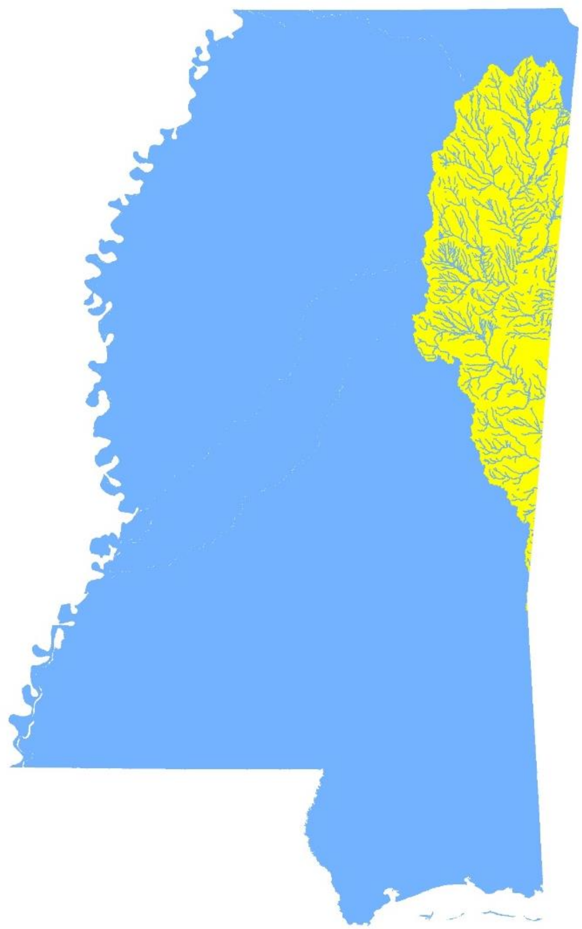
FINAL REPORT
January 2021

Total Maximum Daily Load

For Designated Streams in the Tombigbee River Basin

For Impairment due to Sediment



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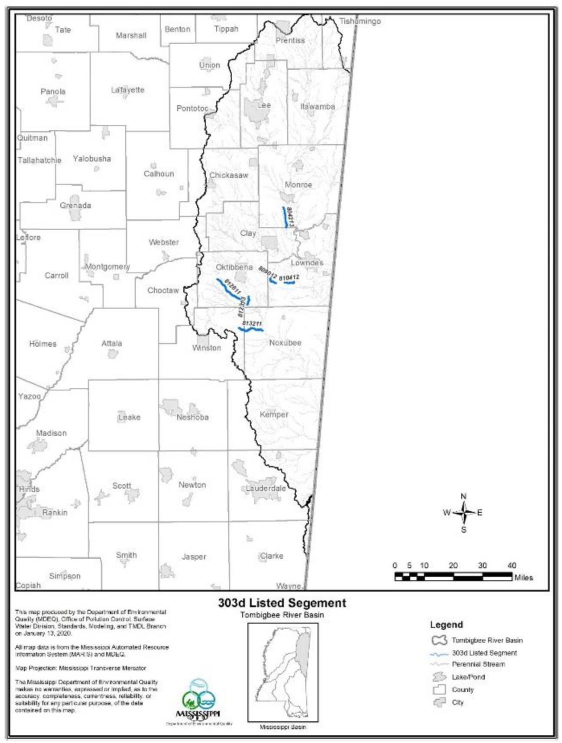
TMDL Fact Sheet

Tombigbee River Basin Sediment TMDL

The following waterbodies within the Tombigbee River Basin have been identified impaired due to sediment; Chinchahoma Creek, Unnamed Tributary to Catalpa Creek, Unnamed Tributary to Gilmer Creek, Shaw Creek, Spring Creek, and Yellow Creek (Waterbody ID's 812811, 809012, 810412, 812313, 804213, and 813211). This TMDL addresses impairment due to sediment/siltation located in Hydrologic Unit Codes (HUCs); 31601080207, 31601040603, 31601060101, 31601080208, 31601011302, and 31601080304 respectively. An estimated 62% to 98.6% reduction in sediment load across all basins is required to meet TMDL target loads. Best management practices are encouraged to reduce loads from non- point sources.



Subwatershed	Ecoregion	Area (Acres)	Estimated Load*	TMDL*	% Reduction
Chinchahoma Creek	65	15,610.34	31.22 to 842.96	11.7	62.5% to 98.6%
Unnamed Tributary to Catalpa Creek	65	2,410.08	4.82 to 130.14	1.8	62.7% to 98.6%
Unnamed Tributary to Gilmer Creek	65	1,730.90	3.46 to 93.47	1.2	62.3% to 98.6%
Shaw Creek	65	2,290.45	4.58 to 123.68	1.7	62.9% to 98.6%
Spring Creek	65	7,350.81	14.70 to 396.94	5.5	62.6% to 98.6%
Yellow Creek	65	28,023.30	56.05 to 1,513.26	21.0	62.5% to 98.6%

*tons per day at the effective discharge

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TMDL INFORMATION

Table 1: Listing Information

ID	Name	County	Cause	Ecoregion
812811	Chinchahoma Creek	Oktibbeha	Sediment	65
809012	Unnamed Tributary to Catalpa Creek	Lowndes	Sediment	65
810412	Unnamed Tributary to Gilmer Creek	Lowndes	Sediment	65
812313	Shaw Creek	Oktibbeha/ Winston/ Noxubee	Sediment	65
804213	Spring Creek	Monroe/ Clay	Sediment	65
813211	Yellow Creek	Winston/ Noxubee	Sediment	65

Table 2: Water Quality Standard

Parameter	Beneficial use	Narrative Water Quality Criteria
Sediment/Siltation	Aquatic Life Support	Waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers 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.

EXECUTIVE SUMMARY

The following waterbodies within the Tombigbee River Basin have been identified impaired due to sediment; Chinchahoma Creek, Unnamed Tributary to Catalpa Creek, Unnamed Tributary to Gilmer Creek, Shaw Creek, Spring Creek, and Yellow Creek (Waterbody ID's 812811, 809012, 810412, 812313, 804213, and 813211). This TMDL addresses impairment due to sediment/siltation located in Hydrologic Unit Codes (HUCs); 31601080207, 31601040603, 31601060101, 31601080208, 31601011302, and 31601080304 respectively (Figure 1). The waterbodies were identified as biologically impaired on the 2018 Mississippi Section 303(d) List of Impaired Waterbodies. Sediment was identified as a probable primary stressor for these biological impairments through a stressor identification process.

This TMDL is for clean sediment. The *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* regulation does not include a numeric water quality standard for aquatic life protection due to sediment (MDEQ, 2016). The narrative standard for the protection of aquatic life is sufficient for justification of TMDL development, but does not provide a quantifiable TMDL target. The target for this TMDL is based on reference sediment yields developed by the Channel and Watershed Processes Research Unit (CWPRU) at the National Sedimentation Laboratory (NSL).

The CWPRU developed reference sediment yields, or targets, for each level III ecoregion within Mississippi. These yields were derived from the empirical analysis of historical flow and suspended sediment concentrations for stable streams in each level III ecoregion. The methods used to develop the level III reference yields are described in detail in the reports titled *"Reference" and "Impacted" Rates of Suspended-Sediment Transport for Use in Developing Clean Sediment TMDLs: Mississippi and the Southeastern United States* (Simon, et al., 2002b) and *Actual and Reference Sediment Yields for the James Creek Watershed – Mississippi* (Simon, et al., 2002a). The ecoregion(s) for the streams referenced in this TMDL in HUC 080302010404 is the Southeastern Plains Ecoregion (65). The TMDL targets are based on the sediment yield at the effective discharge (bankfull flow or Q1.5).

According to 40 CFR §130.2 (i), TMDLs can be expressed in terms of mass per time, toxicity, or other appropriate measure. This TMDL is expressed as the tons of sediment that can be discharged from a subwatershed during a day (tons/day) at the effective discharge and still attain the applicable water quality standard.

The TMDL is expressed at the effective discharge. The effective discharge is the channel-forming flow or the flow that moves the most sediment. The effective discharge is obtained by combining flow frequency data with sediment transport relationships (Simon, et al., 2002b). The effective discharge occurs statistically once every one and a half years (Q1.5) and not on a daily basis. However, because the effective discharge is the critical condition, compliance with the TMDL at the effective discharge will result in the attainment of the water quality standards at all times. For many of the §303(d) listed streams in the Tombigbee River Basin sediment data were either not available or were insufficient to calibrate a water quality model for prediction of existing sediment loads. A range of unstable values was assigned based on the level III ecoregion. The unstable range stream values within ecoregion 65 is 0.002 to 0.054 tons per acre per day at the effective discharge. This is representative of the existing loads expected for the waterbody within HUCs 31601080207, 31601040603, 31601060101, 31601080208, 31601011302, and 31601080304.

The unstable yields are larger than the target yields for these waterbodies, therefore, a reduction is recommended for Chinchahoma Creek, Unnamed Tributary to Catalpa Creek, Unnamed Tributary to Gilmer Creek, Shaw Creek, Spring Creek, and Yellow Creek.

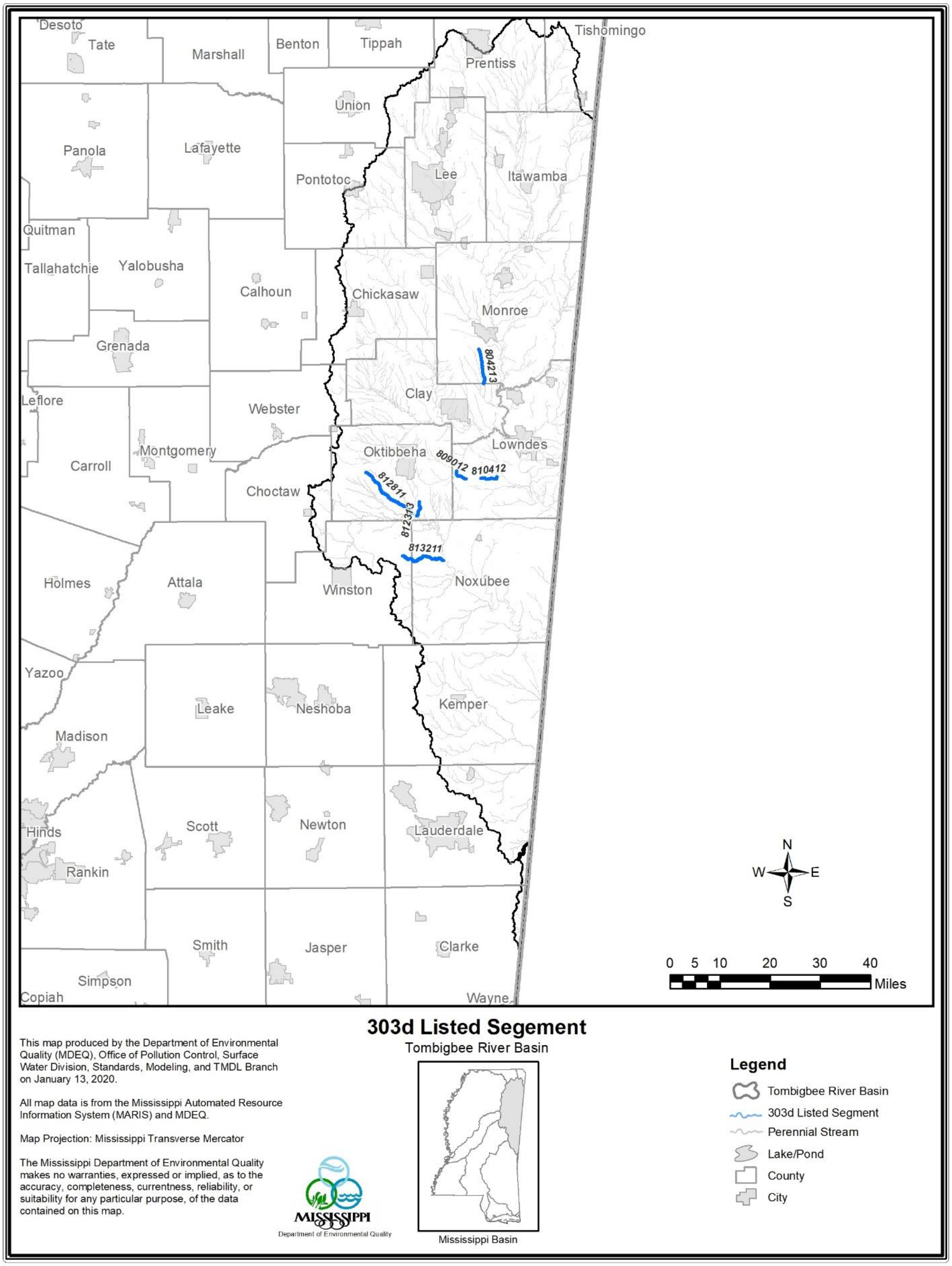

Figure 1: §303(d) Listed Segments Tombigbee River Basin

1.0 INTRODUCTION

1.1 Background

The identification of waterbodies not meeting their designated use and the development of total maximum daily loads (TMDLs) for those waterbodies are required by Section 303(d) of the Clean Water Act (CWA) and the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulations (40 CFR part 130). The TMDL process is designed to restore and maintain the quality of those impaired waterbodies through the establishment of pollutant specific allowable loads. The pollutant of concern for this TMDL is sediment from landuse runoff and in-channel sediment processes. The waterbodies included in this TMDL is located within United States Geological Survey (USGS) Hydrologic Unit Codes (HUCs); 31601080207, 31601040603, 31601060101, 31601080208, 31601011302, and 31601080304. These HUCs are located in Oktibbeha, Lowndes, Winston, Noxubee, Monroe, and Clay Counties.

The entire Chichahoma Creek subwatershed covers 15,610 acres and located in Oktibbeha County. The watershed contains many landuse types including agricultural land, pastureland, wetland, and forest areas. However, the dominant landuse within the HUC is Forest. The location of the §303(d) listed segment is shown in Figure 2.

The Unnamed Tributary to Catalpa Creek watershed located in Lowndes County has an area of approximately 2,410 acres. The watershed has urban, pasture, and wetlands, but consists mostly of pasture land (Figure 3).

Located in Lowndes County the Unnamed Tributary to Gilmer watershed covers 1,730 acres. The landuse of the watershed consists mostly of forest, pasture, and wetland. With the majority of the area used for Pasture (Figure 4).

Shaw Creek lies in Oktibbeha County and covers more than 2,290 acres. In the watershed the landuse is predominantly forest, pasture, and wetland; with pasture being the largest in area (Figure 5).

Spring Creek watershed lies on the Monroe and Clay County border. The area of the watershed is about 7,351 acres, with a landuse consisting mostly of scrub, pasture, and wetland. Forest covers the largest percentage of landuse cover (Figure 6).

The Yellow Creek watershed covers about 28,023 acres and is in both Winstoon and Noxubee Counties. The landuse in the watershed is pasture, scrubland, and wetland. With forest covering the vast amount of this watershed (Figure 7).

These waterbodies were listed due to failure to meet minimum water quality criteria for biological use support based on biological sampling. A detailed assessment of the watershed and potential point sources, called a stressor identification, was completed for the waterbody. The results of the stressor identification indicated that sediment was a probable primary stressor.

1.2 Applicable Waterbody Segment Classification

The waterbody classification for all the waterbodies listed, as established by the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* regulation, is Fish and Wildlife Support (MDEQ, 2016). Waters with this classification are intended for fishing and propagation of fish, aquatic life, and wildlife. Waters that meet the Fish and Wildlife classification should also be suitable for secondary contact, which is defined as incidental contact with water including wading and occasional swimming.

1.3 Applicable Waterbody Segment Standard

The *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* do not include a water quality standard applicable to aquatic life protection due to sediment (MDEQ, 2016). However, a narrative standard for the protection of aquatic life was interpreted to determine an applicable target for this TMDL. The narrative standard is that waters shall be free from materials attributable to municipal, industrial, agricultural, or other dischargers 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.

