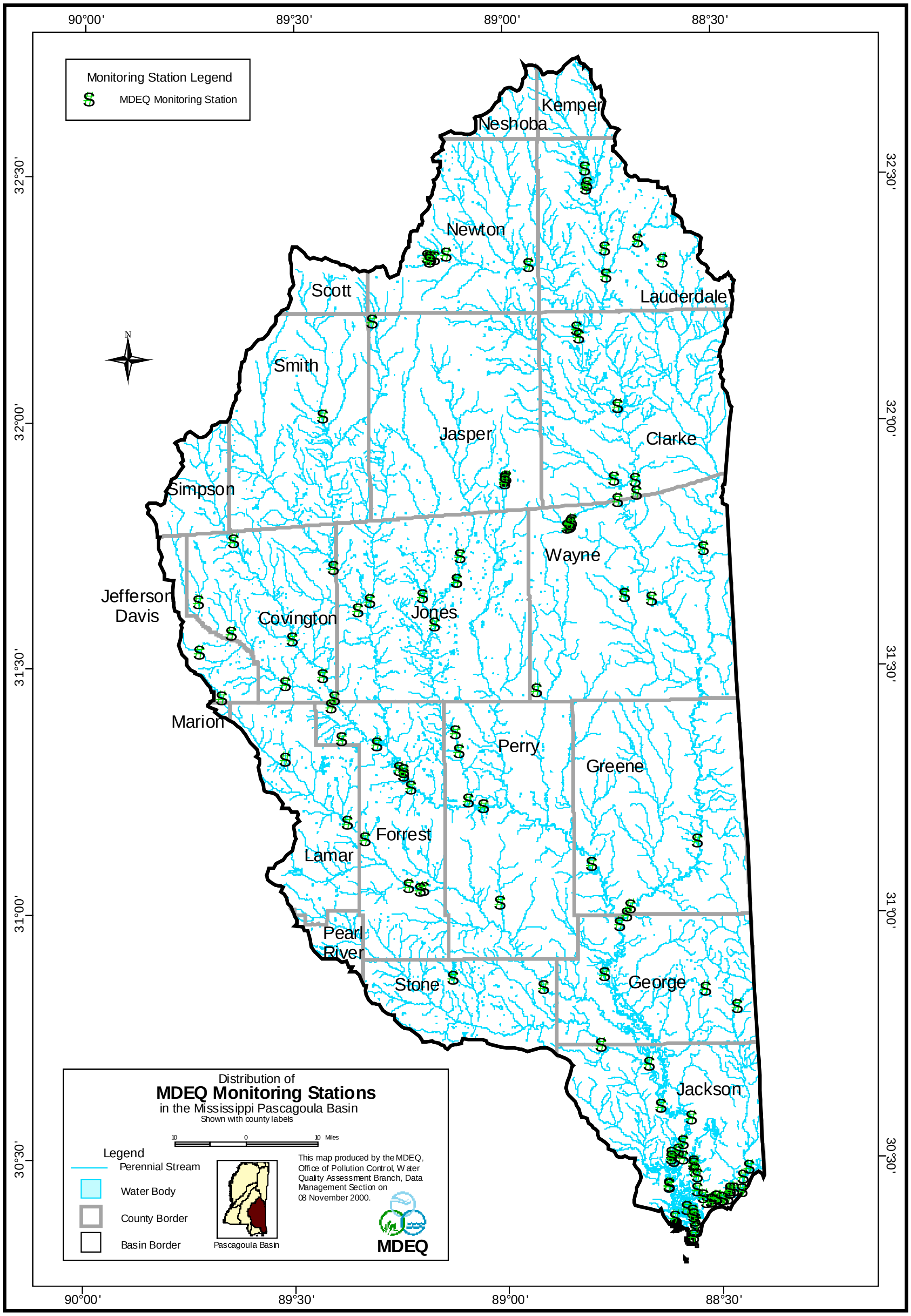

TABLE III, 8-9
2000 305(b) Summary of Monitored Segments
Pascagoula River Basin

GEOGRAPHICAL INFORMATION		SITE_AGENCY ID	PHYSICAL/CHEMICAL DATA Numeric Criteria and Target Values												TOXICS		BIOL	SEGMENT USE SUPPORT					
WBIDSEGID	SEGMENT NAME & DESCRIPTION	STATION ID	†TEMP	†PH	†DO	COD	TOC	TKN	NO2 NO3	TP	TURB	TSS	†CDT	†FCLS	WTR	FSH	BIO	AQ	FC	SHL	SC	CR	DW
MSPA057R00_010	CHUNKY RIVER, AT CHUNKY FROM CONFLUENCE WITH CHUNKY CREEK AND POTTERCHITTO CREEK TO WATERSHED BOUNDARY (058)	02475490_D														F		U	F		U		
MSPA057R00_050	POTTERCHITTO CREEK, FROM CONFLUENCE WITH RISER CREEK TO CONFLUENCE WITH TARROW CREEK	02475300_D															N	N	U		U		
MSPA057R00_060	POTTERCHITTO CREEK, FROM CONFLUENCE WITH RICHARDSON MILL CREEK TO CONFLUENCE WITH DRY BRANCH NORTH OF I 20	MB002D03-PC2_D			F												U	F	U		U		
MSPA057R00_065	POTTERCHITTO CREEK, FROM HEADWATERS NEAR LAWRENCE TO CONFLUENCE WITH RICHARDSON MILL CREEK	MB002D03-PC1_D			F												F	F	U		U		
MSPA057R00_070	RICHARDSON MILL CREEK, FROM NEWTON POTW TO CONFLUENCE WITH POTTERCHITTO CREEK	MB002D03-RM3_D															P	P	U		U		
MSPA057R00_075	RICHARDSON MILL CREEK, FROM HEADWATERS TO NEWTON POTW OUTFALL	MB002D03-RM1_D			F													F	U		U		
		MB002D03-RM1A_D			F												U						
MSPA058R00_010	Chunky River, FROM CONFLUENCE WITH TALLAHATTA CREEK TO MOUTH OF HUC BOUNDARY AT ENTERPRISE	02475700_D															F	F	U			U	
MSPA059L01_010	OKATIBBEE RESERVOIR, NEAR COLLINSVILLE	540OKR01_D	F	F	F	F	F	F	F	F	F	F	F			F	U	F	F			U	U
		540OKR02_D	F	N	F	F	F	F	F	P	F	F	F				U						
		PA052D00-OK1_D														F							
MSPA060R00_010	OKATIBBEE CREEK, AT ARUNDEL FROM CONFLUENCE WITH SOWASHEE CREEK TO CONFLUENCE WITH CHUNKY RIVER	02476600_D	F	F	F	F	F	F	N	P	F		F	F		F	U	F	F		F		
		PA060P-OC4_P															F						
		PA060P-OC5_P	F	F	F								F				F						
		PA060P-OC6_P	F	F	F								F				F						
		PA060P-OC7_P															F						
		PA060P-OC8_P															F						
MSPA060R00_020	OKATIBBEE CREEK, FROM HWY 19 TO CONFLUENCE WITH SOWASHEE CREEK	02476000_D															U	F	U		U		
		PA060P-OC2_P															F						
		PA060P-OC3_P															F						
MSPA060R00_030	OKATIBBEE CREEK, NEAR MERIDIAN FROM OKATIBBEE RESERVOIR TO HWY 19	PA060P-OC1_P															F	F	U		U		
MSPA061R00_010	SOWASHEE CREEK, FROM MERIDIAN POTW OUTFALL TO CONFLUENCE WITH OKATIBBEE CREEK	02476500_D															N	N	U		U		
MSPA063L01_010	ARCHUSA CREEK WATER PARK, AT QUITMAN	063ACP01_D														P	U	U	P*			U	
MSPA063R00_030	CHICKASAWHAY RIVER, AT ENTERPRISE FROM CONFLUENCE OF CHUNKY RIVER AND OKATIBBEE CREEK TO STONEWALL POTW OUTFALL	02477000_D	F	F	F	F	F	F	F	F	F	F	F			F	F	F	F		U		
MSPA064R00_010	SHUBUTA CREEK, NEAR SHUBUTA FROM CONFLUENCE WITH GOODWATER CREEK TO MOUTH AT CHICKASAWHAY RIVER	02477330_D															F	F	U		U		
MSPA065R00_020	CHICKASAWHAY RIVER, AT WAYNESBORO FROM HWY 84 TO WAYNESBORO POTW OUTFALL	02477560_D	F	F	F	F	F	P	F	F	F	F	F	P			U	F	U		P		
MSPA065R00_050	CHICKASAWHAY RIVER, FROM WATERSHED BOUNDARY (063) TO CONFLUENCE WITH EUCUTTA CREEK	02477344_D	F	F	F	F	F	F	F	P	F	F	F				U	F	F			P	
		02477350_D	F	F	F	F	F	F	F	F	F	F	F	P		F	U						
MSPA065R00_300	EUCUTTA CREEK, FROM CONFLUENCE WITH LITTLE EUCUTTA CREEK TO MOUTH AT CHICKASAWHAY RIVER	02477360_D															F	F	U		U		
		PA044D00-EC5_D															F						
MSPA065R00_320	LITTLE EUCUTTA CREEK, FROM HEADWATERS TO MOUTH AT EUCUTTA CREEK	PA044D00-EC1_D															U	P	U		U		
		PA044D00-EC2_D															U						
		PA044D00-EC3_D															U						
		PA044D00-EC4_D															P						
MSPA067L01_010	LONG CREEK RESERVOIR, NEAR ENZOR	PA1CR1-SP_D														F		U	F		U		U

