Upper Piney Creek Watershed Plan
9 Key Element Plan
HUC 080302060704
MWS 9223
GY 22 Project Area
Version 0 (9/21/2022)

Element a: Identification of Causes and Sources of Impairment

The Upper Piney Creek Watershed (MWS 9223) is located in the Northeastern portion of Yazoo County, just east of Yazoo City, in North Central Mississippi covering approximately 31,154 acres. This watershed includes Piney Creek from the headwaters to the watershed boundary. Piney Creek serves as the mainstem drainage for the watershed and flows west from the headwaters to the watershed boundary. The watershed includes several smaller unnamed intermittent streams and some small ponds. According to the 2019 National Land Cover Database (NLCD), the landuse within this watershed is comprised of approximately 64% forestland, 20% pastureland, 9% cropland, and 7% other (water, scrub/barren, wetland, and urban) as depicted in Figure 1.

The water-use classification for Piney Creek and all water bodies in the Upper Piney Creek watershed, as established by *Regulations for Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2021), is *Fish and Wildlife.* Waters with this classification are intended for fishing and propagation of fish, aquatic life, and wildlife. Waters that are classified as *Fish and Wildlife* should also be suitable for secondary contact recreation, which is defined as incidental contact with water including wading and occasional swimming.

Piney Creek (MS366E) has a long history with Mississippi's Section 303(d) List of Impaired Water Bodies. The entire length of the stream (11 miles) from the headwaters in the Upper Piney Creek watershed to the mouth at the Yazoo River was listed as impaired. Originally, the segment was listed based on an "evaluated" assessment in 1998 due to pesticides, pathogens, nutrients, siltation, and organic enrichment/low dissolved oxygen based primarily on review of anecdotal information and not actual monitoring data. This waterbody remained on the list until Total Maximum Daily Load (TMDL) estimates for sediment and pathogens were developed for Piney Creek. Total Maximum Daily Loads, TMDLs, are pollution budgets. A TMDL determines how much of a pollutant can be present in a stream, river, or lake without negatively affecting aquatic life or public health. The portion of MS366E that falls within the Upper Piney Creek watershed is shown in Figure 1.

In order to make water quality assessments on wadeable streams outside of the Mississippi Alluvial Plain, MDEQ uses a calibrated and verified index of biological integrity (IBI) referred to as the Mississippi Benthic Index of Stream Quality (M-BISQ). Using biological community data and comparing it to the attainment thresholds from the M-BISQ, Piney Creek was assessed as impaired (segment MS366E) for Aquatic Life Use Support due to biological impairment in 2002. Due to this determination, the evaluated causes of pesticides, nutrients, siltation, and organic enrichment/low dissolved oxygen (DO) based primarily on review of evaluated anecdotal information and not monitoring data were removed and MS366E was included on the 2002 §303(d) List of Impaired Water Bodies for biological impairment.