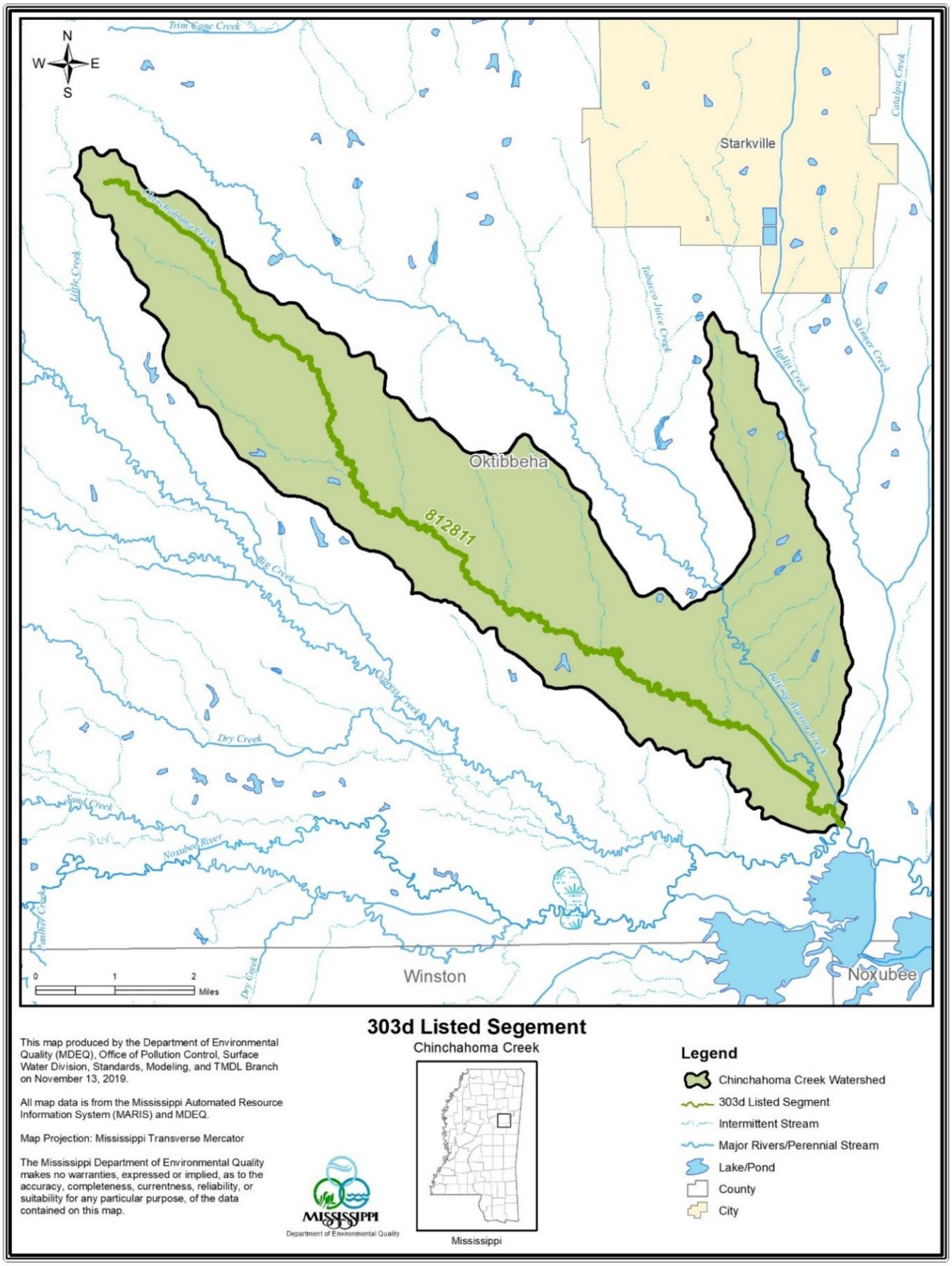

Figure 2: §303(d) Listed Segment Chinchahoma Creek

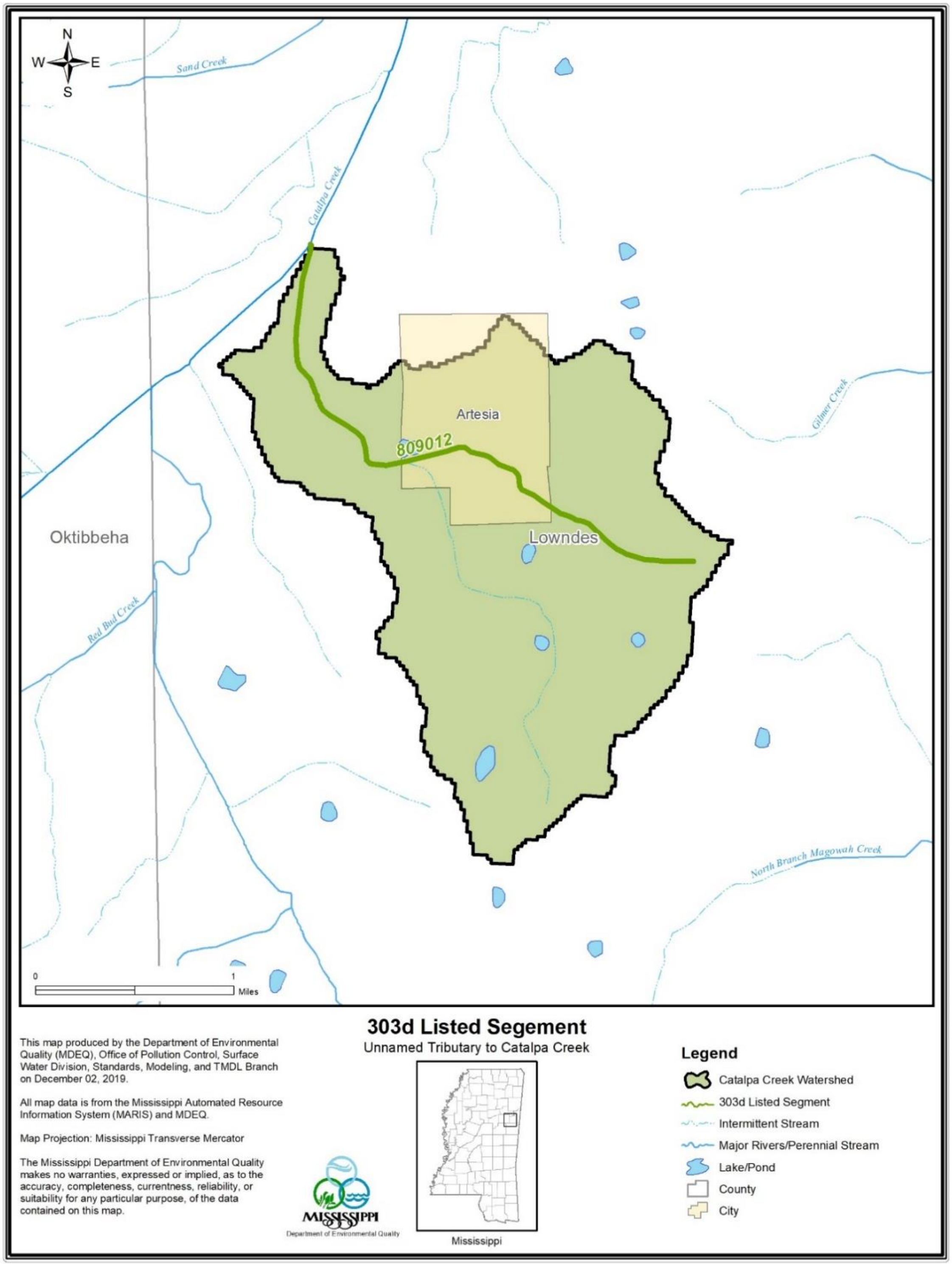

Figure 3: §303(d) Listed Segment Unnamed Tributary to Catalpa Creek

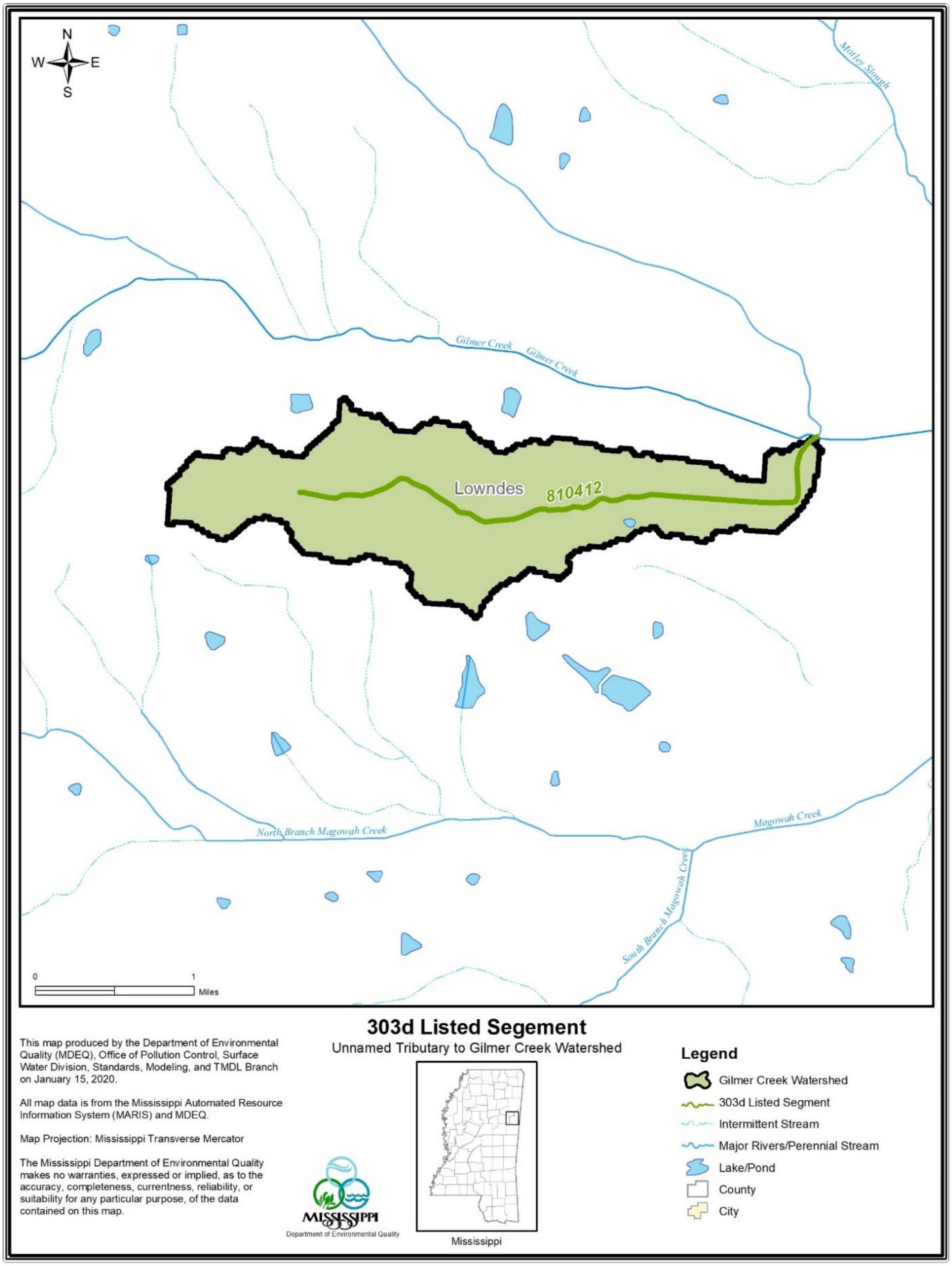

Figure 4: §303(d) Listed Segment Unnamed Tributary to Gilmer Creek

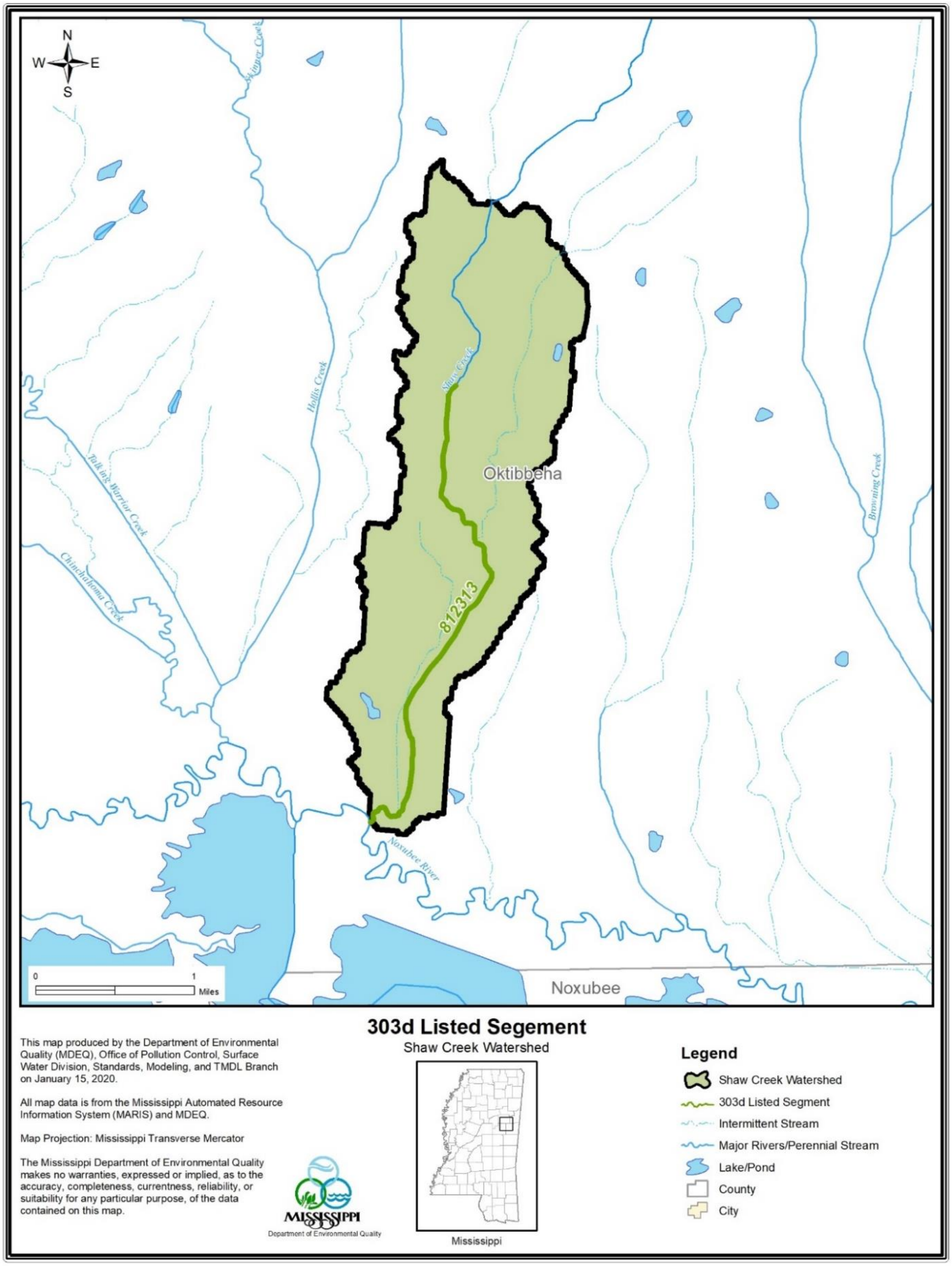

Figure 5: §303(d) Listed Segment Shaw Creek

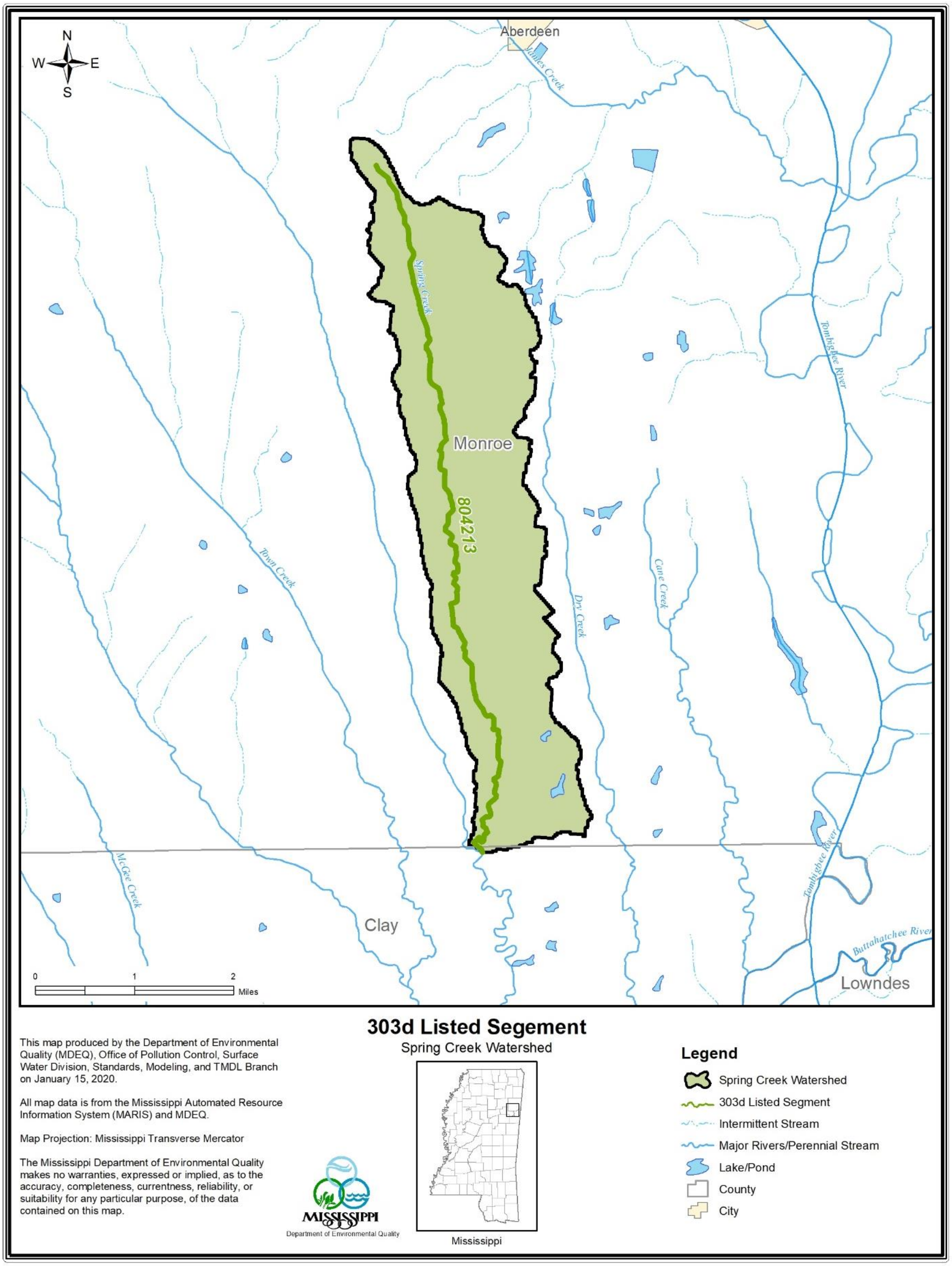

Figure 6: §303(d) Listed Segment Spring Creek

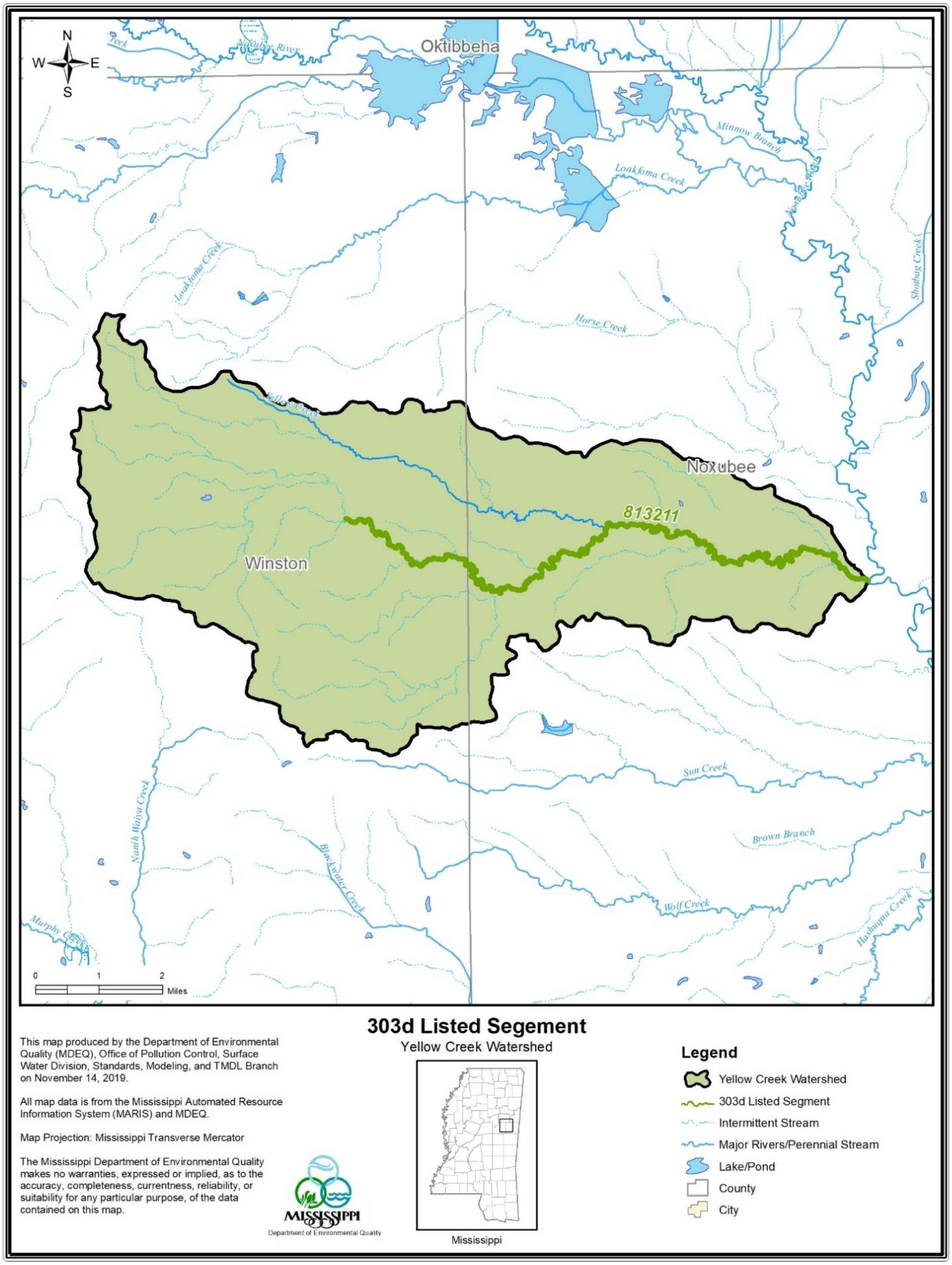

Figure 7: §303(d) Listed Segment Yellow Creek

2.0 TMDL ENDPOINT AND WATER QUALITY ASSESSMENT

2.1 Selection of a TMDL Endpoint and Critical Condition

One of the major components of a TMDL is the establishment of target endpoints, which are used to evaluate the attainment of acceptable water quality. Target endpoints, therefore, represent the water quality goals that are to be achieved by meeting the load and wasteload allocations specified in the TMDL. The endpoints allow for a comparison between observed conditions and conditions that are expected to restore designated uses.

For the waterbodies listed there is an acceptable range of sediment loadings at the effective discharge of the waterbody. The range was developed from suspended sediment concentration (SSC) data measured at stable streams in the same ecoregion. The target range for the waterbodies within ecoregion 65 is 0.0004 to 0.0019 tons per acre per day at the effective discharge. The midpoint of the range was selected to calculate the TMDL yields for the waterbody. The effective discharge is the discharge which moves the most sediment, or is the channel-forming flow. This discharge has been selected as the critical condition for this TMDL (Simon, et al., 2002b). Calculating the effective discharge is a matter of integrating a flow-frequency curve with a sediment transport rating to obtain the discharge (range of discharges) that transports the most sediment. For these waterbodies in Mississippi, the $Q_{1.5}$ is on average, a good approximation. Therefore, the $Q_{1.5}$ was used as a measure of establishing the effective discharge at the site. If the sediment target applicable for sediment in the waterbody is maintained during critical conditions, then the health of the stream should improve.

3.0 SOURCE ASSESSMENT and LOAD ESTIMATION

An important part of the TMDL analysis is the identification of individual sources, source categories, or source subcategories of sedimentation in the watershed and the amount of pollutant loading contributed by each of these sources. Under the CWA, sources are broadly classified as either point or nonpoint sources. Under 40 CFR §122.2, a point source is defined as a discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters. The National Pollutant Discharge Elimination System (NPDES) program regulates point source discharges. Point sources can be described by two broad categories: 1) NPDES regulated municipal and industrial wastewater treatment plants (WWTPs) and 2) NPDES regulated industrial activities, which include construction activities and municipal storm water discharges (Municipal Separate Storm Sewer Systems [MS4s]). For the purposes of this TMDL, all sources of sediment loading not regulated by NPDES permits are considered nonpoint sources.