HEADER ABBREVIATIONS: Tmp-Temperature, pH-Acidity/Alkalinity, DO-Dissolved Oxygen, COD-Chemical Oxygen Demand, TOC-Total Organic Carbon, TKN-Kjeldahl Nitrogen, N+N-Nitrite Nitrate, TP-Total Phosphorus, Turb-Turbidity, TSS-Total Suspended Solids, CDT-Condictivity, FCLS-Fecal Coliform (limit set according to segment uses at right), TOX-Toxicants, WTR-in Water Column, FSH-in Fish Tissue, BIO-Biological Rating, †-Target Value
SEGMENT USE CLASSIFICATIONS: AQ-Aquatic Life Use, FC-Fish Consumption Use, SHL-Shellfish harvest Use, SC-Secondary Contact Use, CR-Contact Recreation Use, DW-Drinking Water Use
*USE SUPPORT STATUS: F-Fully Supported, T-Fully Supported but Threatened, P-Pertially Supported, N-Not Supported, U-Unknown, *-due to Fish Advisory*
AGENCIES ABBREVIATED: C-USACE, D-MSDEQ, E-USEPA, F-USFS, G-USGS, I-Int. of Higher Lerning, M-DMR, N-NOAA, P-Permittee, V-Volunteer Monitor

TABLE III, 8-9
2000 305(b) Summary of Monitored Segments
Pascagoula River Basin

GEOGRAPHICAL INFORMATION		SITE_AGENCY ID	PHYSICAL/CHEMICAL DATA Numeric Criteria and Target Values												TOXICS		BIOL	SEGMENT USE SUPPORT					
WBIDSEGID	SEGMENT NAME & DESCRIPTION	STATION ID	†TEMP	†PH	†DO	COD	TOC	TKN	NO2 NO3	TP	TURB	TSS	†CDT	†FCLS	WTR	FSH	BIO	AQ	FC	SHL	SC	CR	DW
MSPA069R00_010	BUCKATUNA CREEK, NEAR GRETNA FROM CONFLUENCE WITH DRY CREEK TO CONFLUENCE WITH TURKEY CREEK	02477980_D															F	F	U		U		
MSPA070L01_010	MAYNOR CREEK WATER PARK, NEAR WAYNESBORO	070MCP01_D														F	U	U	F		U		
MSPA070R00_010	BIG CREEK, AT CLARA FROM CONFLUENCE OF MAYNOR CREEK TO CONFLUENCE WITH CHICKASAWHAY RIVER	02478140_D															F	F	U		U		
MSPA072RX0_010	LOWER CHICKASAWHAY RIVER, AT MERRILL FROM CONFLUENCE WITH BIG CREEK TO HUC BOUNDARY	02478800_D														F		U	F		U		
		MSLCHKRE1_D														F							
MSPA072RX0_020	LOWER CHICKASAWHAY RIVER, NEAR LEAKESVILLE FROM WATERSHED BOUNDARY (070 & 071) TO CONFLUENCE WITH BIG CREEK	02478500_D	F	F	F	F	F	F	F	F	F	P	F	F		F	U	F	F		F		
MSPA073R00_010	UPPER LEAF RIVER, NEAR OTHO FROM HEADWATERS TO CONFLUENCE WITH ICHUSA CREEK	02471100_D														F		U	F		U		
MSPA074R00_020	WEST TALLAHALA CREEK, NEAR LOUIN FROM CONFLUENCE WITH QUARTERLIAH CREEK TO WATERSHED BOUNDARY (075)	PA061D00-WTC1_D															F	F	U		U		
		PA061D00-WTC2_D															F						
MSPA075R00_010	LEAF RIVER, NEAR HEBRON FROM CONFLUENCE WITH OAKOHAY CREEK TO WATERSHED BOUNDARY (079)	02472000_D	F	F	F	F	F	F	F	F	P	P	F	P		F		F	F		P		
MSPA075R00_040	LEAF RIVER, NEAR SYLVARENA FROM CONFLUENCE WITH WEST TALLAHALA CREEK TO CONFLUENCE WITH FISHER'S CREEK	PA061D00-LR3_D															F	F	U		U		
		PA061D00-LR4_D															F						
MSPA075R00_050	LEAF RIVER, NEAR SYLVARENA FROM WATERSHED BOUNDARY (073) TO CONFLUENCE WITH WEST TALLAHALA CREEK	PA061D00-LR2_D															F	F	U		U		
MSPA077R00_010	BIG CREEK, NEAR SOSO FROM CONFLUENCE WITH MILL CREEK TO WATERSHED BOUNDARY (075 & 079)	02472150.50_D															F	F	U		U		
MSPA078R00_010	OAKEY WOODS CREEK, NEAR SAND HILL FROM CONFLUENCE WITH STATION CREEK TO CONFLUENCE WITH LEAF RIVER	02472210_D															N	N	U		U		
MSPA079R00_010	LOWER LEAF RIVER, NEAR MOSELLE FROM SOUTHERN HENS OUTFALL TO HUC BOUNDARY AT PETAL	PA079D-FS1_D														F		F	F		U		
		PA079E-LR1_E															F						
		PA079P-LR1_P															F						
		PA079P-LR2_P															F						
MSPA079R00_030	LOWER LEAF RIVER, NEAR SAND HILL FROM WATERSHED BOUNDARY (077) TO CONFLUENCE WITH OAKEY WOODS CREEK	PA079D-FS2_D														F		U	F		U		
MSPA080R00_010	OKATOMA CREEK, AT SEMINARY FROM HWY 590 TO CONFLUENCE WITH BOWIE RIVER AT WATERSHED BOUNDARY	02472820_D	F	F	F	F	F	F	F	F	F	F	F	U		F	F	T	F			N	
		02472850_D	F	P	F	F	F	F	N	P	F	F	F	N			F						
		MB003V08-OC1_V	F	P	F												F						
		PA062D00-OC1_D															F						
MSPA080R00_020	OKATOMA CREEK, AT COLLINS FROM SANDERSON FARMS OUTFALL TO HWY 590 AT SEMINARY	02472820_D	F	F	F	F	F	F	F	F	F	F	F	U		F	F	F	F		U		
MSPA080R00_030	OKATOMA CREEK, AT MOUNT OLIVE FROM CONFLUENCE WITH GOODWIN CREEK TO SANDERSON FARMS OUTFALL	02472600_D															N	N	U		U		
MSPA082R00_010	DRY CREEK, NEAR MT CARMEL FROM HEADWATERS TO WATERSHED BOUNDARY (081)	02472382_D															N	N	U		U		
MSPA083L01_010	LAKE MIKE CONNER, COVINGTON COUNTY	PALMC1-SF_D														F		U	F			U	
MSPA083R00_020	WEST BOWIE CREEK, NEAR BASSFIELD FROM HEADWATERS TO CONFLUENCE WITH BOWIE CREEK	02472392_D															N	N	U		U		