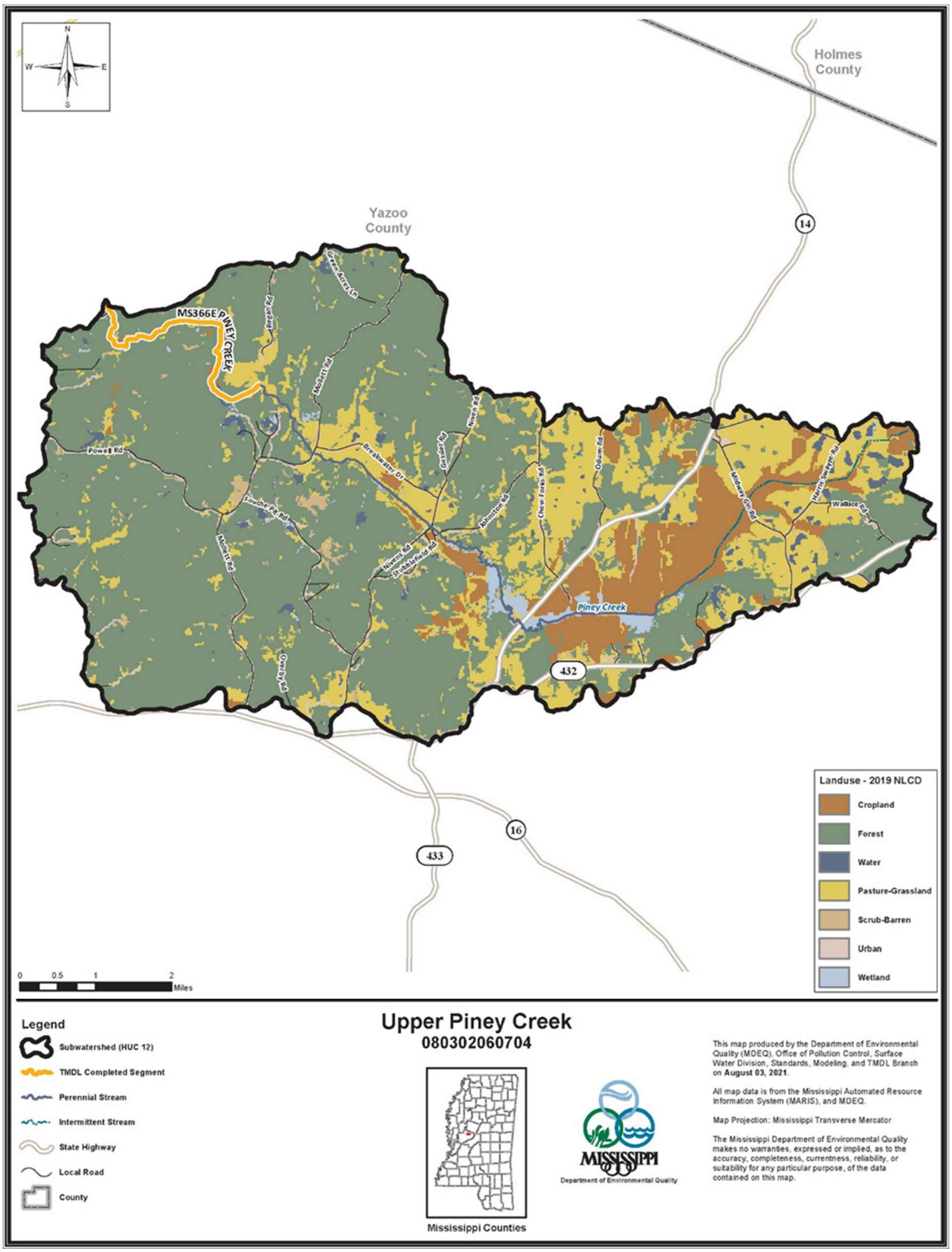

Figure 1: Landuse Distribution in the Upper Piney Creek Watershed

There are two TMDLs for the Piney Creek segment MS366E; one for sediment and another for pathogens. The *Fecal Coliform TMDL for Piney Creek* (MDEQ, 2008), was developed for the entire segment of Piney Creek. This TMDL requires all NPDES permitted discharges of fecal coliform to meet water standards for disinfection and recommends reducing fecal coliform contributions that occur as a result of cattle access to streams and failing septic systems in the watershed.

MDEQ has a strong team of scientists and engineers focused on evaluating water quality data and identifying stressors in water bodies that have been listed as being biologically impaired using benthic macroinvertebrate community data. When biological community data indicate that a water body segment is impaired, an investigative, stressor identification analysis using strength-of-evidence approach is conducted to determine the cause(s) of the impairment. Such causes may range from specific pollutants (e.g. Total Nitrogen) to other causes of pollution such as sedimentation, habitat loss or hydrologic alteration. In most cases, nonpoint sources contribute to, or are the primary causes of impairment. MDEQ relies upon all available monitoring and assessment data and conducts additional monitoring to gather the necessary data and information to help determine both the causes and sources of impaired waters. The *U.S. Environmental Protection Agency (EPA) Stressor Identification Process and Stressor Identification Guidance Document* (USEPA, 2000), is used to identify the most probable stressors causing biological impairment thereby providing the information necessary to develop required TMDLs that will guide restoration activities. A stressor identification study was conducted on Piney Creek in 2007. The results of this analysis indicate that sediment is the primary probable pollutant causing the aquatic life use impairment to the stream. This information was used to develop a TMDL for sediment.