3.1 Assessment of Point Sources

The TSS component of municipal and sanitary sewer treatment discharges is generally composed of organic material and not siltation, and therefore would not have a direct impact on the biological integrity of a stream whose probable primary stressor is sediment which is impacted by soil erosion during wet weather events. The pollutant of concern for this TMDL is sediment from landuse runoff and in-channel processes. There are no MS4 permits within the watersheds listed in this TMDL. As of March 2003, discharge of storm water from construction activities disturbing more than one acre must obtain an NPDES permit. The purpose of the NPDES permit is to eliminate or minimize the discharge of pollutants (sediment) from construction activities. Since construction activities at a site are of a temporary, relatively short term nature, the number of construction sites covered by the general permit varies. A general permit authorizes a category of discharges, rather than tailoring an individual permit to a specific facility. The target for these areas is the same range as the TMDL target for the watershed. Properly designed and well-maintained BMPs are expected to provide attainment of water quality standards.

3.2 Assessment of Nonpoint Sources

Nonpoint loading of sediment in a waterbody results from the transport of the material into receiving waters by the processes of mass wasting, head cutting, gullying, and sheet and rill erosion.

Sources of sediment include:

- Agriculture
- Silviculture
- Rangeland
- Construction sites
- Roads
- Urban areas
- Mass wasting areas
- Gullies
- Surface mining not covered by an NPDES or general permit
- In-channel and instream sources

- Historical landuse activities and channel alterations

The watersheds listed contain many different landuse types, including forest, cropland, pasture, wetland, scrub land, and urban as shown in Figures 8-13 and Tables 3-8. The landuse information for the watershed is based on the National Landcover Database 2011 (NLCD 2011). This data set is based on 2011 Landsat satellite data.

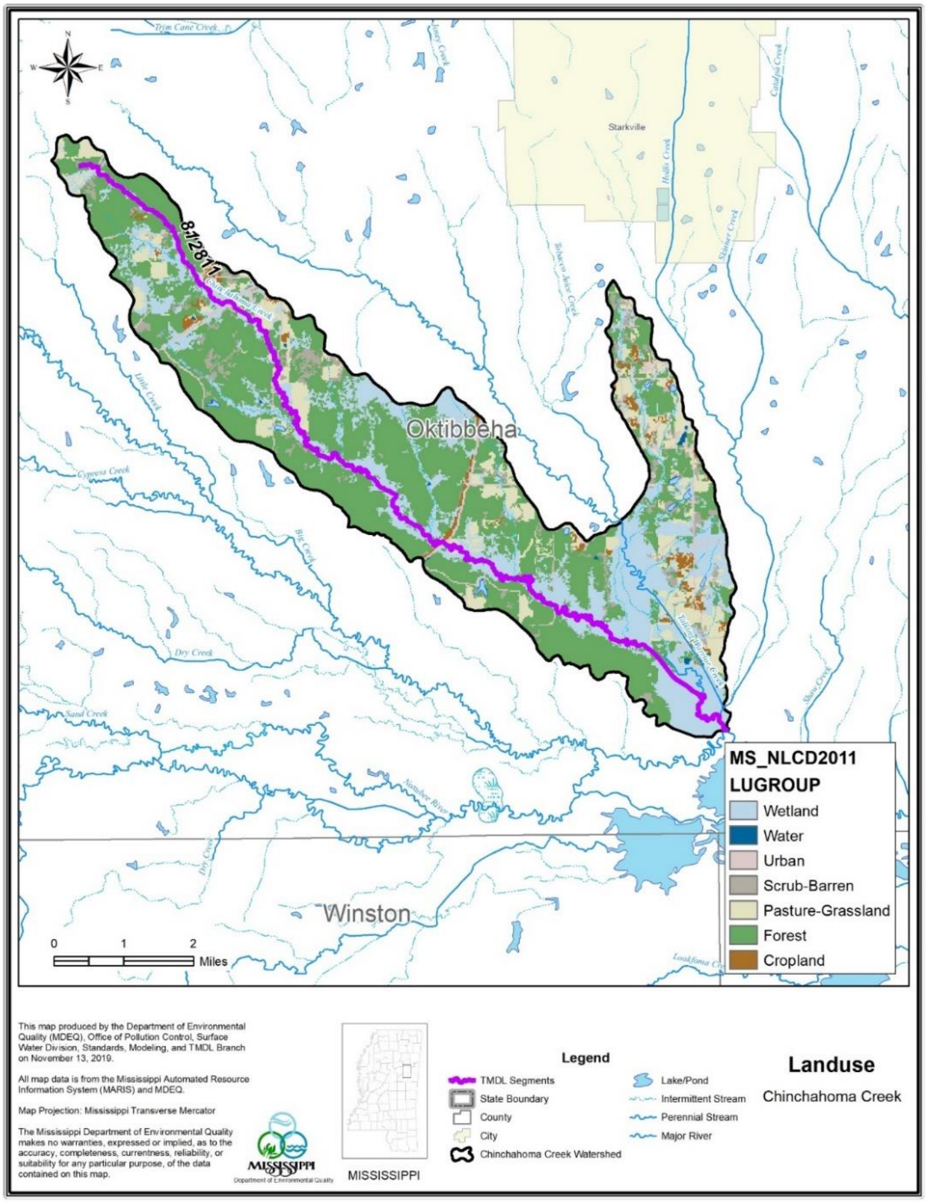

Figure 8. Chinchahoma Creek Landuse Distribution Map

Table 3: Landuse Distribution Table Chinchahoma Creek

	Chichahoma Creek HUC 31601080207		
	Land Use Distribution		
	Landuse	Acres	Percent
Landuse for the entire drainage area	Water	59.16	0.40%
	Urban	458.80	2.90%
	Forest	7661.28	49.10%
	Scrub Barren	754.81	4.80%
	Pasture/Grass	1812.96	11.60%
	Cropland	324.03	2.10%
	Wetland	4539.30	29.10%
	Total	15610.34	100.00%