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GEOGRAPHICAL INFORMATION	SITE_AGENCY ID	PHYSICAL/CHEMICAL DATA Numeric Criteria and Target Values												TOXICS		BIOL	SEGMENT USE SUPPORT					
WBIDSEGID SEGMENT NAME & DESCRIPTION	STATION ID	†TEMP	†PH	†DO	COD	TOC	TKN	NO2 NO3	TP	TURB	TSS	†CDT	†FCLS	WTR	FSH	BIO	AQ	FC	SHL	SC	CR	DW
MSPA084R00_010 BOWIE CREEK, NEAR SUMRALL FROM HWY 589 BRIDGE TO CONFLUENCE WITH BOWIE RIVER	02472420_D	F	F	F	F	F	F	F	P	F	F	F	N			U	F	F			N	
	02472500_D	F	F	F	F	F	F	F	F	F	F	F	U		F							
MSPA084R00_020 BOWIE CREEK, NEAR SUMRALL FROM WATERSHED BOUNDARY 083 TO HWY 589 BRIDGE	02472420_D	F	F	F	F	F	F	F	P	F	F	F	F			U	F	U		F		
MSPA085L01_010 COUNTRY CLUB LAKE, NEAR HATTIESBURG	MS085CCLM-1_D														N	U	U	N*		U		
MSPA085R00_010 BOWIE RIVER, AT HATTIESBURG FROM I-59 TO MOUTH AT LEAF RIVER	MS085E2-A_D														F		T	F		U		
	PA085E-BR3_E															T						
	PA085E-BR4_E															T						
MSPA085R00_040 BOWIE RIVER, NEAR HATTIESBURG FROM CONFLUENCE WITH BOWIE CREEK AND OKATOMA CREEK TO CONFLUENCE WITH BIG CREEK	PA085E-BR1_E															F	F	U			U	
MSPA086R00_010 LEAF RIVER, NEAR MAHNED FROM CONFLUENCE WITH REESE CREEK TO CONFLUENCE WITH TALLAHALA CREEK	02473360_D	F	F	F	F	F	F	F	F	F	F	F			F		F	F		U		
MSPA086R00_020 LEAF RIVER, AT HATTIESBURG FROM HATTIESBURG OUTFALL TO CONFLUENCE WITH REESE CREEK	02473130_D														F		F	F		F		
	02473260_D	F	P	F	F	F	F	F	F	F	F	F	F		F							
	LR-1_D															F						
	LR-2_D															F						
	PA086P-LR8_P															F						
	PA086P-LR9_P															F						
MSPA086R00_030 LEAF RIVER, AT HATTIESBURG FROM CONFLUENCE OF BOWIE RIVER TO HATTIESBURG POTW OUTFALL	PA086E-LR2_E															F	T	U		U		
	PA086P-LR3_P															F						
	PA086P-LR4_P															F						
	PA086P-LR5_P	F	F	T								F				F						
	PA086P-LR6_P	F	F	F								F				F						
	PA086P-LR7_P															P						
MSPA087R00_010 TALLAHALA CREEK, AT LAUREL FROM LAUREL SOUTH POTW OUTFALL TO CONFLUENCE WITH TALLAHOMA CREEK	PA063D00-TCB2_D															F	F	U		U		
	TC-7_D	F	F	F			F	N	N			F				F						
	TC-7A_D	F	F	P								F				F						
	TC-8_D	F	F	F			F	N	N			F				F						
MSPA087R00_020 TALLAHALA CREEK, AT LAUREL FROM MASONITE NORTH DISCHARGE TO LAUREL SOUTH POTW OUTFALL	PA063D00-TCB1_D															F	T	U		U		
	TC-5_D	F	F	P			F	N	N			F				F						
	TC-6_D	F	F	T			F	N	N			F				F						
MSPA087R00_030 TALLAHALA CREEK, AT LAUREL FROM LAUREL EAST FACILITY TO MASONITE OUTFALL	02473500_D															F	F	U		U		
	PA030D1_D															F						
	TC-3_D	F	F	F			F	N	N			F				F						
	TC-4_D	F	F	F			F	N	N			F				F						
MSPA087R00_040 TALLAHALA CREEK, AT LAUREL FROM CONFLUENCE WITH BIG REEDY CREEK TO LAUREL EAST FACILITY	02473490-95_D															F	F	U		U		
	TC-1_D	F	F	F			F	F	F			F										
	TC-2_D	F	F	F			F	F	F			F										
MSPA087R00_070 TALLAHALA CREEK, NEAR MONTROSE FROMCONFLUENCE WITH THOMPSON CREEK TO CONFLUENCE WITH MCVAY CREEK	02473395_D															N	N	U		U		

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MSPA088R00_010 TALLAHOMA CREEK, AT ELLISVILLE FROM CONFLUENCE WITH HORSE CREEK TO CONFLUENCE WITH TALLAHALA CREEK AT WATERSHED BOUNDARY (089)	02474150_D															F	F	U		U		
	HM-1_D	F	F	F			F		F													
MSPA089R00_010 TALLAHALA CREEK, NEAR RUNNELSTOWN FROM CONFLUENCE WITH CHAPEL BRANCH TO MOUTH AT LEAF RIVER	02474480_D														F		F	F		F		
	02474500_D	F	F	F	F	F	F	F	N	F	F	F	F			U						
MSPA089R00_030 TALLAHALA CREEK, AT ELLISVILLE FROM WATERSHED BOUNDARY (088) TO CONFLUENCE WITH WOODARD'S MILL CREEK	02474300_D	F	F	F	F	F	F	F	N	F	F	F			F	F	F	F		U		
	TC-11_D	F	F	F			F	N	N			F										
	TC-9_D	F	F	F			F	N	N			F										
MSPA090R00_010 LEAF RIVER, AT BEAUMONT FROM CONFLUENCE WITH BOGUE HOMA TO WATERSHED BOUNDARY (094) AND CONFLUENCE WITH THOMPSON CREEK	PA090D-FS_D														F		U	F		U		
MSPA090R00_020 LEAF RIVER, AT NEW AUGUSTA FROM WATERSHED BOUNDARY (086) TO CONFLUENCE WITH BOGUE HOMO	02474560_D														F		U	F		U		
MSPA091R00_030 BOGUE HOMO, NEAR SANDERSONVILLE FROM CONFLUENCE WITH BEAVER CREEK TO LAKE BOGUE HOMO	BHC1_D	F	F	F								F					F	U		U		
	BHC2_D	F	F	F								F										
MSPA091R00_040 BOGUE HOMO, AT HEIDELBERG FROM HEADWATERS TO CONFLUENCE WITH BEAVER CREEK	PA043D00-BBH1_D															F	F	U		U		
	PA043D00-BBH2_D															F						
	PA043D00-BBH3_D															F						
	PA043D00-BBH4_D															F						
MSPA093R00_050 WEST LITTLE THOMPSON CREEK, NEAR MULBERRY FROM HEADWATERS TO MOUTH OF THOMPSON CREEK	02474779_D															N	N	U		U		
MSPA094R00_010 LEAF RIVER, AT MCLAIN FROM CONFLUENCE WITH GAINES CREEK TO HUC BOUNDARY AT CONFLUENCE WITH CHICKASAWHAY RIVER	02475000_D	F	F	F	P	F	F	F	F	F	P	F	F		F	F	F	F		F		
	02475082_D														F							
MSPA094R00_020 LEAF RIVER, NEAR BEAUMONT FROM CONFLUENCE WITH THOMPSON CREEK TO CONFLUENCE WITH GAINES CREEK	PA094D-FS_D														F		U	F		U		
MSPA096L01_010 DAVIS DEAD RIVER, NEAR WADE	PA049D00-DDR1_D														F		U	F		U		
MSPA096L02_010 LAKE CATCH-EM-ALL, NEAR PASCAGOULA	PA045D00-CEM1_D														F		U	F		U		
MSPA096R00_010 EAST PASCAGOULA RIVER, AT PASCAGOULA FROM MARSH LAKE CUT AND KREBS LAKE OUTLET TO MOUTH AT MS SOUND	02480210_D	F	F	F		F	F	F	P	F	F	F			P	U	T	P*		U		
	02480212_G			F											P	U						
	02480215_D	F	F	P																		
	02480215_G	F	F	F																		
	MSEPASRM2-PE2_D	F	F	F																		
MSPA096R00_020 EAST PASCAGOULA RIVER, NEAR PASCAGOULA FROM CONFLUENCE WITH ESCATAWPA RIVER TO KREBS LAKE OUTLET AND MARSH LAKE CUT	024802082_G	F	F	F												U	P	P*		U		
	024802083_D	F	F	N																		
	024802083_G	F	F	P											P							
	024802087_G			P		N										U						
	024802091_G	F	F	F												U						