Piney Creek (MS366E) is included in the *Total Maximum Daily Load Yazoo River Basin Hills Region for Impairment Due to Sediment* (MDEQ, 2020). There are no facilities in the Upper Piney Creek Watershed with NPDES permits that include limits for Total Suspended Solids (TSS) which is used as an indicator of sediment contributions from permitted activities. The pollutant of concern in the Upper Piney Creek watershed is sediment from land-use runoff. Certain contaminants may be associated with sediment such as pesticides and nutrients. These contaminants were not addressed directly within the sediment TMDL. However, these contaminants would also be controlled by the same best management practices (BMPs) that control the sediment from nonpoint sources of pollution. This TMDL calls for a 99% reduction in sediment. Nonpoint loading of sediment in a water body results from the transport of 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, in-channel and instream sources, and historical land use activities and channel alterations.

Figure 2 shows the location of the impaired segment along with the water quality monitoring locations on Piney Creek.

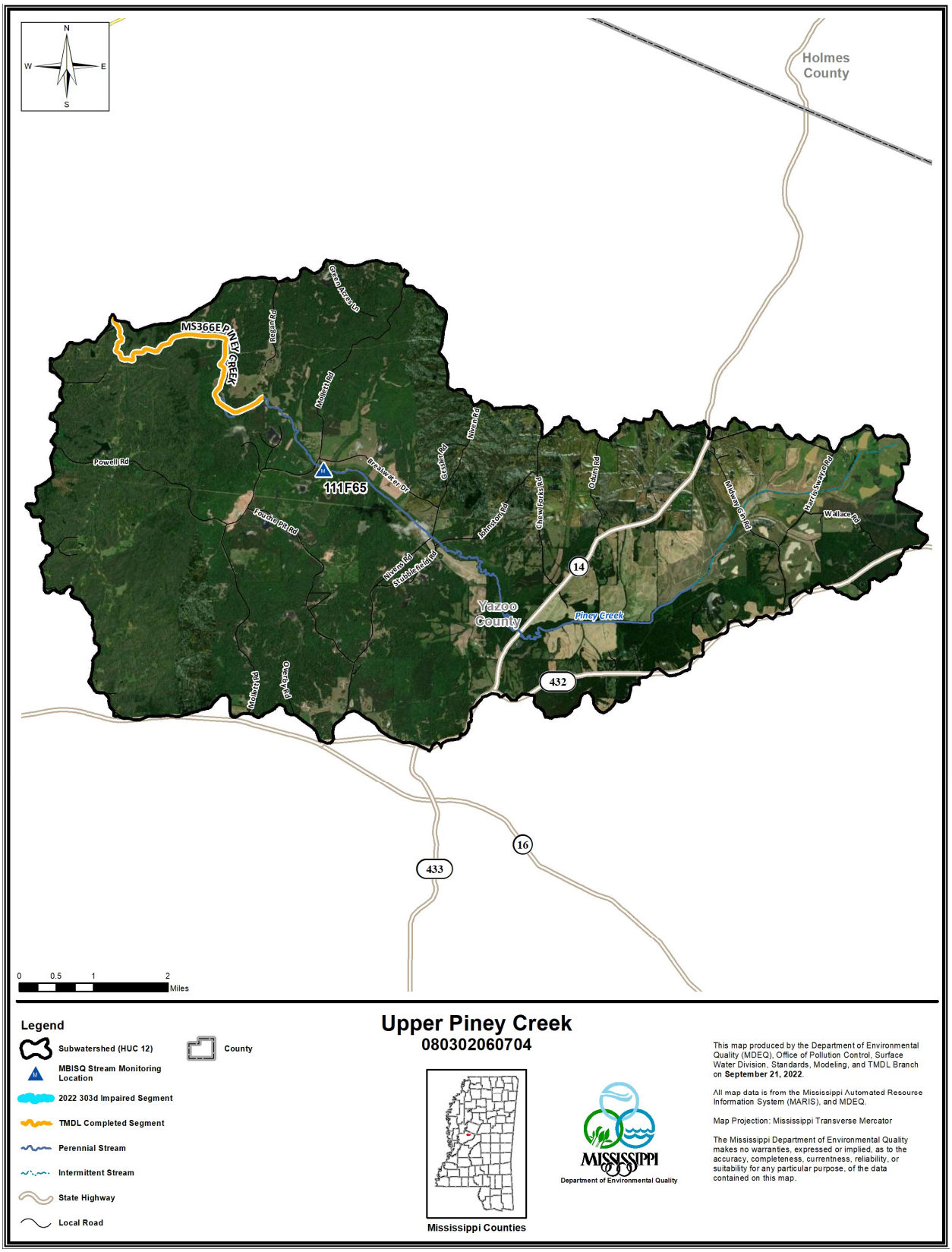

Figure 2: Impaired Segment and Monitoring Sites in the Piney Creek Watershed

Element b: Expected Load Reduction

The *Fecal Coliform TMDL for Piney Creek* (MDEQ, 2008) requires all NPDES permitted discharges of pathogens to meet water standards for disinfection and recommends reducing overall contribution of pathogens from nonpoint sources by 15%. The TMDL further recommends the implementation of education projects to teach best management practices to better control nonpoint sources of pathogens.

The *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2021) regulation does not include a numerical water quality standard for aquatic life protection due to sediment. 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 the sediment TMDL is based on reference sediment yields developed by the USDA Agricultural Research Service's Channel and Watershed Processes Research Unit (CWPRU) at the National Sedimentation Laboratory (NSL). Based on the ranges of stable and unstable yield values, a reduction in sediment of 99% is recommended for the Piney Creek Watershed.

The MDEQ will work with agency resource partners to identify and implement BMPs to address pathogen and sediment concerns in the Upper Piney Creek Watershed. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has a list of approved BMPs to address pathogen and sediment issues and this list will be used to identify candidate BMPs in the Upper Piney Creek watershed. Conservation practices that address sediment often provide an additional benefit in the reduction of nutrients as they attach to sediment particles in run-off. Practices approved by NRCS will be used to identify candidate BMPs in the Upper Piney Creek watershed.