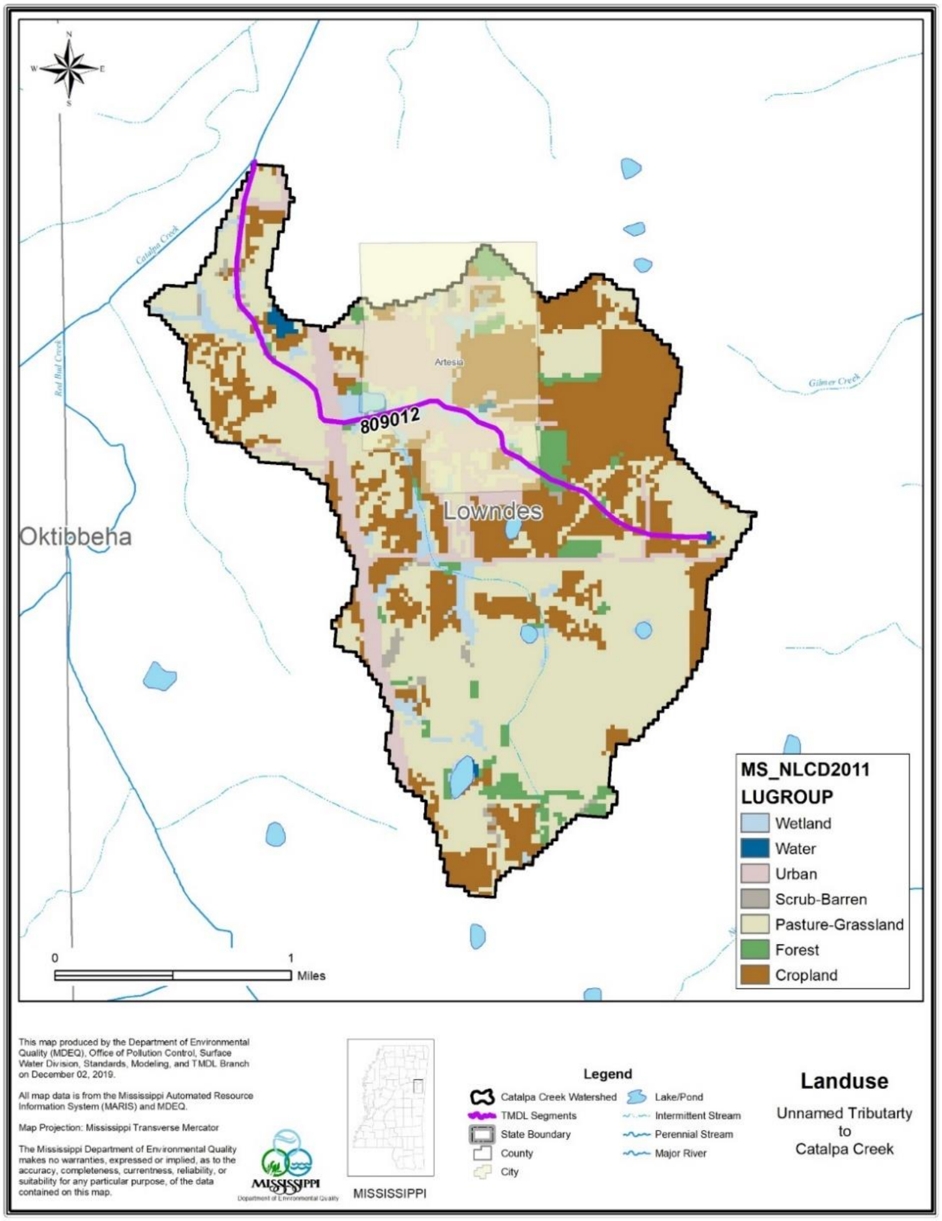

Figure 9. Unnamed Tributary of Catalpa Creek Landuse Distribution Map

Table 4: Landuse Distribution Table UNT Catalpa Creek

	UNT to Catalpa Creek HUC 31601040603		
	Land Use Distribution		
	Landuse	Acres	Percent
Landuse for the entire drainage area	Water	14.23	0.60%
	Urban	303.79	12.60%
	Forest	103.19	4.30%
	Scrub Barren	32.47	1.30%
	Pasture/Grass	1137.99	47.30%
	Cropland	697.65	28.90%
	Wetland	120.76	5.00%
	Total	2410.08	100.00%

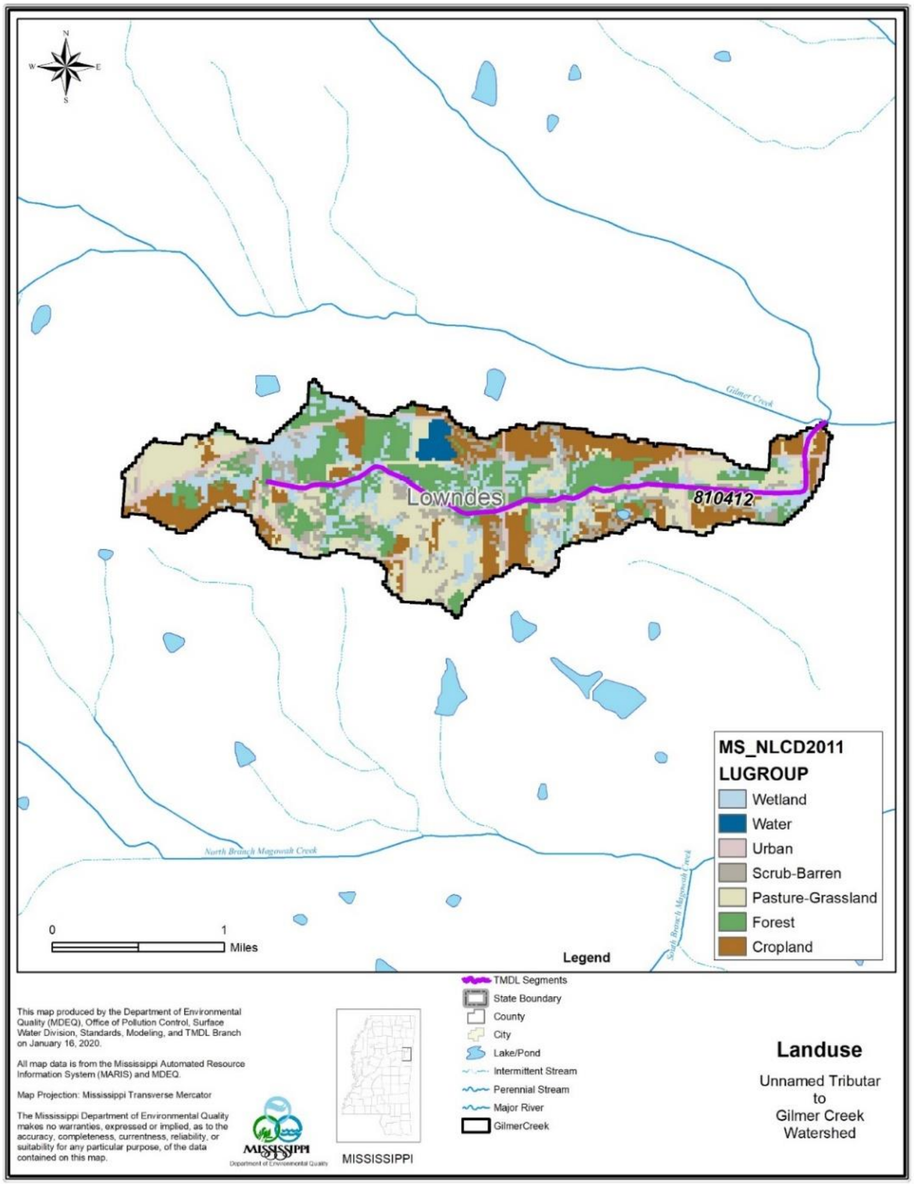

Figure 10. Unnamed Tributary of Gilmer Creek Landuse Distribution Map

Table 5: Landuse Distribution Table UNT Gilmer Creek

	UNT to Gilmer Creek HUC 31601060101		
	Land Use Distribution		
Landuse for the entire drainage area	Landuse	Acres	Percent
	Water	25.80	1.50%
	Urban	106.97	6.20%
	Forest	375.62	21.70%
	Scrub Barren	173.25	10.00%
	Pasture/Grass	438.56	25.30%
	Cropland	337.60	19.50%
	Wetland	273.10	15.80%
	Total	1730.90	100.00%

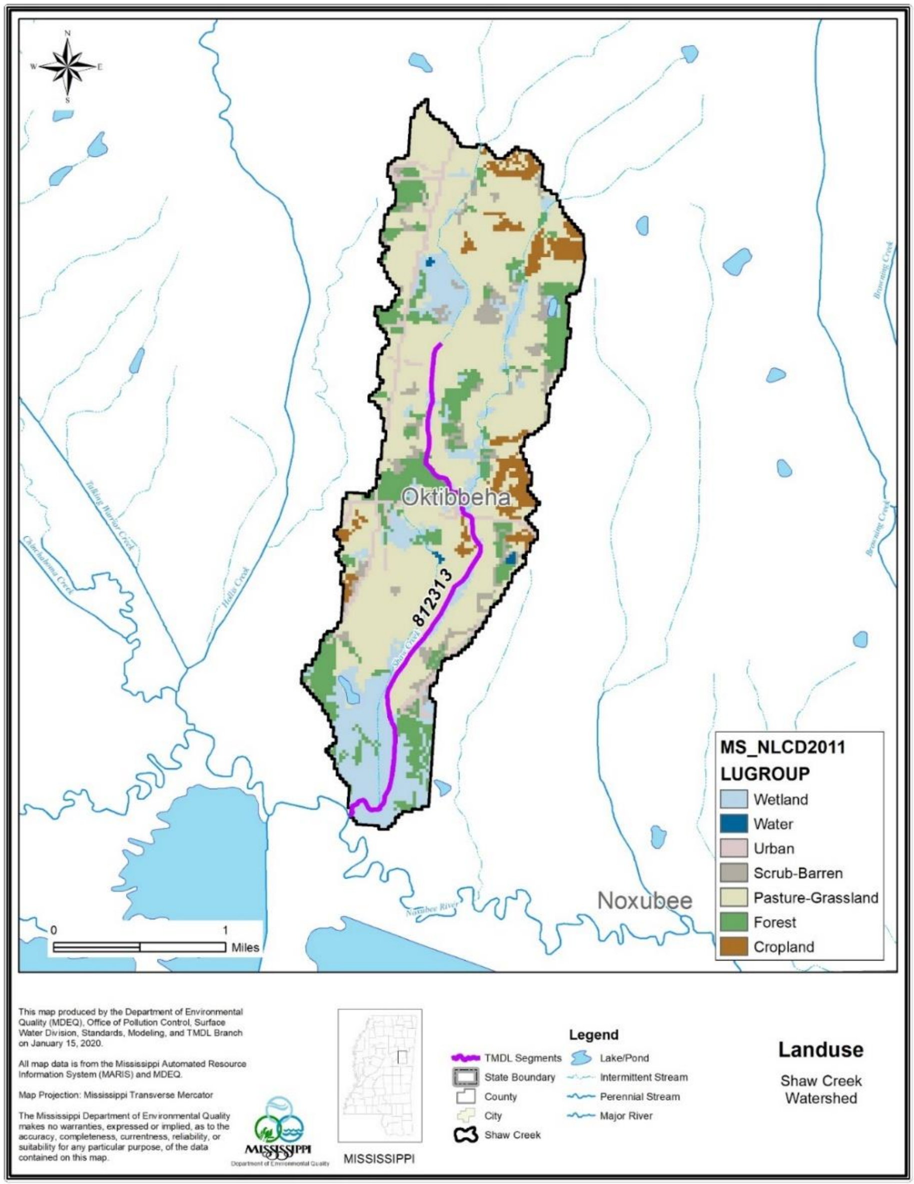

Figure 11. Shaw Creek Landuse Distribution Map

Table 6: Landuse Distribution Table Shaw Creek

	Shaw Creek HUC 31601080208		
	Land Use Distribution		
	Landuse	Acres	Percent
Landuse for the entire drainage area	Water	5.12	0.22%
	Urban	99.86	4.36%
	Forest	315.13	13.76%
	Scrub Barren	116.09	5.07%
	Pasture/Grass	1247.64	54.47%
	Cropland	124.54	5.44%
	Wetland	382.07	16.68%
	Total	2290.45	100.00%

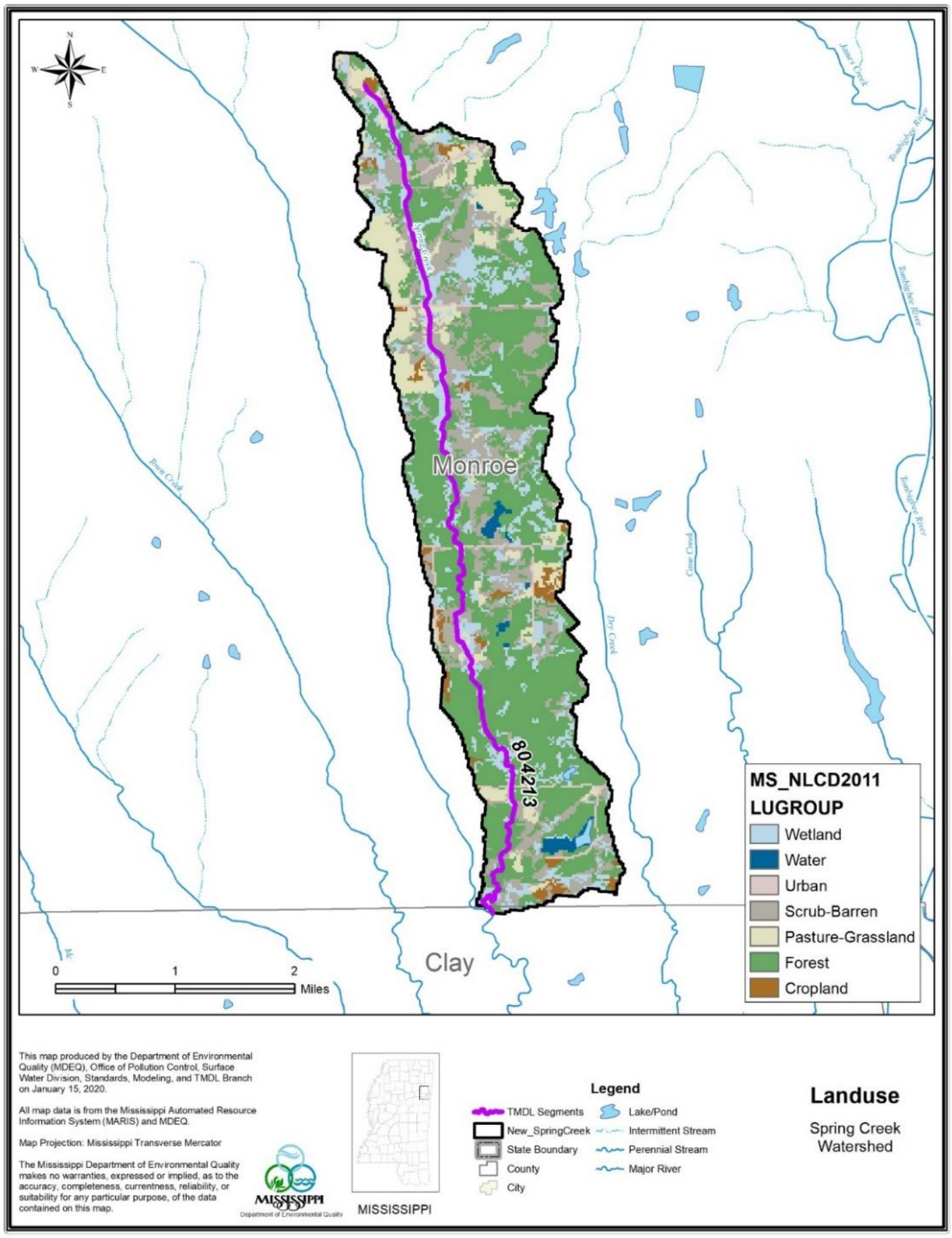

Figure 12. Spring Creek Landuse Distribution Map

Table 7: Landuse Distribution Table Spring Creek

	Spring Creek HUC 31601011302		
	Land Use Distribution		
Landuse for the entire drainage area	Landuse	Acres	Percent
	Water	60.27	1.20%
	Urban	100.52	2.00%
	Forest	2553.54	50.10%
	Scrub Barren	1013.45	19.90%
	Pasture/Grass	503.95	9.90%
	Cropland	2386.07	2.50%
	Wetland	733.01	14.40%
	Total	7350.81	100.00%