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WBIDSEGID SEGMENT NAME & DESCRIPTION	STATION ID	†TEMP	†PH	†DO	COD	TOC	TKN	NO2 NO3	TP	TURB	TSS	†CDT	†FCLS	WTR	FSH	BIO	AQ	FC	SHL	SC	CR	DW
MSPA096R00_030 EAST PASCAGOULA RIVER, NEAR ESCATAWPA FROM CONFLUENCE WITH SMEAR BAYOU TO CONFLUENCE WITH ESCATAWPA RIVER	024793427_G	F	F	F												U	T	P*		F		
	024793428_G	F	F	F												U						
	02479343_D	F	F	F																		
	02479343_G	F	F	F												U						
	024793431_G	F	F	F												U						
MSPA096R00_040 EAST PASCAGOULA RIVER, NEAR COLLTOWN FROM CONFLUENCE WITH CLARK BAYOU TO CONFLUENCE WITH SMEAR BAYOU	024793409-50_D	F	F	F											P		F	P*			U	
	02479341_G	F	F	F												U						
	02479342_G	F	F	T												U						
	024793422_G	F	F	F												U						
	MSEPASRM1-MS1_D	F	F	F																		
MSPA096R00_050 EAST PASCAGOULA RIVER, NEAR COLLTOWN FROM CONFLUENCE WITH WEST PASCAGOULA RIVER TO CONFLUENCE WITH CLARK BAYOU	024793403_G	F	F	P												U	T	P*			U	
	024793404_G	F	F	F												U						
	024793409_G	F	F	P												U						
	MSEPASRM1-MS2_D	F	F	F																		
MSPA096R00_060 PASCAGOULA RIVER, NEAR THREE RIVERS FROM CUMBEST BLUFF TO CONFLUENCE WITH WEST PASCAGOULA RIVER	02479340_D	F	F	F			F	F	N			F					F	P*			U	
	MSPASRM2-MS3_D	F	F	F								F				U						
	PAPRCB1-SF_D														P							
MSPA096R00_070 PASCAGOULA RIVER, NEAR WADE FROM CONFLUENCE WITH BIG CEDAR CREEK TO CUMBEST BLUFF	02479310_D	F	F	F	F	F	F	F	F	F	F	F	P		P	U	F	P*			P	
MSPA096R00_090 PASCAGOULA RIVER, NEAR BENNDALE FROM 6 MILES NORTH OF HWY 26 TO CONFLUENCE WITH BIG CREEK	02479020_D														P		F	P*			U	
	02479020_G	F	F	F			N		F	F	F	F										
MSPA096R00_300 LITTLE CEDAR CREEK, NEAR LUCEDALE FROM HEADWATERS TO CONFLUENCE WITH BIG CEDAR CREEK	02479067_D															F	F	U		U		
MSPA098R00_010 WEST PASCAGOULA RIVER, AT GAUTIER FROM CONFLUENCE WITH SIOUX BAYOU TO MOUTH AT MS SOUND	02480285_D	F	F	F		F	F	F	F	F	F	F				U	T	P*		U		
	MSWPASRM2-PWM_D	F	F	F												U						
MSPA098R00_020 WEST PASCAGOULA RIVER, AT GAUTIER FROM CONFLUENCE WITH BLUFF CREEK TO CONFLUENCE WITH SIOUX CREEK	024802701-90_D	F	F	N			F	F	N						P		T	P*		U		
	MSWPASRM2-MS5_D	F	F	P																		
MSPA098R00_030 WEST PASCAGOULA RIVER, NEAR GAUTIER FROM CONFLUENCE WITH EAST PASCAGOULA RIVER TO CONFLUENCE WITH BLUFF CREEK	024802202-10_D	F	F	F			F	F	N								F	P*		U		
	MSWPASRM1-1_D														P							
	MSWPASRM1-MS4_D	F	F	F																		
MSPA099L01_010 LITTLE BLACK CREEK LAKE, NEAR TALOWAH	BCWP1-SF_D														F		U	F		U		
MSPA099R00_020 BLACK CREEK, NEAR PURVIS FROM AMERADA HESS DISCHARGE AT HWY 11 TO CONFLUENCE WITH LITTLE BLACK CREEK	02479100_D														F		F	F			U	
	02479102_D	F	P	F	F	F	F	F	F	F	F	F	U			U						
MSPA099R00_040 BLACK CREEK, NEAR BASSFIELD FROM HEADWATERS TO CONFLUENCE WITH MILL CREEK	02479088_D															F	F	U		U		
MSPA099R00_070 MONROE CREEK, NEAR OLOH FROM HEADWATERS TO CONFLUENCE WITH BLACK CREEK AT HWY 98	02479089_D	F	N	F	F	F	F	F	F	F	F	F	F			F	F	U		F		
MSPA100R00_030 BLACK CREEK, NEAR BROOKLYN FROM CONFLUENCE WITH BIG CREEK TO CONFLUENCE WITH POPLAR CREEK	02479130_D														F		F	F		U		
	MB003V14-BC1_V															F						
	MS100BE1-1_D																					

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MSPA100R00_040 GRANNY CREEK, NEAR BROOKLYN FROM HEADWATERS TO CONFLUENCE WITH BLACK CREEK	DAAS-2_D															F	F	U		U		
MSPA101R00_030 BLACK CREEK, NEAR BARBARA FROM CONFLUENCE WITH CYPRESS CREEK TO CONFLUENCE WITH SWEETWATER CREEK	02479160_D	F	N	F	F	F	F	F	P	F	F	F	N		F		F	F			N	
MSPA101R00_040 CYPRESS CREEK, NEAR BARBARA FROM HEADWATERS TO CONFLUENCE WITH BLACK CREEK	02479155_G	F	N	F			F		F	F		F					F	U		U		
MSPA102L01_010 FLINT CREEK RESERVOIR, AT WIGGINS	PA050D00-FCR1_D														F		U	F			U	U
MSPA102L02_010 LAKE TOC-O-LEEN, NEAR STILLMORE	PA102D-TOL1_D														F		U	F		U		
MSPA102R00_050 UNNAMED TRIB TO RED CREEK, AT WIGGINS FROM HEADWATERS TO CONFLUENCE WITH RED CREEK	UTRC-1_D	N	F	P								F				N	P	U		U		
	UTRC-2_D	P	F	N								F				N						
	UTRC-3_D	F	F	F								F				U						
	UTRC-4_D	F	F	F								F				U						
MSPA103R00_010 RED CREEK, AT VESTRY FROM CONFLUENCE WITH BLUFF CREEK AT RUBLE TO WATERSHED BOUNDARY (101)	02479300_D	F	N	F	F	F	F	F	F	F	F	F	P		F		F	F			P	
	PARC1-SF_D														F							
MSPA107R00_010 ESCATAWPA RIVER, AT PASCAGOULA FROM MILE 10 (ABOVE CONFLUENCE WITH BLACK CREEK) TO MOUTH	02480182_G	F	F	F												U	P	F		U		
	02480183_G	F	F	F												U						
	02480184_G	F	P	F												U						
	024802057-80_D	F	F	P																		
	02480207_D	F	P	F		F	F	F	P	F	F	F				U						
	02480208_G	F	P	F												U						
	302455088313100_G	F	F	P																		
	302459088320800_G	F	F	P																		
	302512088292200_G	F	F	F																		
	302515088301300_G	F	F	P																		
	302528088304400_G	F	F	N											F							
	302541088290100_G	F	F	P																		
	MS107M3-2.50_D														F							
MSPA107R00_020 ESCATAWPA RIVER, NEAR PASCAGOULA FROM IP CANAL TO MILE 10	02480180_G	F	N	F												U	F	P*		U		
	024801804_G	F	P	F												U						
	024801806_G	F	F	F												U						
	02480181_D			F																		
	02480181_G	F	F	F																		
MSPA107R00_030 ESCATAWPA RIVER, NEAR AGRICOLA FROM MS/AL STATE LINE TO IP CANAL	02479560_D	F	N	F	F	F	F	F	F	F	F	F	P			F	F	P*		P		
	MS107M2-10_D														P							

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Appendix A

Mississippi 1998 Water Quality Assessment
Federal Clean Water Act Section 305(b) Report

Table of Contents

TABLE OF CONTENTS

Appendix B

STATE OF MISSISSIPPI
WATER QUALITY CRITERIA FOR INTRASTATE, INTERSTATE AND COASTAL WATERS

Adopted November 16, 1995

**WATER QUALITY CRITERIA FOR INTRASTATE,
INTERSTATE AND COASTAL WATERS**

STATE OF MISSISSIPPI

SECTION I. GENERAL CONDITIONS:

1. The policy inherent in the standards shall be to protect water quality existing at the time these water quality standards were adopted and to upgrade or enhance water quality within the State of Mississippi. Waters whose existing quality is better than the established standards will be maintained at high quality unless the Commission finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In no event, however, may degradation of water quality interfere with or become injurious to existing instream water uses. Further, in no case will water quality be degraded below (or above) the base levels set forth in these standards for the protection of the beneficial uses described herein. In addition, the State will assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control. Where the Commission determines that high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected. For the purposes of this section, existing uses are defined as those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the Water Quality Criteria.

2. The limiting values of water quality herein described shall be measured by the Commission in waters under consideration as determined by good sanitary engineering practice and after consultation with affected parties. Samples shall be taken from points so distributed over the time of day and area and depth of the waters being studied as to permit a realistic appraisal of such actual or potential damage to water use as may exist. Samples shall be analyzed in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater" or other methods acceptable to the Commission.

3. Certain waters of the State may not fall within desired or prescribed limitations as outlined. In such instances the Commission may authorize exceptions to these limits, under the following conditions:

    A. The existing designated use is not attainable because of natural background conditions; or

    B. the existing designated use is not attainable because irretrievable man-induced conditions; or

C. the application of effluent limitations for existing sources is more stringent than those required pursuant to Section 301(b)(2)(A) and (B) of the Federal Water Pollution Control Act of 1972, as amended, in order to attain the existing designated use, would result in substantial and widespread adverse economic and social impact.

In no case shall it be permissible to deposit or introduce materials into waters of the State which will cause impairment of the reasonable or legitimate use of said waters.

4. In view of the fact that industry is continuing to produce new materials whose characteristics and effects are unknown at this time or for which incomplete national criteria have been established, for the purposes of setting water quality standards or permit limits on a case-by-case basis, such materials shall be evaluated on their merits as information becomes available to the Commission. Sources of information shall include, but not be limited to, the latest edition of Quality Criteria for Water, prepared by the Environmental Protection Agency pursuant to Section 304(a) of the Federal Clean Water Act.