Element c: Proposed Management Measures

Coordinating partners with MDEQ include the Mississippi Soil and Water Conservation Commission (MSWCC), the Natural Resource Conservation Service (NRCS), and the local Soil and Water Conservation Districts (SWCDs) throughout the state. These SWCDs are typically housed within USDA Service Centers co-located with NRCS offices. These partners have been coordinating with local stakeholders to gauge landowner interest and based on their expertise, have identified a suite of BMPs that should be effective in addressing nonpoint source pollution sources in the Upper Piney Creek Watershed.

Staff from MSWCC and the SWCD depend upon assistance from their NRCS partners in determining landowner interest in the watershed because they are present on the farms and in the fields with local landowners. These staff members also understand the conservation needs at the local level and have knowledge of unfunded applications for federal program assistance which meet Section 319 eligibility requirements. At present, the Upper Piney Creek Watershed has TMDLs for sediment and pathogens. Based on previous experience in watersheds with similar impairments, our partners recommend installation of the following BMPs to help mitigate sediment and pathogen issues in the Upper Piney Creek Watershed: cover crop planting, grade stabilization, streambank and shoreline protection, and structures for water control. Factors considered for determining specific locations for the placement of BMPs included the following attributes based upon best professional judgement of trained NRCS, SWCD and MDEQ Staff:

1. Likely water quality benefit;
2. Willingness of landowners to participate;
3. Implementation of the recommendations of the TMDLs;
4. Ease of showing effectiveness of the BMP(s) through monitoring;
5. Shorter length of time for anticipated results (i.e., within the grant period).

Upon receipt of funding, MDEQ will coordinate with the field staff from MSWCC in Yazoo County to target implementation in priority areas, and then move to other areas as funds allow. A map depicting the landuse can be found in Figure 1 and recent imagery in Figure 2. Additional considerations for prioritization of BMPs included the positioning of BMPs with willing landowners; the increased likelihood for leveraging of in-kind services; and proximity to pollutant sources to Piney Creek.