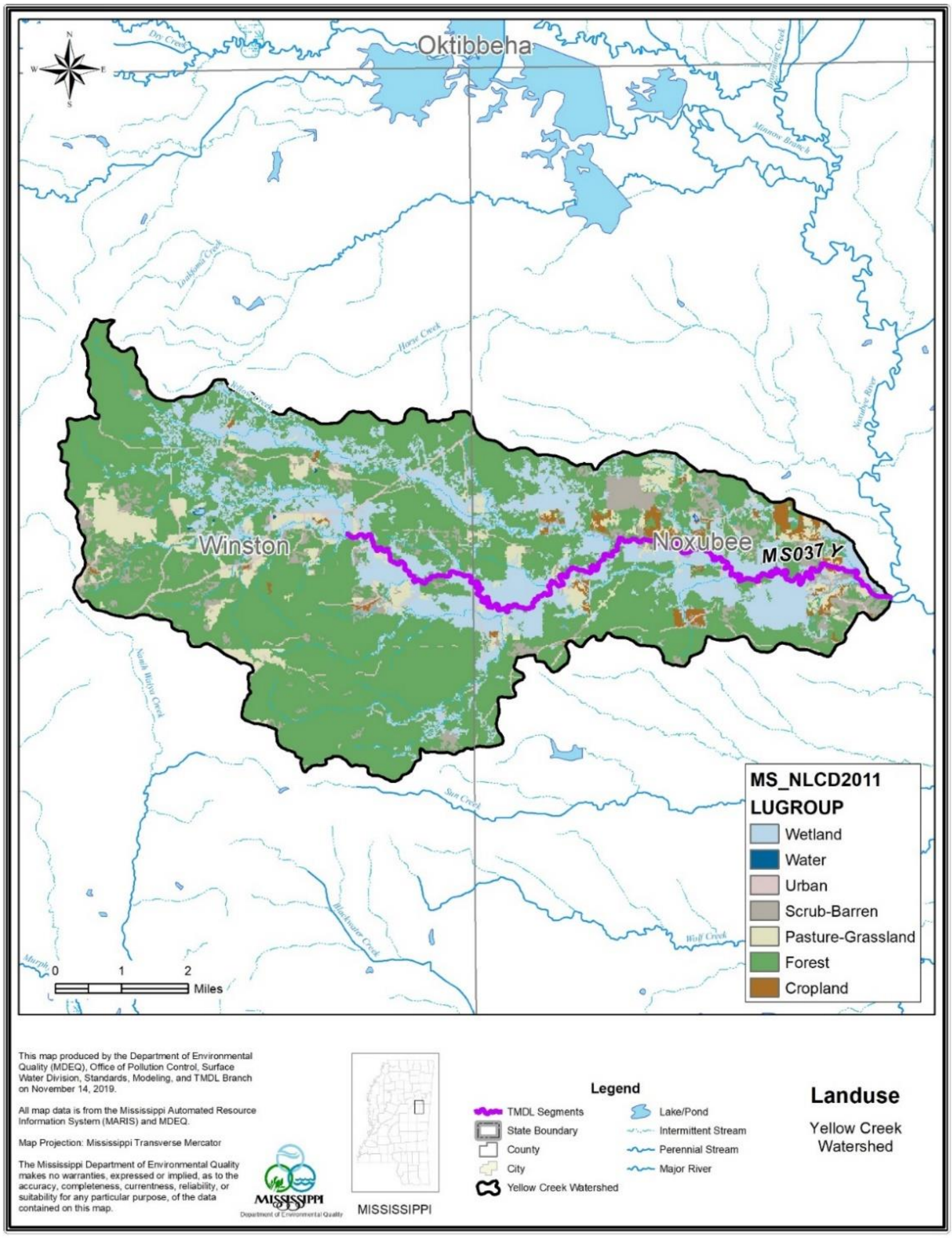

Figure 13. Yellow Creek Landuse Distribution Map

Table 8: Landuse Distribution Table Yellow Creek

	Yellow Creek HUC 31601080304		
	Land Use Distribution		
Landuse for the entire drainage area	Landuse	Acres	Percent
	Water	19.79	0.10%
	Urban	689.42	2.50%
	Forest	16961.39	60.50%
	Scrub Barren	1655.95	5.90%
	Pasture/Grass	1708.44	6.10%
	Cropland	507.28	1.80%
	Wetland	6481.03	23.10%
	Total	28023.30	100.00%

3.3 Existing Load Estimation

Due to lack of data for calibration it was determined that a modeling exercise to quantify the load from each source and estimate the total existing load would be ineffective. Instead an ecoregion approach was utilized to estimate existing load ranges. The CWPRU estimated the typical range for unstable streams within the level III ecoregion in the Tombigbee River Basin. That range was then used to estimate an existing load for subwatersheds within Ecoregion 65.

A range of unstable values was assigned based on the level III ecoregion values in Table 9. Therefore, the existing load for ecoregion 65 is 0.002 to 0.054 tons per acre per day at the effective discharge. The Estimated Existing Loads are shown in Table 10.

Table 9: Unstable Stream Sediment Yield Ranges for Level III Ecoregion 65

Level III Ecoregion	Unstable Streams Sediment Yield Range*
Ecoregion 65	0.002 to 0.054

*tons per acre per day at the effective discharge

Table 10: Estimated Existing Loads for Tombigbee River Basin

Subwatershed	Area (Acres)	Estimated Load*
Chinchahoma Creek	15,610.34	31.22 to 842.96
Unnamed Tributary to Catalpa Creek	2,410.08	4.82 to 130.14
Unnamed Tributary to Gilmer Creek	1,730.90	3.46 to 93.47
Shaw Creek	2,290.45	4.58 to 123.68
Spring Creek	7,350.81	14.70 to 396.94
Yellow Creek	28,023.30	56.05 to 1,513.26

*tons per day

4.0 DETERMINING THE TARGET SEDIMENT LOAD

The information and methodologies described in the following sections are based on research efforts conducted by the CWPRU of the National Sedimentation Laboratory in Oxford, Mississippi. The primary sources of the information presented in this section are:

- *Actual and Reference Sediment Yields for the James Creek Watershed – Mississippi* (Simon, et al., 2002a)

- *"Reference" and "Impacted" Rates of Suspended-Sediment Transport for Use in Developing Clean Sediment TMDLs: Mississippi and the Southeastern United States* (Simon, et al., 2002b)

4.1 Selecting a Reference Condition (Simon, et al., 2002a)

Sediment loads (transport rates) in streams vary by orders of magnitude over time and by location. Controls such as geology and channel-boundary materials, land use, channel stability, and the type and timing of precipitation events make prediction of sediment loads difficult and complex. Still, in order to determine the amount of sediment that impairs a given waterbody (TMDL), one must first be able to determine the sediment load that would be expected in an unimpaired stream of a given type and location. However, baseline conditions of flow, sediment concentrations, and transport rates for streams in the wide variety of physiographic provinces and under a wide variety of land uses are poorly understood.

There is no reason to assume that "natural" or background rates of sediment transport will be consistent from one region to another. Within the context of clean sediment TMDLs, it follows that there is no reason to assume that "target" values should be consistent on a nationwide basis. Similarly, there is no reason to assume that channels within a given region will have consistent rates of sediment transport. For example, unstable channel systems or those draining disturbed watersheds will produce and transport more sediment than stable channel systems in the same region. This reflects differences in the magnitude and perhaps type of erosion processes that dominate a subwatershed or stream reach.

To be useful for TMDL practitioners, sediment transport relations must be placed within a conceptual and analytic framework such that they can be used to address sediment-related problems at sites where no such data exist. To accomplish this, sediment transport characteristics and relations need to be regionalized according to attributes of channels and drainage basins that are directly related to sediment production, transport, and potential impairment. In a general way, these attributes include among others, physiography, geology, climate and ecology, differentiated collectively as an ecoregion.

In order to identify those sediment transport conditions that represent impacted or impaired conditions, it is essential to first define a non-disturbed, stable, or "reference" condition for the particular stream reach. In some schemes the "reference" condition simply means "representative" of a given category of classified channel forms or morphologies and as such, may not be analogous with a "stable", "undisturbed", or "background" rate of sediment production and transport.

The Rosgen (1985) stream classification system is widely used to describe channel form. In this classification system, stream types D, F, and G are by definition, unstable (Rosgen, 1996). These stream reaches, therefore, would be expected to produce and transport enhanced amounts of sediment and represent "impacted", if not "impaired" conditions. Thus, although it may be possible to define a "representative" reach of stream types D, F, and G, for the purpose of TMDL development, a "reference" condition transporting "natural" or "background" rates of sediment will be difficult to find.

As an alternative scheme for TMDL practitioners, the channel evolution framework set out by Simon and Hupp (1986) is proposed in Figure 14. In most alluvial channels, disruption of the dynamic equilibrium generally results in a certain degree of upstream channel degradation and downstream aggradation. If the predisturbed channel is considered as the initial stage (stage I) of channel evolution and the disrupted channel as an instantaneous condition (stage II), rapid channel degradation can be considered stage III. Degradation flattens channel gradients and consequently reduces the available stream power for given discharges with time. Concurrently, bank heights are increased and bank angles are often steepened by fluvial undercutting and by pore-pressure induced bank failures near the base of the bank. Thus, the degradation stage (stage III) is directly related to destabilization of the channel banks and to channel widening by mass-wasting processes (stage IV) once bank heights and angles exceed the critical conditions of the bank material (as determined by shear-strength characteristics).

As degradation migrates further upstream, aggradation (stage V) becomes the dominant trend in previously degraded downstream sites because the flatter gradient and lower hydraulic radius at the degraded site cannot transport the heightened sediment loads originating from degrading reaches upstream. This secondary aggradation occurs at rates roughly 60% less than the associated degradation rate (Simon and Hupp, 1992). These reduced aggradation rates indicate that bed-level recovery will not be complete and that attainment of a new dynamic equilibrium will take place through (1) further channel widening, (2) the establishment of riparian vegetation that adds roughness elements and reduces the stream power for given discharges, and (3) further gradient reduction by meander extension and elongation.

The lack of complete bed-level recovery often results in a two-tiered channel configuration with the original floodplain surface becoming a terrace. Flood flows are, therefore, constrained within this enlarged channel below the terrace level. Without proliferation of riparian vegetation within the channel, this results in a given flow having greater erosive power than if an equivalent flow could dissipate energy by spreading across the floodplain. Where vegetation does re-establish, the additional roughness limits the erosive power of flood events within the incised channel and constrains shear-stress values to near bankfull levels. Aggrading conditions (stage V) are also common in reaches downstream from the area of maximum disturbance immediately after the disturbance is imposed on the stream channel.

With stages of channel evolution tied to discrete channel processes and not strictly to specific channel shapes, they have been successfully used to describe systematic channel-stability processes over time and space in diverse environments subject to various disturbances such as stream response to: channelization in the Southeast US Coastal Plain; volcanic eruptions in the Cascade Mountains; and dams in Tuscany, Italy (Rinaldi and Simon, 1998). Because the stages of channel evolution represent shifts in dominant channel processes, they are systematically related to suspended-sediment and bed-material discharge (Simon, 1989; Kuhnle and Simon, 2000), fish-community structure, rates of channel widening (Simon and Hupp, 1992), and the density and distribution of woody riparian vegetation (Hupp, 1992).

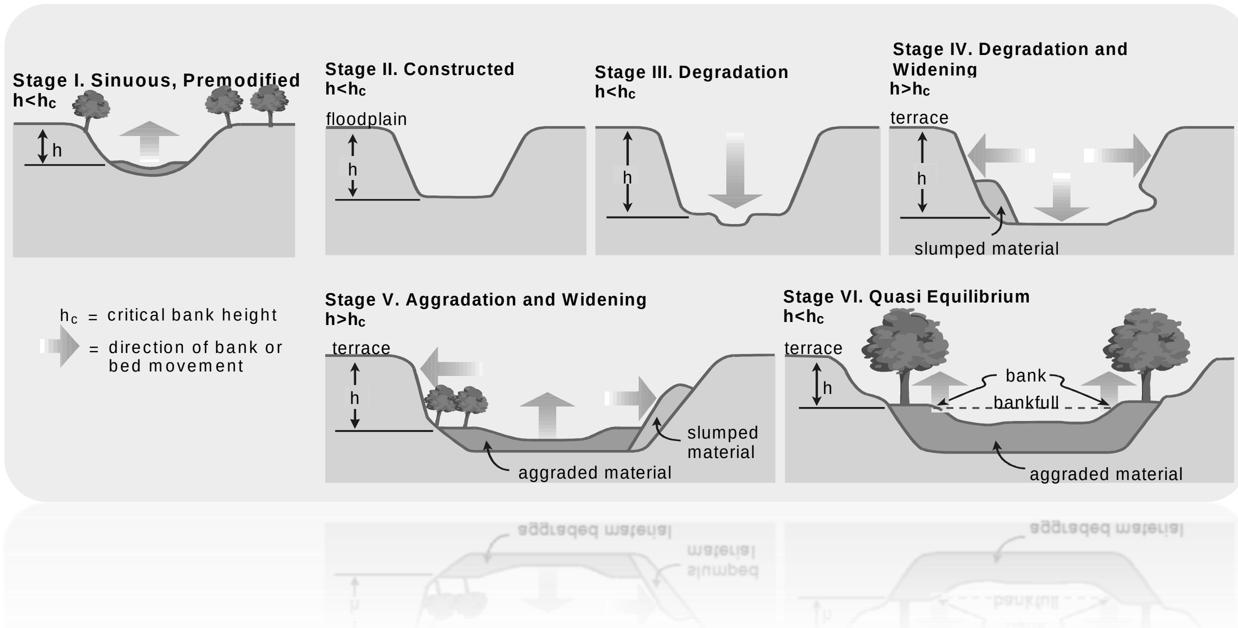

Figure 14. Six Stages of Channel Evolution (Simon and Hupp, 1986)

An advantage of a process-based channel-evolution scheme for use in TMDL development is that Stages I and VI represent two true “reference” conditions. In some cases, channels are unlikely to recover to Stage I, pre-modified conditions. Stage VI, re-stabilized conditions are a more likely target under the present regional landuse and altered hydrologic regimes and can be used as a “reference” condition. However, in pristine areas where disturbances have not occurred or where they are far less severe, Stage I conditions can be used as a “reference” condition.

4.2 Analysis of Available Suspended-Sediment Data (Simon, et al., 2002a)

Analysis of suspended-sediment transport data involves establishing a relation between flow and sediment concentration or load. Instantaneous concentration data combined with either an instantaneous flow value or flow data representing the value obtained from the stage-discharge relation at 15-minute intervals are best. Mean daily values of both flow and sediment loads, which are readily available from the USGS, tend to be biased towards lower flows, particularly in basins prone to flashfloods. For establishing sediment transport rating relations, instantaneous concentration and 15-minute flow data were used from USGS and ARS gauging station records.

Because the “effective discharge” is that discharge or range of discharges that shape channels and perform the most geomorphic work (transport the most sediment) over the long term, it can serve as a useful indicator of regional suspended-sediment transport conditions for “reference” and impacted sites. The effective discharge is obtained by combining flow frequency data with sediment transport relationships. In many parts of the United States, the effective discharge is approximately equal to the peak flow that occurs about every 1.5 years ($Q_{1.5}$) and may be analogous to the bankfull discharge in stable streams.

Calculating the effective discharge is a matter of integrating a flow-frequency curve with a sediment transport rating to obtain the discharge (range of discharges) that transports the most sediment. This was accomplished where the complete 15-minute flow record was easily obtainable. For streams in Mississippi, the $Q_{1.5}$ is on average, a good approximation. Therefore, the $Q_{1.5}$ was used as a measure of establishing the effective discharge at all sites. This discharge was then applied to the sediment transport relation to obtain the sediment load at the effective discharge. To normalize the data for differences in basin size, the sediment load was divided by drainage area to obtain sediment yield (in tons/acre/day).