5. All criteria contained herein shall apply to all stages of stream flow greater than or equal to the 7-day, 10-year minimum flow in unregulated, natural streams, and the legally guaranteed minimum flow in regulated streams, unless otherwise provided in these regulations. This requirement shall not be interpreted to permit any unusual waste discharges during periods of lower flow. Notwithstanding the above, a stream flow equal to the 7-day, 2-year minimum flow in unregulated natural streams shall be utilized in establishing permit limitations for storm water permits. In cases in which either (1) the data is indefinite or inconclusive, or (2) the 7-day, 2-year minimum flow and/or the 7-day, 10-year minimum flow are inappropriate because of the hydrology of the area, other appropriate State and federal agencies will be consulted in establishing the applicable stream flow.

6. In open ocean waters there shall be no oxygen demanding substances added which will depress the dissolved oxygen content below 5.0 mg/l.

7. The Mississippi River is classified for Fish and Wildlife use, but with the following additions to the criteria stated herein:

Mineral Constituents: Not to exceed the following concentrations at any time:

From Mississippi-Tennessee border to Vicksburg

Chlorides	60 mg/l
Sulfates	150 mg/l
T.D.S.	425 mg/l

From Vicksburg south to the Mississippi-Louisiana border

Chlorides	75 mg/l
Sulfates	120 mg/l
T.D.S.	400 mg/l

8. It is recognized that limited areas of mixing are sometimes unavoidable; however, mixing zones shall not be used as a substitute for waste treatment. Mixing zones constitute an area whereby physical mixing of a wastewater effluent with a receiving water body occurs. Application of mixing zones shall be made on a case-by-case basis and shall only occur in cases involving large surface water bodies in which a long distance or large area is required for the wastewater to completely mix with the receiving water body.

   The location of a mixing zone shall not significantly alter the designated uses of the receiving water outside its established boundary. Adequate zones of passage for the migration and free movement of fish and other aquatic biota shall be maintained. Toxicity and human health concerns within the mixing zone shall be addressed as specified in the Environmental Protection Agency Technical Support Document for Water Quality-Based Toxics Control (EPA-505/2-90-001, March 1991) and amendments thereof. Under no circumstances shall mixing zones overlap or cover tributaries, nursery locations, or other ecologically sensitive areas.

SECTION II. MINIMUM CONDITIONS APPLICABLE TO ALL WATERS:

1. Waters shall be free from substances attributable to municipal, industrial, agricultural or other discharges that will settle to form putrescent or otherwise objectionable sludge deposits.

2. Waters shall be free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, agricultural or other discharges in amounts sufficient to be unsightly or deleterious.

3. Waters shall be free from materials attributable to municipal, industrial, agricultural or other discharges producing color, odor, taste, total suspended solids, 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. Specifically, the turbidity outside the limits of a 750-foot mixing zone shall not exceed the background turbidity at the time of discharge by more than 50 Nephelometric Turbidity Units (NTU). An exemption may be granted in cases of emergency to protect the public health and welfare.

4. Waters shall be free from substances attributable to municipal, industrial, agricultural or other discharges in concentrations or combinations which are toxic or harmful to humans, animals or aquatic life. Specific requirements for toxicity are found in Section II.9.

5. Municipal wastes, industrial wastes, or other wastes shall receive effective treatment or control in accordance with Section 301, 306 and 307 of the Federal Clean Water Act. A degree of treatment greater than defined in these sections may be required when necessary to protect legitimate water uses.

6. Dissolved Oxygen: Dissolved oxygen 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 in streams; 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 in estuaries and in the tidally affected portions of streams; and 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 in the epilimnion (i.e., the surface layer of lakes and impoundments that are thermally stratified, or five feet from the water's surface (mid-depth if the lake or impoundment is less than 10 feet deep at the point of sampling)) for lakes and impoundments that are not stratified.

   Epilimnion samples may be collected at the approximate mid-point of that zone (i.e., the mid-point of the distance or if the epilimnion is more than five feet in depth, then at five feet from the water's surface).

7. pH: The normal pH of the waters shall be 6.5 to 9.0 and shall not be caused to vary more than 1.0 unit; however, should the natural background pH be outside the 6.5 to 9.0 limits, it shall not be changed more than 1.0 unit unless after the change the pH will fall within the 6.5 to 9.0 limits, and the Commission determines that there will be no detrimental effect on stream usage as a result of the greater pH change.

8. Temperature: The maximum temperature rise above natural temperatures shall not exceed 5EF in streams, lakes and reservoirs nor shall the maximum water temperature exceed 90EF, except that in the Tennessee River the temperature shall not exceed 86EF. In lakes and reservoirs there shall be no withdrawals from or discharge of heated waters to the hypolimnion unless it can be shown that such discharge will be beneficial to water quality. In all waters the normal daily and seasonal temperature variations that were present before the addition of artificial heat shall be maintained. The discharge of any heated waste into any coastal or estuarine waters shall not raise temperatures more than 4EF above natural during the period October through May nor more than 1.5EF above natural of the months June through September. There shall be no thermal block to the migration of aquatic organisms. Requirements for zones of passage as referenced in Section I.8 shall apply. In addition to the general requirements of Section I.2, the temperature shall be measured at a depth of five feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, temperature criteria will be applied at mid-depth.
   In those specific cases where natural conditions elevate the temperatures in excess of the limits expressed herein, Section I.3 shall apply on a case-by-case basis.

9. Toxic Substances:

A. Aquatic Life and Human Health Standards

(1) Aquatic Life - The concentration of toxic substances shall not result in chronic or acute toxicity or impairment of the uses of aquatic life. Any levels in excess of these values will be considered to result in chronic or acute toxicity, or the impairment of the uses of aquatic life. Regardless of direct measurements of chronic or acute toxicity, the concentrations of toxic substances shall not exceed the chronic or acute values, except as provided for in Sections 9.E.(1) and 9.E.(2).

(2) Human Health - The concentration of toxic substances shall not exceed the level necessary to protect human health through exposure routes of fish (and shellfish) tissue consumption, water consumption, or other routes identified as appropriate for the waterbody.

B. Numeric criteria for all waters are established herein for the 34 toxic pollutants for which the Environmental Protection Agency (EPA) has published national criteria for the protection of aquatic life and human health pursuant to Section 304(a) of the Federal Clean Water Act and chlorine and are listed in Appendix A and are expressed as the dissolved phase of the parameter.

C. Definitions: When applying acute or chronic toxicity or human health criteria, the following definitions shall apply:

(1) 7Q10 is the seven-day average low stream flow with a ten-year occurrence period.

(2) Mean Annual Flow is the total of daily mean flows for the full period of record divided by the total days for the period of record.

D. Application of Numerical Criteria:

(1) When evaluating human health effects all waters must comply with the organisms only criteria except for waters classified as public water supply and all stream segments within fifty (50) stream miles upstream of a drinking water intake. Stream segments which are classified as public water supply or are within fifty (50) miles upstream of a drinking water intake shall comply with the water and organisms criteria.

(2) When applying toxicity or human health criteria the following stream flows shall be used:

Acute Toxicity - 7Q10
Chronic Toxicity - 7Q10
Human Health - Mean Annual Flow

(3) Criteria for certain metals may be modified on a site-specific basis when a water effect ratio (WER) is conducted in accordance with VI.C.2.a. of Mississippi 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. In these instances, the criterion for the specific metal in the affected waterbody shall be equal to the criteria concentrations calculated using the following equations: CMC = WER * Acute and CCC = WER * Chronic.

Where:
CCC = Criteria Continuous Concentration
CMC = Criteria Maximum Concentration
WER = Water Effects Ratio for a Specific Pollutant
Acute = Acute Criteria from Appendix A
Chronic = Chronic Criteria from Appendix A

When a WER has not been conducted, the criteria listed in Appendix A of this regulation shall apply as the value of the WER is presumed to equal one in the absence of data to indicate otherwise.

E. <u>Discharge Specific Criteria</u>:

(1) Existing Discharges

(a) The Commission may establish discharger specific alternative criteria for existing discharges if all of the following conditions are satisfied:

(i) Discharge existed prior to December 1, 1988.

(ii) Discharger performs acute and/or chronic bioassays and instream biological assessments and other evaluations as deemed appropriate by the Commission.

(iii)The designated use of the waters is maintained.

(b) All discharger specific alternative criteria will be subject to Mississippi public participation requirements for revisions to water quality standards and will be subject to review by the U. S. Environmental Protection Agency.

(2) New Source Discharges

(a) The Commission may establish discharger specific criteria for new source discharges if the discharger can demonstrate that established Water Quality Criteria is based on conditions not applicable to Mississippi such as, but not limited to, the use of species not indigenous to Mississippi.