Element d: Technical and Financial Assistance

As part of any Section 319 funded project, MDEQ requires a 40% match in project areas. This match may be in the form of actual dollars or may be provided as "in-kind" to project activities. Partners in this project who may contribute match include MSWCC, Yazoo County Soil and Water Conservation District, NRCS, and/or local landowners and operators. For project implementation, administration, management, and watershed plan revision, as well as hosting and facilitating team meetings, MDEQ plans to work under a memorandum of agreement (MOA) with the MSWCC to implement this project. Project partners provided the funding amounts used to estimate costs for BMP installation. Provided below is summary of estimated costs for potential BMPs and overall project implementation:

Cost Estimate: Full Project Implementation

BMPs	Amount	Estimated Cost
Grade Stabilization Structure	85 ea.	$1,068,330
Cover Crops	400 ac	$30,800
Structure for Water Control	20,000 lnft	$80,000
Streambank and Shoreline Protection	867 cy	$141,321
Technical Assistance*	N/A	$45,000
Education and Outreach*	N/A	$28,000
Monitoring*	N/A	$25,760
Project Management, Implementation, Coordination, Plan Revision*		$135,000
Total Estimated Cost		**$1,554,211**

NOTE: Conservation Best Management Practices provide a 40% match at a minimum
*Denotes fields that are estimated upon three incremental funding cycles of the project

Due to the magnitude of BMP needs, this project will need to be funded incrementally using multiple sources of funds. To fully address all suggested conservation needs in the watershed,

this plan recommends funding be provided in 3 increments. To maximize education and outreach activities and monitoring efforts, MDEQ plans to leverage with existing programs already allocated for funding where possible.

Below is the estimated budget for the first incremental funding (Phase 1) of this project:

Cost Estimate: Phase 1 Implementation:

BMPs	Amount	Estimated Cost
Grade Stabilization Structure (med. Flow/med. Fill)	25 each	$235,550
Cover Crops	200 ac	$15,400
Streambank and Shoreline Protection	367 cy	$59,821
Technical Assistance	N/A	$15,000
Education and Outreach	N/A	$12,800
Monitoring	N/A	$19,500
Project Management, Implementation, Coordination, Plan Revision		$51,160
Total Estimated Phase 1 Cost		**$409,231**

NOTE: Conservation Best Management Practices provide a 40% match at a minimum.

Element e: Information and Education

The MDEQ, in cooperation with numerous federal, state, and local stakeholders has developed diversified information/education programs, best management practices manuals, literature, books, videos, and public service announcements that address pollutants from the seven (7) major landuse categories of nonpoint source pollution: agriculture, construction, forestry, on-site waste water disposal, surface mining, urban storm water runoff, and hydrologic modification. Audiences from pre-school to adults throughout the state are reached with a variety of mature, well-designed programs each year. These programs, events, manuals and literature can be used in the Upper Piney Creek Watershed project by tailoring them to address pollutants of concern. A positive approach is used to reach the full diversity of people in the community with projects that foster a "sense of place", a "sense of pride in community", and a sense of the native plants, animals, and general ecology of their region. Stakeholders and coordinators join together to participate in problem-solving, brainstorming, plan development, training workshops, soil and water conservation field days and other activities that promote collaboration and ownership of the watershed, as well as solutions to its problems. The ultimate goal is to bring about behavior changes and the use of "best management practices" that will improve water quality and the overall quality of life in the watershed. Evaluation forms, pre-test/ post-test, surveys, and reporting of the number of people who attend workshops, trainings and events are among the methods used to measure the success of education/information programs. A partial list of MDEQ's programs that could be used in the Upper Piney Creek watershed are listed below:

- **Water Model Presentations** - Enviroscapes and groundwater aquifer models distributed statewide with training and related interactive lesson plans.

- **Teacher workshops –** train educators in proximity to the watershed about NPS pollution and provide materials and information that can be used in their classrooms.
- **Adopt A Stream -** workshops and training venues for citizens, teachers, and students in the watershed.
- **Mobile Classroom Education and Outreach Events** - for school ages kindergarten –5th grade students.
- **"Waste Pesticide Disposal Event" -** The primary goal of this program is to help Mississippi farmers and property owners minimize the environmental risks associated with the disposal of waste-pesticide products by disposing of products in a safe and efficient manner.