4.3 Target Sediment Yields

Target values for suspended-sediment are based on the concept that stable channel conditions can be represented by channel evolution Stages I and VI. Therefore, the effective discharge sediment yields for Stage I and VI in a given ecoregion represent background or natural transport rates shown in Figure 14 (Simon, et al., 2002b). The targeted sediment yield for an ecoregion is based on the sediment yield values obtained for Stage I and VI sites within that ecoregion. The targeted sediment yield range for ecoregion 65 is 0.0004 to 0.0019 tons per acre per day at the effective discharge (Q1.5) shown in Table 11 and Figures 15- 21. A stable stream sediment load was calculated for the subwatershed using the mean value in the range for the appropriate ecoregion over the area.

Table 11: Stable Stream Sediment Yield Ranges for Level III Ecoregion 65

Level III Ecoregion	Stable Streams Sediment Yield Range*
Ecoregion 65	0.0004 to 0.0019

*tons per acre per day at the effective discharge

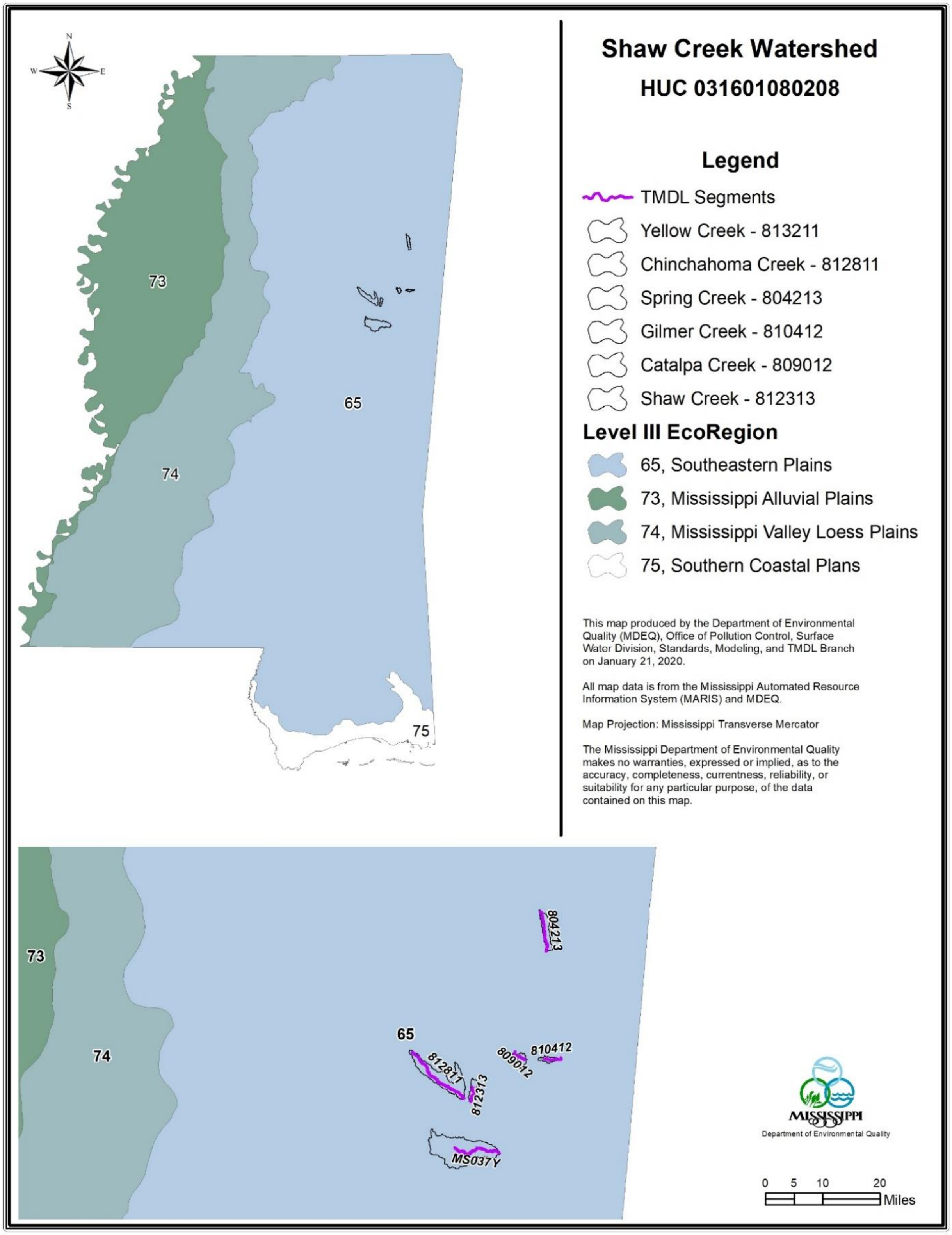

Figure 15. Listed Segments in the Tombigbee River Basin with Level III Ecoregion

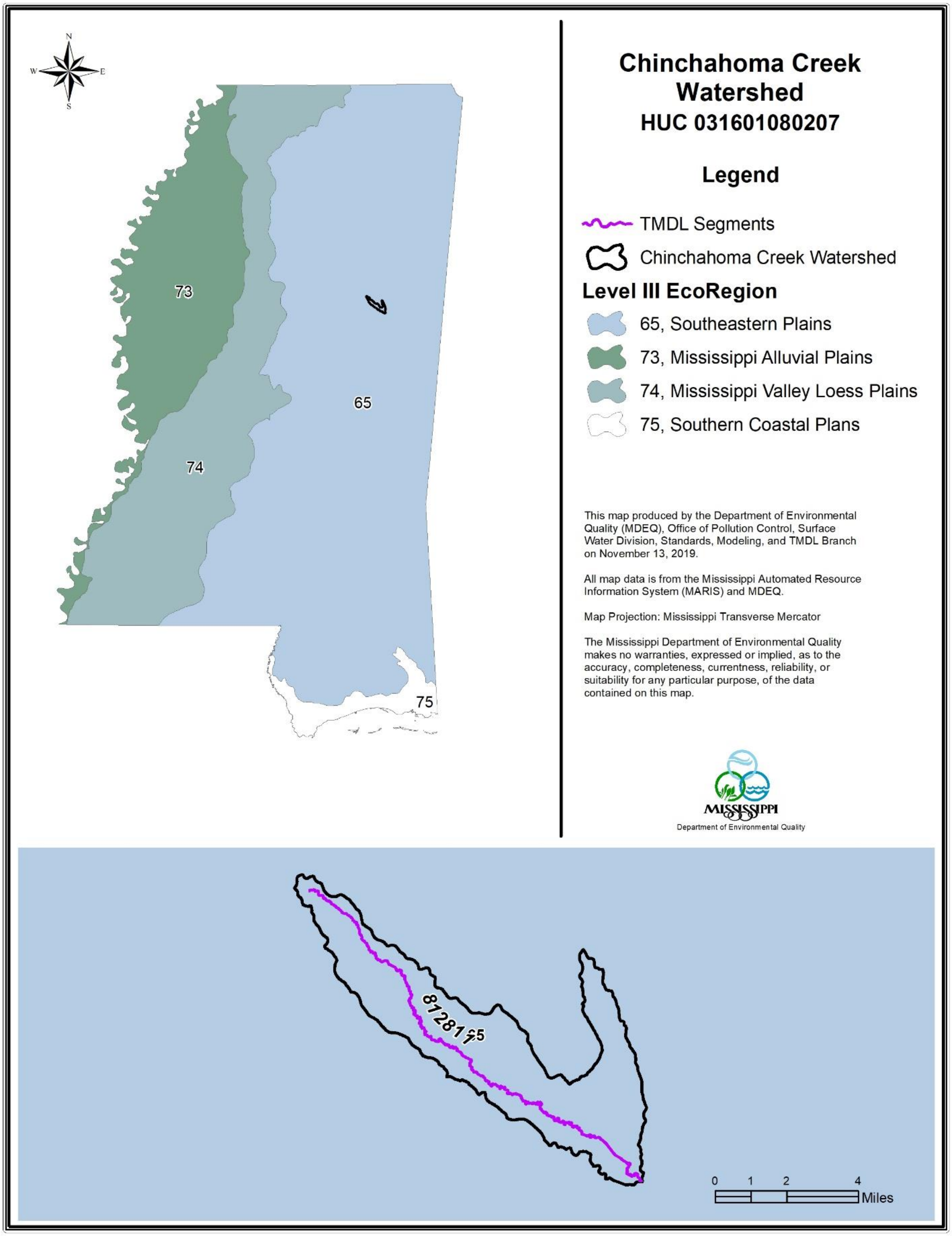

Figure 16. Chinchahoma Creek with Level III Ecoregion

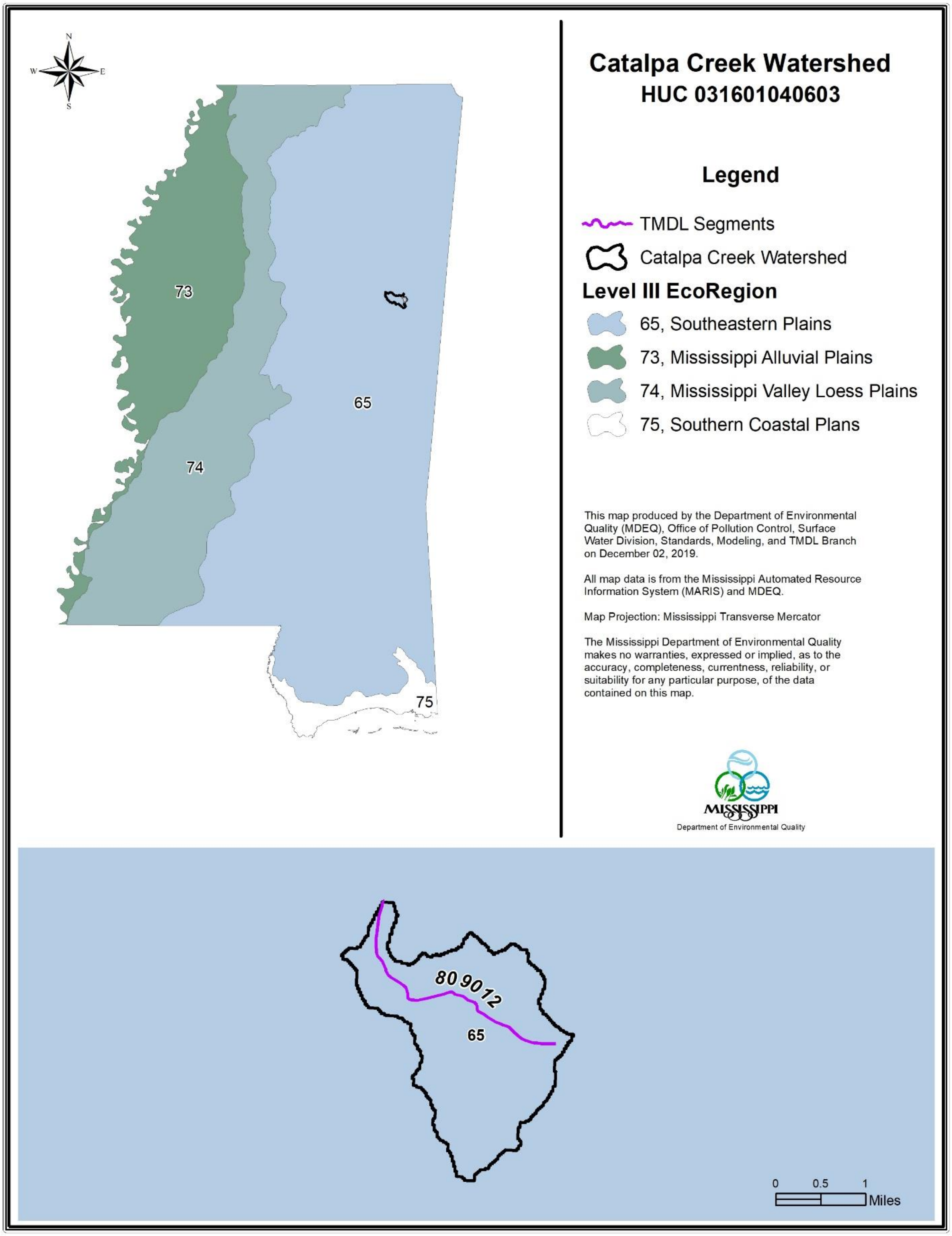

Figure 17. Unnamed Tributary to Catalpa Creek with Level III Ecoregions

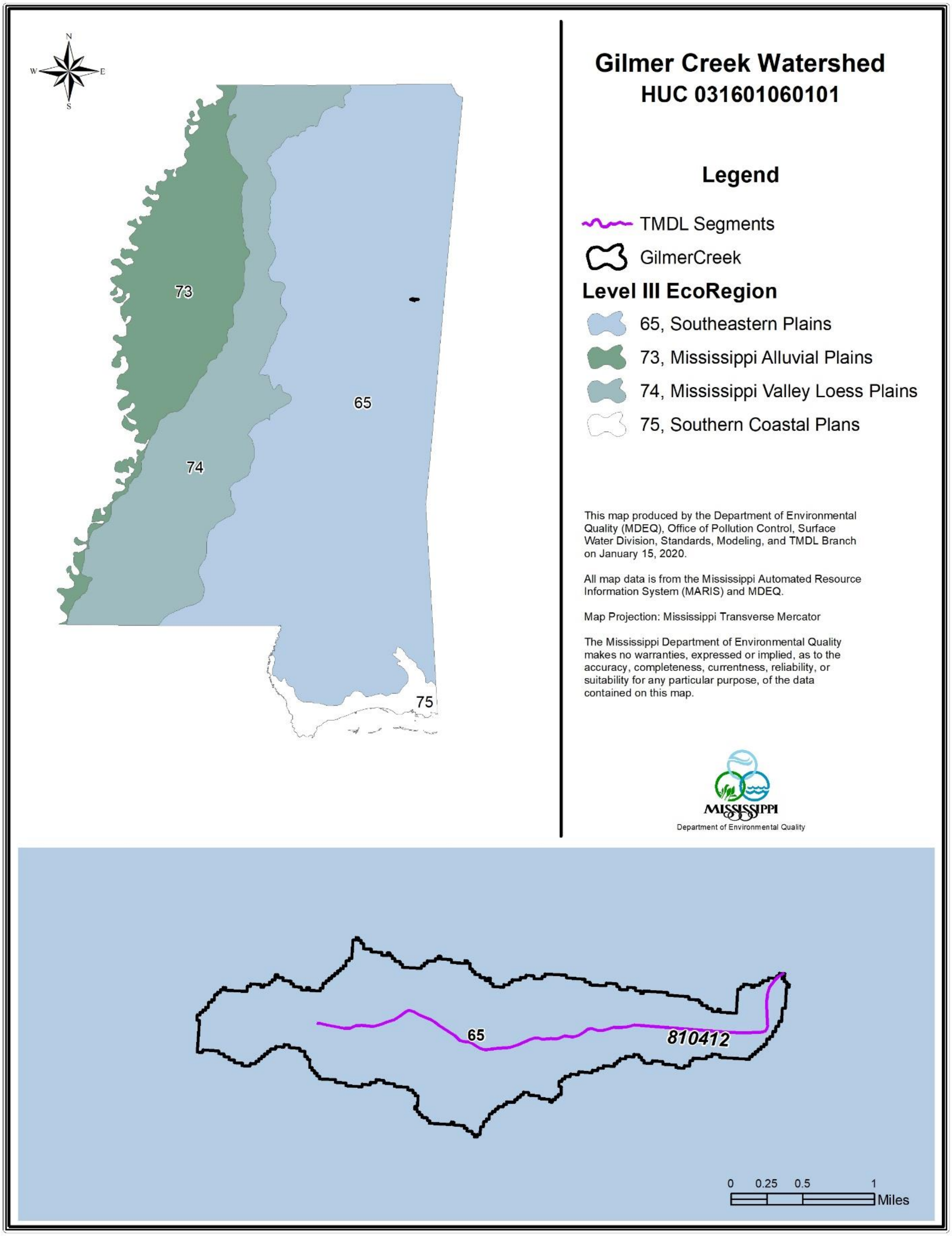

Figure 18. Unnamed Tributary to Gilmer Creek with Level III Ecoregions

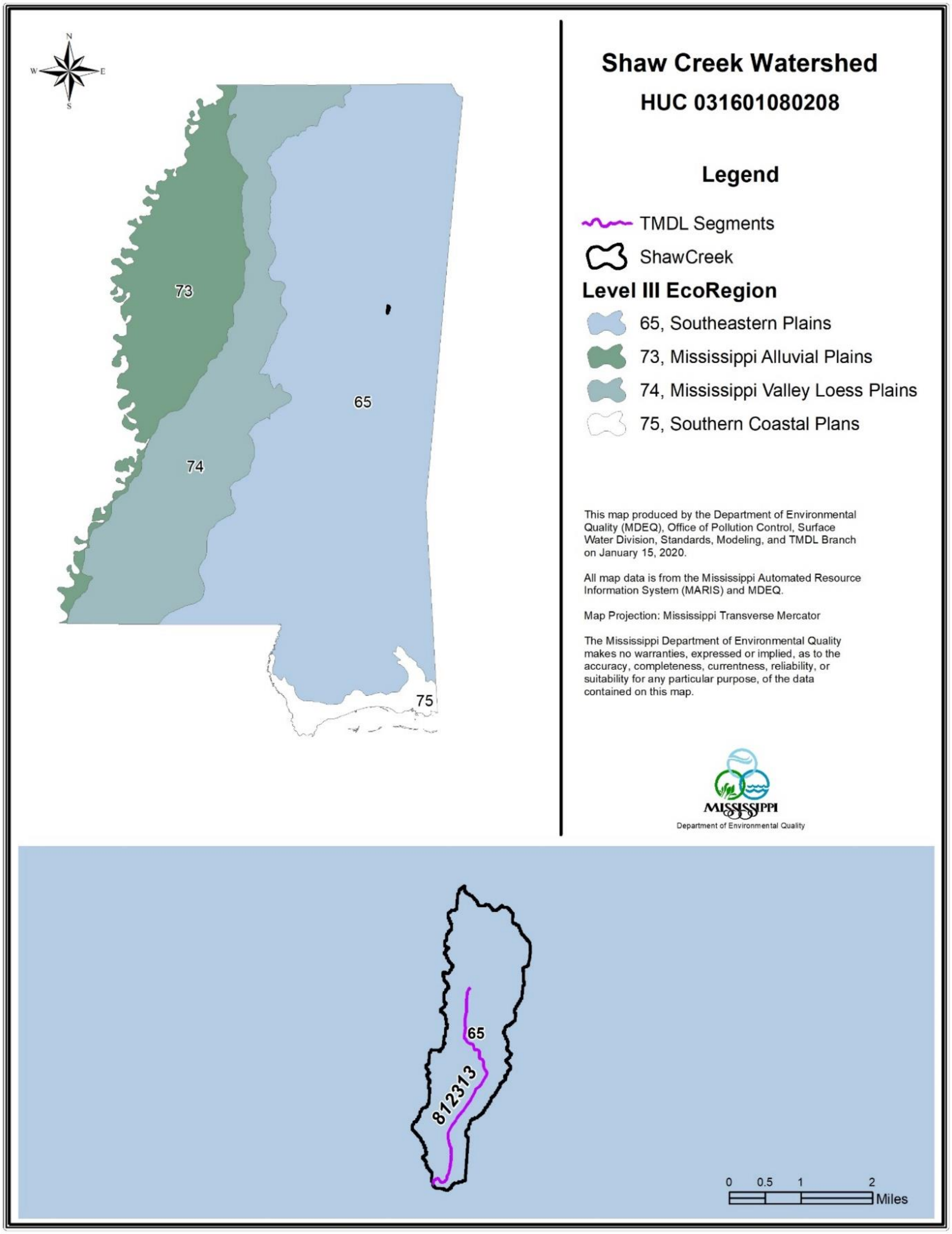

Figure 19. Shaw Creek with Level III Ecoregions

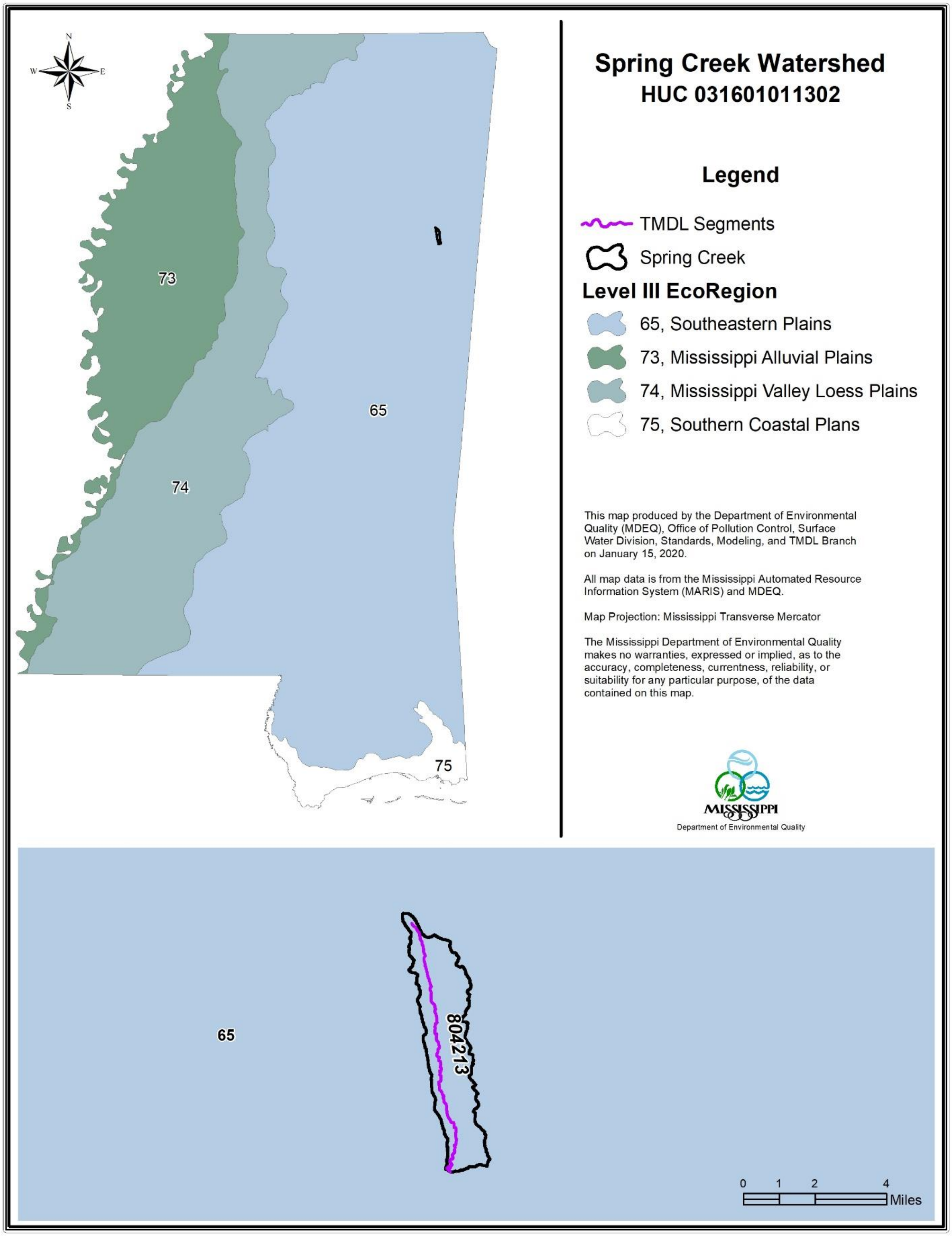

Figure 20. Spring Creek with Level III Ecoregions

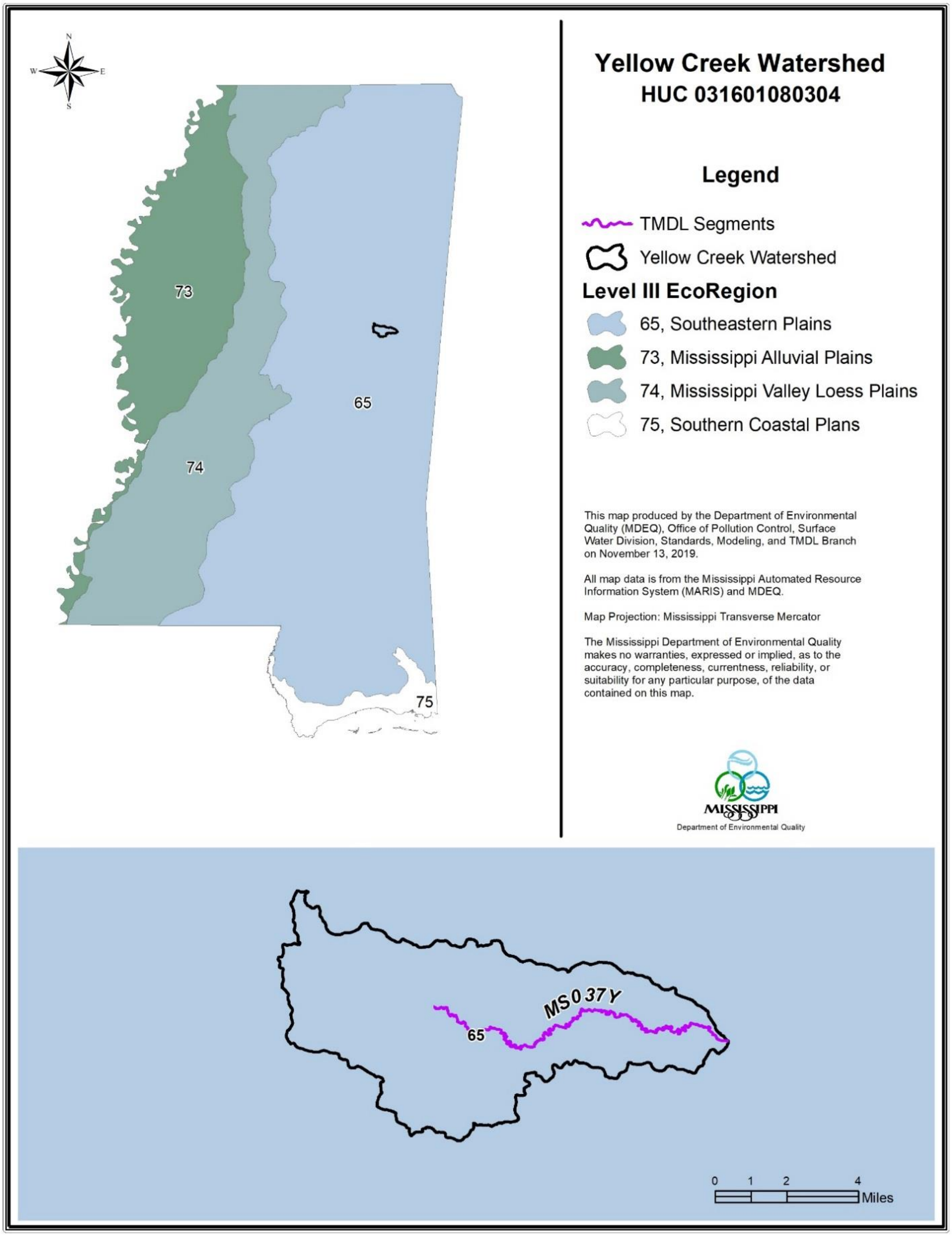

Figure 21. Yellow Creek with Level III Ecoregions

5.0 ALLOCATION

According to 40 CFR §130.2 (i), TMDLs can be expressed in terms of mass per time, toxicity, or other appropriate measure. This TMDL is expressed as the tons of sediment that can be discharged from a subwatershed during a day (tons/day) at the effective discharge and still attain the applicable water quality standard. It is appropriate to apply the same target yield to permitted (WLA) and unpermitted (LA) watershed areas. For load TMDLs the WLA and LA are summed to calculate the TMDL. This TMDL is expressed as the load at the effective discharge. The WLAs and LAs set in this TMDL are to be met at the effective discharge. The sediment targets used in the TMDL are based on suspended sediment concentrations. The methods used to develop these values are described in detail in the reports titled, *"Reference" and "Impacted" Rates of Suspended-Sediment Transport for Use in Developing Clean Sediment TMDLs: Mississippi and the Southeastern United States* (Simon, et al., 2002b) and *Actual and Reference Sediment Yields for the James Creek Watershed – Mississippi* (Simon, et al., 2002a).

5.1 Waste load Allocations

The WLA for the sub watersheds was set to zero tons of sediment per day. The TSS component of any NPDES municipal or sanitary sewer treatment facility is different from the pollutant addressed within this TMDL and the categorical TSS limit given in the NPDES permit will comply with this TMDL. The TSS component of municipal and sanitary sewer treatment discharges is composed of organic material and not stream sedimentation due to soil erosion during wet weather events. The pollutant of concern for this TMDL is sediment from landuse runoff and in-channel processes**,** consistent with discharges associated with construction activities and MS4s. There are no facilities whose effluent have the potential to be relevant to this TMDL.