(b) All discharger specific alternative criteria will be subject to Mississippi public participation requirements for revisions to water quality standards and will be subject to review by the U. S. Environmental Protection Agency.

F. Toxic and Human Health Parameters for which no Numeric Criteria have been Established:

(1) For those toxic and human health parameters for which no numeric criteria have been established, the Commission shall determine limitations using available references which shall include, but not be limited to, Quality Criteria for Water (Section 304(a)), Federal regulations under Section 307 of the Clean Water Act, and Federal regulations under Section 1412 of the Public Health Service Act as amended by the Safe Drinking Act (Pub. 93-523).

(2) Definitions:

(a) The not to be exceeded value for criteria published in 1980 or the one-hour average value for criteria published in 1985 or later shall be used as an acute toxicity number for calculating effluent limitations or reviewing ambient water quality data.

(b) The 24-hour average for criteria published in 1980 or the four-day average for criteria published in 1985 or later shall be used as a chronic toxicity number for calculating effluent limitations or reviewing ambient water quality data.

(c) If metals concentrations for criteria are hardness-dependent, the chronic and acute concentrations shall be based on 50 mg/l hardness if the ambient hardness is less than or equal to 50 mg/l. Concentrations shall be based on the actual mixed stream hardness if it is greater than 50 mg/l.

(d) If separate criteria are given for fresh and salt waters, they shall be applied as appropriate.

(e) For non-carcinogens, these concentrations will be determined using a Reference Dose (RfD) as published by the U. S. Environmental Protection Agency pursuant to Section 304(a) of the Federal Water Pollution Act as amended unless a more recent RfD is issued by the U. S. Environmental Protection Agency as listed in the Integrated Risk Information System (IRIS) file, in which case the more recent value will be used. Water quality standards or criteria used to calculate water quality-based effluent limitations (and for all other purposes of water quality criteria under Section 303(c) of the Clean Water Act) to protect human health through the different exposure routes are determined as follows:

(i) Fish tissue consumption:

WQS = (RfD) x Body Weight/(FCR x BCF)
where:

WQS = water quality standard or criterion;
RfD = reference dose;
FCR = fish consumption rate (6.5 gm/person-day);
BCF = bioconcentration factor.

BCF values are based on U. S. Environmental Protection Agency publications pursuant to Section 304(a) of the Clean Water Act. FCR values are average consumption rates for a 70 Kg adult for a lifetime of the population; alternative FCR values may be used when it is considered necessary to protect localized populations which may be consuming fish at a higher rate.

(ii) Water consumption and fish tissue consumption:

WQS = (RfD) x Body Weight/(WCR + (FCR x BCF))
where:

WQS = water quality;
RfD = reference dose;
FCR = fish consumption rate (6.5 gm/person-day);
BCF = bioconcentration factor;
WCR = water consumption rate (assumed to be 2 liters per day for adults).

The equations listed in this subparagraph will be used to develop water criteria or standards on a case-by-case basis for toxic substances which are not presently included in the water quality standards. Alternative FCR values may be used when it is considered necessary to protect localized populations which may be consuming fish at a higher rate.

(f) For carcinogens, the concentrations of toxic substances will not result in unacceptable health risk and will be based on a Carcinogenic Potency Factor (CPF). An unacceptable health risk for cancer will be considered to be more than one additional case of cancer per one million people exposed (10 -6 risk level). The CPF is a measure of the cancer-causing potency of a substance estimated by the upper 95 percent confidence limit of the slope of a straight line calculated by the Linearized Multistage Model according to the U. S. Environmental Protection Agency Guidelines (FR 51(185): 33992-34003, and FR 45(231 Part V): 79318-79379). Water quality standards or criteria used to calculate water quality-based effluent limitations (and for all other purposes of water quality criteria under Section 303(c) of the Clean Water Act) to protect human health through the different exposure routes are determined as follows:

(i) Fish tissue consumption:

WQS = (Risk) x Body Weight/(CPF x (FCR x BCF))
where:

WQS = water quality standard or criterion;
Risk = risk factor (10 -6);
CPF = cancer potency factor;
FCR = fish consumption rate (6.5 gm/person-day);
BCF = bioconcentration factor.

BCF values are based on U. S. Environmental Protection Agency publications pursuant to Section 304(a) of the Clean Water Act. FCR values are average consumption rates for a 70 Kg adult for a lifetime of the population; alternative FCR values may be used when it is considered necessary to protect localized populations which may be consuming fish at a higher rate.

(ii) Water consumption (including a correction for fish consumption):

WQS = Risk x Body Weight/(CPF x (WCR + (FCR x BCF)))
where:

WQS = water quality standard or criterion;
Risk = risk factor (10 -6);
CPF = cancer potency factor;
FCR = fish consumption rate (6.5 gm/person-day);
BCF = bioconcentration factor;
WCR = water consumption rate (assumed to be 2 liters per day for adults).

The equations listed in this subparagraph will be used to develop water criteria or standards on a case-by-case basis for toxic substances which are not presently included in the water quality standards. Alternative FCR values may be used when it is considered necessary to protect localized populations which may be consuming fish at a higher rate.

SECTION III. SPECIFIC WATER QUALITY CRITERIA:

1. PUBLIC WATER SUPPLY:

Water in this classification is for use as a source of raw water supply for drinking and food processing purposes. The water treatment process shall be approved by the Mississippi State Department of Health. The raw water supply shall be such that after the approved treatment process, it will satisfy the regulations established pursuant to Section 1412 of the Public Health Service Act as amended by the Safe Drinking Water Act (Pub. L. 93-523). Waters that meet the Public Water Supply Criteria shall also be suitable for secondary contact recreation. Secondary contact recreation is defined as incidental contact with the water, including wading and occasional swimming.

In considering the acceptability of a proposed site for disposal of bacterially-related wastewater in or near waters with this classification, the Permit Board shall consider the relative proximity of the discharge to water supply intakes.

A. Bacteria: For the months of May through October, when water contact recreation activities may be expected to occur, fecal coliform shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent (10%) of the samples examined during any month exceed 400 per 100 ml. For the months of November through April, when incidental recreational contact is not likely, fecal coliform shall not exceed 2000/100 ml as a geometric mean (either MPN or MF count) based on at least five samples taken over a 30-day period nor exceed a maximum of 4000/100 ml in any one sample.

B. Chlorides (Cl): There shall be no substances added which will cause the chloride content to exceed 230 mg/l in freshwater streams.

C. Specific Conductance: There shall be no substances added to increase the conductivity above 500 micromhos/cm for freshwater streams.

D. Dissolved Solids: There shall be no substances added to the waters which will cause the dissolved solids to exceed 500 mg/l for freshwater streams.

E. Threshold Odor: There shall be no substances added which will cause the threshold odor number to exceed 24 (at 60EC) as a daily average.

F. Phenolic Compounds: There shall be no substances added which will cause the phenolic content to be greater than 0.001 mg/l (phenol).

G. Radioactive Substances: There shall be no radioactive substances added to the waters which will cause the gross beta activity (in the known absence of Strontium-90 and alpha emitters) to exceed 1000 picocuries per liter at any time.

H. Specific Chemical Constituents: In addition to the provisions in Section II.3. and 9., the following concentrations (dissolved) shall not be exceeded at any time:

Constituent	Concentration (mg/l)
Arsenic (III)	0.0000175
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Cyanide	0.20
Fluoride	1.2
Lead	0.05
Mercury	0.000151
Nitrate (as N)	10.0
Selenium	0.01
Silver	0.05

2. SHELLFISH HARVESTING

Waters classified for this use are for propagation and harvesting shellfish for sale or use as a food product. These waters shall meet the requirements set forth in the latest edition of the National Shellfish Sanitation Program, Manual of Operations, Part I, Sanitation of Shellfish Growing Areas, as published by the U. S. Public Health Service. Waters that meet the Shellfish Harvesting Area Criteria shall also be suitable for recreational purposes. In considering the acceptability of a proposed site for disposal of bacterially-related wastewater in or near waters with this classification, the Permit Board shall consider the relative proximity of the discharge to shellfish harvesting beds.

A. Bacteria: The median fecal coliform MPN (Most Probable Number) of the water shall not exceed 14 per 100 ml, and not more than ten percent (10%) of the samples shall ordinarily exceed an MPN of 43 per 100 ml in those portions or areas most probably exposed to fecal contamination during most unfavorable hydrographic and pollutional conditions.

3. RECREATION:

The quality of waters in this classification are to be suitable for recreational purposes, including such water contact activities as swimming and water skiing. The waters shall also be suitable for use for which waters of lower quality will be satisfactory. In considering the acceptability of a proposed site for disposal of bacterially-related wastewater in or near waters with this classification, the Permit Board shall consider the relative proximity of the discharge to areas of actual water contact activity.

A. Bacteria: Fecal coliform shall not exceed a geometric mean of 200 per 100 ml nor shall more than ten percent (10%) of the samples examined during any month exceed 400 per 100 ml.