As part of the education outreach efforts, the stakeholder group forming the Upper Piney Creek Watershed Implementation Team (WIT) will participate in collaborative meetings. The purpose of the meetings will be to identify partners, update the watershed plan, and host field days to showcase the implemented BMPs for the public. In concert with these WIT meetings, and to incentivize stakeholder participation, project funding will be used to purchase food and other refreshments for the WIT along with providing support for renting facilities in which to host those events. In accordance with 41 CFR § 301-74.11, light refreshments, meals, and/or beverages are an allowable expense under CWA Section 319, provided a description of the agenda, purpose, location, costs, etc., are outlined in an approved 319 grant workplan. At this time the exact number of participants and locations are not known therefore costs have been estimated for the purposes of this plan and will be updated.

Element f: Implementation Schedule

The following schedule describes the approaches and tasks that will be undertaken with project partners to advance and implement this watershed-based plan. During this effort, resource agency partners will work with the Watershed Implementation Team and MDEQ Project Manager (where applicable), to perform the tasks identified below:

1. Work to develop, execute, and implement a Subgrant Agreement that specifies the roles, tasks, requirements, and milestones for project implementation. (Month 1)

2. Facilitate, in coordination with MDEQ and other partners, meetings, media and social media promotion of the project, and coordinate activities to fully implement this plan. (Months 1-36)

3. Work with the Yazoo County SWCD, MSWCC, NRCS, and MDEQ to inform landowners and operators within the watershed about the project and work to secure commitments from priority area landowners and operators who are willing to participate in the project. (Months 1-6)

4. Work with the local SWCD, MSWCC, NRCS, and MDEQ to determine through GIS applications and intensive site surveys the priority areas within the sub-watershed that are contributing significant pollutant loads. All BMPs shall be installed in

accordance with the guidelines developed in the latest edition of the NRCS Technical Field Manual, or other approved guidelines. (Months 1-36)

5. Facilitate, in cooperation with MDEQ and other monitoring partners, the completion and implementation of an effective and efficient plan to collect monitoring data and information to measure changes in water quality resulting from the BMPs implemented through this project. Months 3-36

6. Submit blank copies of standard maintenance agreements to MDEQ. (Months 3-36)

7. Conduct inspections of BMPs during construction (Months 3-36)

8. Coordinate with and support the local SWCD, MSWCC and NRCS in the collection of relevant GPS coordinates of all installed BMPs and incorporate this information into a GIS format. All geospatial data shall be collected in a manner consistent with the Federal Geographic Data committee-endorsed standards. (Months 3-36)

9. Collect adequate photo documentation before, during, and after installation of the approved BMPs. (Months 3-36)

10. Report measured, or estimated, nonpoint source pollutant load reduction, acreage affected, pre-and post- site conditions, and GIS data. (1-36)

Element g: Milestones and Outcomes

Milestone	**Outcome**	**Probable Completion Date**
Coordinate with the MDEQ, NRCS, MSWCC, and the Yazoo Co. Soil and Water Conservation District to determine priority areas that are contributing significant pollutant loads to Upper Piney Creek	Target priority areas for BMPs	Month 1-6
Establish Watershed Implementation Team.	Establish WIT	Month 1-2
Initiate watershed monitoring	Baseline Condition Monitoring	Completed using historical data
Meet with landowners and cooperators to secure commitments to install BMPs in priority areas	Landowner Commitment	Months 1-36
Establish routine meeting schedule for WIT to support WBP revision	WIT Meetings	Months 1-36
Implement BMPs	BMP Instillation	Months 6-36
Coordinate with Landowners to inspect BMPs that were installed using Section 319 funds	BMP Inspection	Months 6-36

Begin monitoring to collect data on post-BMP water quality	Post-BMP Monitoring	Months 40-48
Implement education and outreach plan	Education/Outreach events scheduled	Months 8-36
Finalize revised WBP	Final Revised WBP	Months 30-36

Goal: Reduce pathogen and sediment loads entering waters in the Upper Piney Creek Watershed.