5.2 Load Allocations

The LA developed for this TMDL is an estimation of the acceptable contribution of all nonpoint sources in the watershed. Channel processes and upland sources both contribute to the sediment loading of the waterbody. Examples of potential nonpoint sources of sediment include agricultural activities, silviculture activities, surface mining activities, gullies, in-channel and instream sources, roads, and construction activities not regulated by NPDES permits.

For the waterbody to attain the applicable narrative water quality standard for sediment, the allowable range of sediment loads is 0.0004 to 0.0019 tons per acre per day at the effective discharge for ecoregion 65.

5.3 Incorporation of a Margin of Safety (MOS)

The two types of MOS development are to implicitly incorporate the MOS using conservative assumptions or to explicitly specify a portion of the total TMDL as the MOS. The MOS selected for this TMDL is implicit. The use of conservative procedures provides a sufficient implicit MOS. These conservative procedures include the use of a stable stream as the target and the use of the effective discharge flow, the flow that produces the most sediment transport.

5.4 Calculation of the TMDL

As stated above, the pollutant of concern for this TMDL is sediment from landuse runoff and in-channel processes. The LA includes the contributions from the channel and surface runoff from the watershed. The MOS for this TMDL is implicit and derived from the conservative assumptions incorporated into this methodology. This TMDL is given in Table 12.

Table 12: Tombigbee River Basin Sediment Total Maximum Daily Load

Subwatershed	WLA	LA	MOS	TMDL
Chinchahoma Creek	0	11.7	Implicit	11.7
Unnamed Tributary to Catalpa Creek	0	1.8	Implicit	1.8
Unnamed Tributary to Gilmer Creek	0	1.2	Implicit	1.2
Shaw Creek	0	1.7	Implicit	1.7
Spring Creek	0	5.5	Implicit	5.5
Yellow Creek	0	21.0	Implicit	21.0

*tons per day at the effective discharge

5.5 Seasonality

The use of data collected throughout the year at multiple stations in each ecoregion to set the target addresses seasonal variation. Instantaneous flow and suspended-sediment data were used to develop the TMDL targets for each ecoregion. These data were collected throughout the year and would account for all seasons of the calendar year, changing atmospheric conditions (including rainy and dry seasons and high and low temperatures), and the periods representative of critical conditions.

6.0 CONCLUSION

The estimated existing loading of sediment for the listed waterbodies are higher than the TMDL target loads seen in Table 13. Therefore, it is recommended that the waterbody be considered for streambank and riparian buffer zone restoration and any sediment reduction BMPs, especially for the road crossings, agricultural activities, and construction activities. The implementation of these BMP activities should reduce the sediment load to the waterbody. The reduction of the sediment load to equal that of a relatively stable stream will allow the stream to approach stable conditions. This will provide improved habitat for the support of aquatic life in the waterbody and will result in the attainment of the applicable water quality standards.