B. Specific Conductance: There shall be no substances added to increase the conductivity above 1000 micromhos/cm for freshwater streams.

C. Dissolved Solids: There shall be no substances added to the water to cause the dissolved solids to exceed 750 mg/l as a monthly average value, nor exceed 1500 mg/l at any time for freshwater streams.

4. FISH AND WILDLIFE:

Waters in this classification are intended for fishing and for propagation of fish, aquatic life, and wildlife. Waters that meet the Fish and Wildlife Criteria shall also be suitable for secondary contact recreation. Secondary contact recreation is defined as incidental contact with the water, including wading and occasional swimming.

A. Bacteria: For the months of May through October, when water contact recreation activities may be expected to occur, fecal coliform shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent (10%) of the samples examined during any month exceed 400 per 100 ml. For the months of November through April, when incidental recreational contact is not likely, fecal coliform shall not exceed a geometric mean of 2000/100 ml, nor shall more than ten percent (10%) of the samples examined during any month exceed 4000/100 ml.

B. Specific Conductance: There shall be no substances added to increase the conductivity above 1000 micromhos/cm for freshwater streams.

C. Dissolved Solids: There shall be no substances added to the waters to cause the dissolved solids to exceed 750 mg/l as a monthly average value, nor exceed 1500 mg/l at any time for freshwater streams.

D. Phenolic Compounds: There shall be no substances added which will cause the phenolic content to exceed 0.300 mg/l (phenol).

5. EPHEMERAL STREAM:

Waters in this classification do not support a fisheries resource and are not usable for human consumption or aquatic life. Ephemeral streams normally are natural watercourses, including natural watercourses that have been modified by channelization or manmade drainage ditches, that without the influent of point source discharges flow only in direct response to precipitation or irrigation return-water discharge in the immediate vicinity and whose channels are normally above the groundwater table. These streams may contain a transient population of aquatic life during the portion of the year when there is suitable habitat for fish survival. Normally, aquatic habitat in these streams is not adequate to support a reproductive cycle for fish and other aquatic life. Wetlands are excluded from this classification.

Waters in this classification shall be protective of wildlife and humans which may come in contact with the waters. Waters contained in ephemeral streams shall also allow maintenance of the standards applicable to all downstream waters.

A. Provisions 1,2,3 and 5 of Section II (Minimum Conditions Applicable to All Waters) are applicable except as they relate to fish and other aquatic life. All aspects of provisions 4 and 9 of Section II concerning toxicity will apply to ephemeral streams, except for domestic or compatible domestic wastewater discharges which will be required to meet toxicity requirements in downstream waters not classified as ephemeral. Alternative methods may be utilized to determine the potential toxic effect of ammonia. Acutely toxic conditions are prohibited under any circumstances in waters in this classification.

B. Dissolved Oxygen: The dissolved oxygen shall be maintained at an appropriate level to avoid nuisance conditions.

C. Bacteria: The Permit Board may assign bacterial criteria where the probability of a public health hazard or other circumstances so warrant.

D. Definitions:

   (1) Fisheries resources is defined as any waterbody which has a viable gamefish population as documented by the Mississippi Department of Wildlife Conservation or has sufficient flow or physical characteristics to support the fishing use during times other than periods of flow after precipitation events or irrigation return water discharge.

   (2) "Not usable for human consumption or aquatic life" means that sufficient flow or physical characteristics are not available to support these uses.

   (3) "Flow only in response to precipitation or irrigation return water" means that without the influence of point source discharges the stream will be dry unless there has been recent rainfall or a discharge of irrigation return water.

   (4) "Protective of wildlife and humans which may come in contact with the waters" means that toxic pollutants shall not be discharged in concentrations which will endanger wildlife or humans.

(5) "Nuisance conditions" means objectionable odors or aesthetic conditions which may generate complaints from the public.

Recommendations for assignment of the Ephemeral Stream classification shall be made to the Commission on Environmental Quality by the Permit Board after appropriate demonstration of physical and hydrological data. The Ephemeral Stream classification shall not be assigned where environmental circumstances are such that a nuisance or hazardous condition would result or public health is likely to be threatened. Alternate discharge points shall be investigated before the Ephemeral Stream classification is considered.

SECTION IV. DESIGNATED USES IN STATE WATERS:

All of the State waters not specifically listed below shall be classified as Fish and Wildlife. State waters carrying other classifications are:

Waters	From	To	Classification
COASTAL BASIN			
Bangs Lake	Headwaters	Miss. Sound	Shellfsh Harvest'g
Bayou Cumbest	Headwaters	Miss. Sound	Shellfsh Harvest'g
Biloxi Bay	Headwaters U.S. Hwy 90 Bridge	Miss. Sound	Shellfsh Harvest'g
Davis Bayou	Headwaters	Biloxi Bay	Shellfsh Harvest'g
Graveline Bay	Headwaters	Graveline Bayou	Shellfsh Harvest'g
Graveline Bayou	Graveline Bay	Miss. Sound	Shellfsh Harvest'g
Jourdan River	Confluence of Dead Tiger and Catahoula Crk	Highway 43	Recreation
Jourdan River	Highway 43	St. Louis Bay	Recreation
Mallini Bayou	St. Louis Bay	St. Louis Bay	Shellfsh Harvest'g
Miss. Sound	Contiguous	Miss. Coastline	Recreation
Pass Christian Reef- Henderson Point	Miss. Sound		Shellfsh Harvest'g
St. Louis Bay	Harrison-Hancock Counties	Shellfsh Harvest'g	
Tchoutacabouffa Rvr	Headwaters	Back Bay of Biloxi	Recreation
Tuxachanie Creek River	Headwaters	Tchoutacabouffa	Recreation
Wolf River	Ms. Hwy. 26	St. Louis Bay	Recreation
NORTH INDEPENDENT STREAMS BASIN			
Bowden Sand Ditch (East Lagoon)	Ashland	Tubby Creek	Ephemeral
Drennan Sand Ditch (NW Lagoon)	Ashland	Robinson Bottom	Ephemeral
Horn Lake	DeSoto County		Recreation
Tubby Creek	Mile 5.2	Mile 2.8	Ephemeral
PASCAGOULA RIVER BASIN			
Archusa Reservoir	Clarke County		Recreation
Beaverdam Creek	Headwaters Perry-Forrest Counties	Black Creek	Recreation
Black Creek	Highway 11	Pascagoula River	Recreation
Bonita Reservoir	Lauderdale County		Public Water Sup

Bowie Creek	Ms. Hwy. 589	Bowie River	Recreation
Bowie River	Bowie Creek	Interstate 59	Recreation
Chickasawhay River	Stonewall Ms.	Hwy. 84	Recreation
Chunky River	U.S. Hwy. 80	Chickasawhay Rvr	Recreation
Clarke Lake	Clarke County		Recreation
Dry Creek Lake Site #3	W/S SCS	Covington County	Recreation
Escatawpa River	Mile 10	Pascagoula River	Fish and Wildlife
Flint Creek Reservoir	Stone County		Public Water Supply & Rec
Lake Bogue Homa	Jones County		Recreation
Lake Claude Bennett	Jasper County		Recreation
Lake Geiger	Forrest County		Recreation
Lake Marathon	Smith County		Recreation
Lake Mike Conner	Covington County		Recreation
Lake Perry	Perry County		Recreation
Lake Ross Barnett	Smith County		Recreation
Lake Shongela	Smith County		Recreation
Lakeland Park Lake	Wayne County		Recreation
Long Creek Reservoir	Lauderdale County		Public Water Sup
Okatibbee Reservoir	Lauderdale County		Public Water Supply & Rec
Okatoma Creek	Seminary (MS Hwy 590)	Bowie River	Recreation
Pascagoula River	6 Mi. North of MS Hwy 26 George County	Cumbest Bluff Jackson County	Recreation
Pascagoula River	Cumbest Bluff	Smear Bayou	Recreation
Red Creek	U.S. Hwy. 49	Big Black Creek	Recreation
Simpson County Legion Lake	Simpson County		Recreation
Talahala Creek	1 Mi. N. of Hwy. 15 (RM.54.5)	Sholars (RM.27.7)	Fish and Wildlife[2]
Turkey Fork Reservoir	Greene County		Recreation

PEARL RIVER BASIN

Barnett Reservoir	River Bend bet. T7N & T8N	Township Line	Public Water Supply
Barnett Reservoir	Township Line bet. T7N & T8N	Reservoir Dam	Public Water Supply & Rec
Bogue Chitto River	Ms. Hwy. 570	MS/LA State Line	Recreation
Lake Columbia	Marion County		Recreation
Lake Dixie Springs	Pike County		Recreation
Magees Creek	U.S. Hwy. 98	Bogue Chitto River	Recreation
Pearl River	Barnett Reservoir	City of Jackson Water Intake	Public Water Sup
Pearl River	Byram Bridge	Miss. Sound	Recreation