Table 13: Tombigbee River Basin Sediment Loads

Subwatershed	Ecoregion	Area (Acres)	Estimated Load*	TMDL*	% Reduction
Chinchahoma Creek	65	15,610.34	31.22 to 842.96	11.7	62.5% to 98.6%
Unnamed Tributary to Catalpa Creek	65	2,410.08	4.82 to 130.14	1.8	62.7% to 98.6%
Unnamed Tributary to Gilmer Creek	65	1,730.90	3.46 to 93.47	1.2	62.3% to 98.6%
Shaw Creek	65	2,290.45	4.58 to 123.68	1.7	62.9% to 98.6%
Spring Creek	65	7,350.81	14.70 to 396.94	5.5	62.6% to 98.6%
Yellow Creek	65	28,023.30	56.05 to 1,513.26	21.0	62.5% to 98.6%

*tons per day at the effective discharge

This TMDL recommends that BMPs used to control the sediment be analyzed using SSC methodologies to ensure attainment of the target yields, which were established using SSC methodologies. While it is understood that monitoring is not a part of general permits for construction activities, the TMDL recommends that samples collected on sediment-impaired streams be analyzed for SSC as ecoregion loads derived by the National Sedimentation Laboratory were used to derive the target for this sediment TMDL.

6.1 Future Activities

MDEQ has adopted the Basin Management Approach, a plan that divides Mississippi's major drainage basins into four groups. Each of these basin groups is configured to represent approximately one-fourth of the state. The Basin Management Approach strategy is supported by various water quality monitoring activities that take place as part of the program support monitoring conducted by MDEQ and other resource partners that augments the statewide ambient monitoring network with supplemental monitoring sites in the large drainage basins. One objective of program support monitoring is to increase the total coverage of waters monitored in Mississippi and fill data gaps identified in the planning phase of the basin cycle. Concentrating monitoring and assessment resources in specific drainage basins maximizes sampling efficiency to achieve this objective and enhances collaboration among participating resource agencies. These waterbodies in the Tombigbee River Basin may receive additional monitoring to identify any changes or improvements in water quality. MDEQ recommends that any monitoring conducted in conjunction with the implementation of BMPs in this watershed be analyzed for SSC to ensure consistency with the TMDL target. For land disturbing activities related to silviculture, construction, and agriculture, it is recommended that practices, as outlined in *Mississippi's BMPs: Best Management Practices for Forestry in Mississippi* (MFC, 2000), *Planning and Design Manual for the Control of Erosion, Sediment, and Stormwater* (MDEQ, et. al, 2011), and *Field Office Technical Guide* (NRCS, 2000) be followed, respectively.

6.2 Public Participation

This TMDL will be published for a 30-day public notice. During this time, the public will be notified by publication in both a statewide and local newspaper. The public will be given an opportunity to review the TMDL and submit comments. MDEQ also distributes all TMDLs at the beginning of the public notice to those members of the public who have requested to be included on a TMDL mailing list. TMDL mailing list members may request to receive the TMDL reports through either, email or the postal service. Anyone wishing to become a member of the TMDL mailing list should contact Shawn Clark at sclark@mdeq.ms.us.

At the end of the 30-day period, MDEQ will determine the level of interest in the TMDL and make a decision on the necessity of holding a public meeting. All comments received during the public notice period and at any public meeting become a part of the record of this TMDL. All comments will be considered in the ultimate completion of this TMDL for submission of this TMDL to EPA Region 4 for final approval.

DEFINITIONS

Aggradation: The raising of the bed of a watercourse by the deposition of sediment.

Allocations: That portion of a receiving water's loading capacity that is attributed to one of its existing or future pollution sources (nonpoint or point) or to natural background sources.

Ambient Stations: A network of fixed monitoring stations established for systematic water quality sampling at regular intervals, and for uniform parametric coverage over a long-term period.

Anthropogenic: Pertains to the [environmental] influence of human activities.

Assimilative Capacity: The amount of contaminant load that can be discharged to a specific stream or river without violating the provisions of the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters and Water Quality* regulations. Assimilative capacity is the extent to which a body of water can receive wastes without significant deterioration of beneficial uses.

Background: Ambient pollutant concentrations due to natural sources, nearby sources other than the one currently under consideration, and unidentified anthropogenic sources.

Background Levels: Levels representing the chemical, physical, and biological conditions that would result from natural geomorphological processes such as weathering or dissolution.

Bank Full Stage: Stage of flow at which a stream fills its channel up to level of its bank. Recurrence interval averages 1.5 to 2 years.

Bedload Sediment: Portion of sediment load transported downstream by sliding, rolling, bouncing along the channel bottom. Generally consists of particles >1 mm.

Best Management Practices (BMPs): (1) The methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. (2) Methods have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

Calibration: Testing and tuning of a model to a set of field data. Also includes minimization of deviations between measured field conditions and output of a model by selecting appropriate model coefficients.

Channel: (1) A natural stream that conveys water; a ditch or channel excavated for the flow of water. (2) The water-filled groove through which runoff water flows. In a narrow valley the channel may include the entire valley floor, but ordinarily it occupies only a small fraction of the valley.

Channel Improvement: The improvement of the flow characteristics of a channel by clearing, excavation, realignment, lining, or other means in order to increase its capacity. Sometimes used to connote channel stabilization.

Channel Stabilization: Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, vegetation, and other measures.

Channelization: Straightening and deepening streams so that water will move faster, a marsh-drainage tactic that can interfere with waste assimilation capacity, disturb fish and wildlife habitats, and aggravate flooding.

Clean Sediment: Sediment that is not contaminated by chemical substances. Pollution caused by clean sediment refers to the quantity of sediment, as opposed to the presence of pollutant-contaminated sediment.

Critical Condition: The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence.

Cross-Sectional Area: Wet area of a waterbody normal to the longitudinal component of the flow.

Daily Discharge: The discharge of a pollutant measured during a 24-hour period that reasonably represents the day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

Designated Use: (1) Those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. (2) Those water uses identified in state water quality standards which must be achieved and maintained as required under the Clean Water Act.

Discharge Monitoring Report: Report of effluent characteristics submitted by a NPDES permitted facility.

Dissolved Solids: (1) The total amount of dissolved materials, organic and inorganic, contained in water or wastes. Excessive dissolved solids can make water unsuitable for industrial uses, unpalatable for drinking, and even cathartic. Potable water supplies must have dissolved solid content from 20 to 1000 mg/l, but sources which have more than 500 mg/l are not recommended by the U.S. Public Health Service. (2) Disintegrated organic and inorganic material in water. Excessive amounts make water unfit to drink or use in industrial processes.

Diurnal: Recurring daily. Diurnal indicates variations following a distinctive pattern and recurring from day to day.

Dynamic Model: A mathematical formulation describing and simulating the physical behavior of a system or a process and its temporal variability.

Ecoregion: A physical region that is defined by its ecology, which includes meteorological factors, elevation, plant and animal speciation, landscape position, and soils.

Effective Discharge: The channel-forming discharge or discharge which moves the most sediment. This value is obtained by combining flow frequency data with sediment transport data.

Effluent: (1) Any solid, liquid, or gas which enters the environment as a by-product of a man-oriented process. The substances that flow out of a designated source. Effluent, effluence, and efflux have the same meaning. (2) Wastewater – treated or untreated – that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Effluent Standards and Limitations: All State or Federal effluent standards and limitations on quantities, rates, and concentrations of chemical, physical, biological, and other constituents to which a waste or wastewater discharge may be subject under the Federal Act or the State law. This includes, but is not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, pretreatment standards, and schedules of compliance.

Flood Plain: (1) The lowland and relatively flat areas adjoining inland and coastal waters and other floodprone areas such as offshore islands, including at a minimum, the area subject to a one percent or greater chance of flooding in any given year. The base floodplain shall be used to designate the 100-year floodplain (one percent chance floodplain). The critical action floodplain is defined as the 500-year floodplain (0.2 percent chance floodplain). (2) The portion of a river valley that becomes covered with water when the river overflows its banks at flood stage. (3) The flat or nearly flat land along a river or stream or in a tidal area that is covered by water during a flood.

Fluvial Geomorphology: The study of landforms and processes associated with rivers.

Geomorphology: The study of the Earth's landscapes and landforms, the processes by which the landforms originated, their age, and the nature of the materials underlying them.

Gully Erosion: (1) Severe erosion in which trenches are cut to a depth greater than 30 centimeters (1 ft). Generally, ditches deep enough to cross with farm equipment are considered gullies. (2) The widening, deepening, and cutting back of small channels and waterways due to erosion.

Impaired Waterbody: Any waterbody that does not attain water quality standards due to an individual pollutant, multiple pollutants, pollution, or an unknown cause of impairment.

Surface Runoff: Precipitation, snow melt, or irrigation in excess of what can infiltrate the soil surface and be stored in small surface depressions; a major transporter or nonpoint source pollutants.

Load Allocation (LA): The portion of a receiving water's loading capacity attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.

Loading: The portion of a receiving water's loading capacity attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loads should be distinguished.

Mass Wasting: Downslope transport of soil and rocks due to gravitational stress.

NPDES Permit: An individual or general permit issued by the MDEQ Permit Board pursuant to regulations adopted by the Commission under Mississippi Code Annotated (as amended) § 49-17-17 and § 49-17-29 for discharges into State waters.

Narrative Criteria: Nonquantitative guidelines that describe the desired water quality goals.

Natural Waters: Flowing water within a physical system that has developed without human intervention, in which natural processes continue to take place.

Nonpoint Source: The pollution from sources which generally are not controlled by establishing effluent limitations under sections 301, 302, and 402. Nonpoint source pollutants are not traceable to a discrete identifiable origin, but generally result from land runoff, precipitation, drainage, or seepage. This water may contain pollutants that come from land use activities such as agriculture, construction, silviculture, surface mining, disposal of wastewater, hydrologic modifications, and urban development.

Numeric Target: A measurable value determined for the pollutant of concern which, if achieved, is expected to result in the attainment of water quality standards in the listed waterbody.

Phased Approach: Under the phased approach to TMDL development, load allocations and wasteload allocations are calculated using the best available data and information recognizing the need for additional monitoring data to accurately characterize sources and loadings. The phased approach is typically employed when nonpoint sources dominate. It provides for the implementation of load reduction strategies while collecting additional data.

Point Source: Pollution from a stationary location or fixed facility from which pollutants are discharged or emitted. Pollution from any single identifiable source, e.g., a pipe, ditch, ship, ore pit, or factory smokestack.

Pollutant: Includes, but not limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may be reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the term pollutant or contaminant shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

Pollution: Generally, the presence of matter or energy whose nature, location, or quantity produces undesired environmental effects. Under the Clean Water Act, for example, the term is defined as man-made or man-induced alteration of the physical, biological, and radiological integrity of water. Other pollution related terms include: agricultural pollution, air pollution, indoor air pollution, industrial waste pollution, manmade air pollution, natural pollution, noise pollution, oil pollution, sewage pollution, soil pollution, thermal pollution, water pollution, and wood burning stove pollution.

Reference Sites: Waterbodies that are representative of the characteristics of the region and subject to minimal human disturbance.

Scouring: The removal of earth or rock by the action of running water or of a glacier.

Sediment: (1) The unconsolidated inorganic and organic material that is suspended in and being transported by surface water, or has settled out and deposited into beds. (2) Soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers, and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight cannot reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall.

Sediment Delivery: Contribution of transported sediment to a particular location or part of a landscape.

Sediment Production: Delivery of colluvium or bedrock from hillslope to stream channel. The production rate is evaluated as the sum of the rates of colluvial bank erosion and sediment transport across channel banks.

Sediment Yield: The quantity of sediment arriving at a specific location.

Sedimentation: Process of deposition of waterborne or windborne sediment or other material; also refers to the infilling of bottom substrate in a waterbody by sediment (siltation).

Sheet Erosion: Also Sheetwash. Erosion of the ground surface by unconcentrated (i.e. not in rills) overland flow.

Sheetwash: Also Sheet Erosion. Erosion of the ground surface by unconcentrated (i.e. not in rills) overland flow.

Stage: The height of a water surface above an established datum plane.

Stream Restoration: Various techniques used to replicate the hydrological, morphological, and ecological features that have been lost in a stream due to urbanization, farming, or other disturbance.

Surface Runoff: Precipitation, snow melt, or irrigation in excess of what can infiltrate the soil surface and be stored in small surface depressions; a major transporter or nonpoint source pollutants.

Suspended Solids: Organic and inorganic particles (sediment) suspended in and carried by a fluid (water). The suspension is governed by the upward components of turbulence, currents, or colloidal suspension. Suspended-sediment usually consists of particles <0.1 mm, although size may vary according to current hydrological conditions. Particles between 0.1 mm and 1 mm may move as suspended or be deposited (bedload).

Thalweg: Deepest part of a stream channel.

Topography: The physical features of a geographic surface area including relative elevations and the positions of natural and man-made features.

Total Maximum Daily Load or TMDL: (1) The total allowable pollutant load to a receiving water such that any additional loading will produce a violation of water quality standards. (2) The sum of the individual waste load allocations and load allocations. A margin of safety is included with the two types of allocations so that any additional loading, regardless of source, would not produce a violation of water quality standards.

Turbidity: (1) A measure of opacity of a substance; the degree to which light is scattered or absorbed by a fluid. (2) A cloudy condition in water due to suspended silt or organic matter.

Waste: Useless, unwanted, or discarded material resulting from (agricultural, commercial, community, and industrial) activities. Wastes include solids, liquids, and gases.

Wasteload Allocation (WLA): (1) The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality based effluent limitation. (2) The portion of a receiving water's total maximum daily load that is allocated to one of its existing or future point sources of pollution. (3) The maximum load of pollutants each discharger of waste is allowed to release into a particular waterway. Discharge limits are usually required for each specific water quality criterion being, or expected to be, violated. The portion of a stream's total assimilative capacity assigned to an individual discharge.

Water Quality Criteria: Specific levels of water quality which, if reached, are expected to render a body of water suitable for its designated use. The criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, fish production, or industrial processes. Water quality criteria are comprised of numeric and narrative criteria. Numeric criteria are scientifically derived ambient concentrations developed by EPA or States for various pollutants of concern to protect human health and aquatic life. Narrative criteria are statements that describe the desired water quality goal.

Water Quality Standards: (1) Provisions of State or Federal law which consist of a designated use or uses for the water quality criteria for such waters based upon such uses. Water quality standards are to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Clean Water Act. (2) A law or regulation that consists of the beneficial designated use or uses of a waterbody, the numeric and narrative water quality criteria that are necessary to protect the use or uses of that particular waterbody, and an antidegradation statement. (3) State-adopted and EPA-approved ambient standards for waterbodies. The standards prescribe the use of the waterbody and establish the water quality criteria that must be met to protect designated uses.

Waters of the State: All waters within the jurisdiction of this State, including all streams, lakes, ponds, wetlands, impounding reservoirs, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, situated wholly or partly within or bordering upon the State, and such coastal waters as are within the jurisdiction of the State, except lakes, ponds, or other surface waters which are wholly landlocked and privately owned, and which are not regulated under the Federal Clean Water Act (33 U.S.C.1251 et seq.).

Watershed: (1) The land area that drains (contributes runoff) into a stream. (2) The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common delivery point.

ABBREVIATIONS

ARS .... Agricultural Research Service

BMP .... Best Management Practice

CWA .... Clean Water Act

CWPRU .... Channel and Watershed Processes Research Unit

EPA .... Environmental Protection Agency

HUC .... Hydrologic Unit Code

LA .... Load Allocation

MARIS .... Mississippi Automated Resource Information Service

MDEQ .... Mississippi Department of Environmental Quality

MFC .... Mississippi Forestry Commission

MOS .... Margin of Safety

MS4 .... Municipal Separate Storm Sewer System

NPDES .... National Pollution Discharge Elimination System

NRCS .... Natural Resource Conservation Service

NSL .... National Sedimentation Laboratory

SSC .... Suspended Sediment Concentration

TMDL .... Total Maximum Daily Load

TSS .... Total Suspended Solids

USGS .... United States Geological Survey

WLA .... Wasteload Allocation

WWTP .... Wastewater Treatment Plant

NLCD .... National Landuse/ Land Cover Dataset

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