Strong River	U.S. Hwy. 49	Pearl River	Recreation
Warrior Branch	Lake	Warrior Creek	Ephemeral

SOUTH INDEPENDENT STREAMS BASIN

Bayou Pierre	Headwaters	Mississippi River	Recreation
Clear Springs Lake	Franklin County		Recreation
East Fork Amite River	MS Hwy 584	MS/LA State Line	Recreation
Homochitto River	U.S. Hwy 84	U.S. Hwy 98	Recreation
Little Bayou Pierre	Headwaters	Bayou Pierre	Recreation
Percy Quinn Lake	Pike County		Recreation
Unnamed Drainage Ditch	Woodville (Westside Heights)	Bayou Sara	Ephemeral
West Fork Amite River	MS Hwy 24	MS/LA State Line	Recreation

TENNESSEE RIVER BASIN

Tennessee River	Miss.-Ala. State Line	Miss.-Tenn. State Line	Public Water Sup

TOMBIGBEE RIVER BASIN

Aberdeen Lake Tenn-Tom Waterway	Mile 355.5 Normal Pool Elev 190.0	Mile 364.3	Recreation
Bay Springs Lake Tenn-Tom Waterway	Mile 410.0 Normal Pool Elevation 414.0	Mile 419.0	Recreation
Canal Section Pool "C" Tenn-Tom Wtrwy	Mile 389.0 Normal Pool Elev 270.0	Mile 396.4	Recreation
Chiwapa Reservoir	Pontotoc County		Recreation
Choctaw Lake	Choctaw County		Recreation
Columbus Lake Tenn-Tom Waterway	Mile 332.9 Normal Pool Elevation 163.0	Mile 355.5	Recreation
Davis Lake	Chickasaw County		Recreation
Lake Lamar	Bruce Lee County		Recreation
Lake Lowndes	Lowndes County		Recreation
Lake Monroe	Monroe County		Recreation
Lake Tom Bailey	Lauderdale County		Recreation
Luxapalila Creek	Miss.-Ala. State Line	Highway 50	Public Water Sup
Oktibbeha County Lk	Oktibbeha County		Recreation
Tombigbee State Park Reservoir	Lee County		Recreation
Yellow Creek	Miss.-Ala. State Line	Luxapalila Creek	Public Water Sup

YAZOO RIVER BASIN

Arkabutla Reservoir	DeSoto-Tate Counties		Recreation
Canal #12	Delta City	Big Sunflower Rvr	Ephemeral
Chewalla Reservoir	Marshall County		Recreation
Drainage Ditch #3	Rosedale	Lane Bayou	Ephemeral

Enid Reservoir	Panola-Lafayette-Yalobusha Counties		Recreation
Grenada Reservoir	Grenada County		Recreation
Lake Dumas	Tippah County		Recreation
Lake Washington	Washington County		Recreation
Little Tallahatchie River	Sardis Reservior	U.S. Hwy. No. 51	Recreation
Moon Lake	Coahoma County		Recreation
Nunnally Creek	Holly Springs (Lagoons A & #1)	Pigeon Roost Crk	Ephemeral
Sardis Reservoir	Panola-Lafayette Counties	Recreation	
Straight Bayou Drainage Main Ditch "A"	Louise	Dowling Bayou	Ephemeral
Tillatoba Lake	Yalobusha County		Recreation
Unnamed Drainage Canal	Anguilla	Big Sunflower Rvr	Ephemeral
Unnamed Drainage Ditch	Town of Arcola	Black Bayou	Ephemeral
Unnamed Drainage Ditch	Town of Beulah	Leban Bayou	Ephemeral
Unnamed Drainage Ditch	Bobo	Annis Brake	Ephemeral
Unnamed Drainage Ditch	Crenshaw	David Bayou	Ephemeral
Unnamed Drainage Ditch (Hollandale)	Farm Fresh Catfish	Black Bayou	Ephemeral
Unnamed Drainage Ditch	Farrell	Overcup Clough	Ephemeral
Unnamed Drainage Ditch (Lagoon A)	Holly Springs	Nunnally Creek	Ephemeral
Unnamed Drainage Ditch (Lagoon #1)	Holly Springs	Nunnally Creek	Ephemeral
Unnamed Drainage Ditch (Lagoon #3)	Holly Springs	Big Spring Creek	Ephemeral
Unnamed Drainage Ditch	Lambert	Muddy Bayou	Ephemeral
Unnamed Drainage Ditch	Leland	Black Bayou	Ephemeral
Unnamed Drainage Ditch	Lurand	Big Sunflower Rvr	Ephemeral
Unnamed Drainage Ditch (East Lagoon)	Rolling Fork	L. Sunflower Rvr	Ephemeral
Unnamed Drainage Ditch (West Lagoon)	Rolling Fork	Indian Bayou	Ephemeral
Unnamed Drainage Ditch	Ruleville	Quiver River	Ephemeral
Unnamed Drainage Ditch	Shaw	Porter Bayou	Ephemeral
Unnamed Drainage Ditch	Shelby	Mound Bayou	Ephemeral
Unnamed Drainage Ditch	Simmons Farm Raised Catfish (Yazoo County)	Lake George	Ephemeral
Unnamed Drainage Ditch	Sledge	David Bayou	Ephemeral
Unnamed Drainage Ditch	Town of Tunica	Whiteoak Bayou	Ephemeral
Unnamed Drainage Ditch	Winstonville	Mound Bayou	Ephemeral

Wall Doxey State Park Reservoir (Spring Lake)	Marshall County	Recreation

[1] The following dissolved oxygen standard is applicable: The dissolved oxygen shall not be less than 3.0 mg/l.
[2] The following dissolved oxygen standard is applicable: The dissolved oxygen shall not be less than 3.5 mg/l at flows greater than or equal to the 7-day, 10-year low flow.

APPENDIX B2
Numeric Criteria for All Waters (ug/l)

Parameter	Fresh Water		Salt Water		Human Health	
	Acute	Chronic	Acute	Chronic	Organisms Only	Water & Organisms
Aldrin	3.0		1.3		0.00136	0.00127
Arsenic (III), Total Dissolved	360f	190f	69	36		
Arsenic, Total Dissolved					0.14	0.0175
Cadmium, Total Dissolved	1.74b,f	0.62b,f	43	9.3	168	10
Chlordane	2.4	0.0043	0.09	0.004	0.000588	0.000575
Chlorine	19	11	13	7.5		
Chromium (Hex), Total Dissolved	15.7f	10.6f	1100	50	3365	50
Chromium (III), Total Dissolved	311b,f	101b,f			673077	33300
Copper, Total Dissolved	8.85b,f	6.28b,f	2.4	2.4	1000	1000
Cyanide	22.0	5.2	1.0	1.0		200
4,4 DDT	1.1	0.001	0.13	0.001	0.00059	0.00059
Dieldrin	2.5	0.0019	0.71	0.0019	0.000144	0.000135
2,3,7,8 TCDD					1.0 ppq[d]	1.0 ppq[d]
Endosulfan	0.22	0.056	0.034	0.0087	1.99	0.932
Endrin	0.18	0.0023	0.037	0.0023	0.814	0.2
Heptachlor	0.52	0.0038	0.053	0.0036	0.000214	0.000208
Hexachlorocyclohexane (Lindane)	2.0	0.08	0.16		0.0625	0.0186
Lead, Total Dissolved	30b,f	1.18b,f	210	8.1		50
Mercury (II), Total Dissolved	2.1f	0.012	1.8	0.025g		

Mercury					0.153	0.151
Nickel, Total Dissolved	787b,f	87b,f	75	8.3	4584	607
			167e	18.5e		
Phenol	300	102	300	58	300	300
Pentachlorophenol	3.32c	2.1c	13c	7.9c	30	30
PCB 1242	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1254	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1221	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1232	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1248	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1260	0.2	0.014	1.0	0.03	0.000045	0.000044
PCB 1016	0.2	0.014	1.0	0.03	0.000045	0.000044
Selenium, Total Dissolved	20f	5.0f	300f	71f		10
Silver, Total Dissolved	1.05b,f		1.9			50
Toxaphene	0.73	0.0002	0.21	0.0002	0.00075	0.00073
Zinc, Total Dissolved	63.6b,f	58.1b,f	90	81	5000	5000

b = Hardness dependent parameter all criteria are as indicated at hardness less or equal to 50 mg/l, as $CaCo_3$. If hardness exceeds 50 mg/l, as $CaCo_3$, then criteria is equal to result of hardness based equations as found in Quality Criteria for Water.
c = Criteria for Pentachlorophenol are based on a pH dependent equation as found in Quality Criteria for Water Values Listed are for a pH of 7.0 S.U.
d = Criteria for 2,3,7,8 TCDD based on a risk factor of one in one hundred thousand (10^{-5}).
e = Site Specific Criteria for Mississippi Sound.
f = Parameter subject to water effects ratio equations where "CMC = WER * Acute" and "CCC = WER * Chronic".
g = Expressed as total recoverable.