Element h: Load Reduction Evaluation

According to the *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters* (MDEQ, 2021), waters in the Upper Piney Creek Watershed are classified for Fish and Wildlife Use. As such, waters in this classification must meet the aquatic life designated use and the secondary contact recreation designated use. Although the TMDL was developed using fecal coliform as the indicator for pathogens, in 2015, MDEQ updated the water quality criteria for recreational waters. With this update, the pathogen indicator was changed from fecal coliform to *e.coli*. In compliance with the current water quality criteria, *e. coli* will be used as the pathogen indicator for all bacteriological monitoring.

Mississippi's water quality criteria do not include a water quality standard applicable to aquatic life protection due to sediment. However, a narrative standard for the protection of aquatic life was interpreted to determine an applicable target for the sediment 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. In lieu of numeric criteria for sediment, monitoring will be conducted to collect data on parameters that are considered surrogates for sediment (Total Suspended Solids, Total Suspended Sediment, turbidity) and nutrients (chlorophyll-a) along with conventional in-situ parameters generally measured to determine aquatic health (e.g. Dissolved Oxygen, pH, Temperature, Conductivity, Dissolved Solids) will also be obtained. In addition, *e. coli* monitoring will be conducted. The following thresholds will be used to measure compliance applicable with water quality criteria and/or target thresholds:

Success Measurement Thresholds:

Parameter	**Threshold**
Dissolved Oxygen	Daily Average of 5.0 mg/L; Instantaneous threshold of 4.0 mg/L
Dissolved Oxygen % Sat.	$\geq$ 70% - $\leq$ 125%
pH	6.0-9.0
Temperature	Not to exceed 90°F
Specific Conductance	Less Than 1000 micromhos/cm
Dissolved Solids	Monthly average less than 750 mg/L; instantaneous threshold less than 1500 mg/L
Chemical Oxygen Demand	<50 mg/l

Turbidity	<100 NTU
Total Suspended Solids	<80 mg/l
E. coli	30-day geometric mean of 126 per 100 ml; samples during 30-day period should not exceed 410 per 100 ml more than 10% of the time
M-BISQ South Bluff Bioregion	Assessment threshold 55.7 (25th percentile of reference condition)

In addition to chemical data, biological community data and in stream habitat surveys will be collected over the course of the project to determine attainment of the Aquatic Life Designated Use. These data are extremely helpful in identifying positive trends in water quality and should provide information to help determine if the implementation activities are resulting in water quality improvements. Mississippi uses a calibrated and verified index of biotic integrity to make water quality assessment decisions. This index, the Mississippi Benthic Index of Stream Quality (M-BISQ), was originally developed in 2000 and has undergone three recalibration efforts to refine the sensitivity of the index. As part of the index development process, the state was divided into unique bioregions. Within each bioregion, the index has a defined attainment threshold that is used to determine if the biological community measures collected at a site are representative of good water quality that can support a balanced benthic macroinvertebrate community. If the score is above the attainment threshold for the bioregion, the site is assessed as attaining the aquatic life use designation. Piney Creek is in the South Bluff bioregion and the attainment threshold is 55.7. Along with overall MBISQ scores, the in-stream habitat surveys will also be used to determine change over time.

It should be noted that recovery time of a stream is variable and may extend beyond the timeframe identified in the workplan. At the end of the project, data will be analyzed to determine if the data indicate improvements to water quality in Piney Creek. In the event data indicate little or no positive change, a Stressor Analysis will be conducted to determine if any new or additional stressors are preventing improvements to water quality. If any new stressors are identified, the Watershed Implementation Team will identify future actions/activities to address those stressors.

Element i: Monitoring

Prior to BMP installation, pre-implementation water quality chemical and biological monitoring was collected in 2022 to serve as baseline data for the project. Water quality monitoring included water chemistry data (nutrients, suspended solids, oxygen demand, chlorides, etc.), in-situ field measurements for such parameters as dissolved oxygen, pH, temperature, specific conductance, and turbidity, as well as biological community monitoring for benthic macroinvertebrates. A list of this historical water quality monitoring in the Upper Piney Creek Watershed is provided in the table below and their sample locations are shown in Figure 2.

Station ID	Water Body	Sample Year(s)	Collecting Agency	Project	Water Chem	In-Situ	Sonde	Benthics
111F65	Piney Creek	2022	MDEQ	M-BISQ	X	X		X

Post-BMP monitoring locations will be selected using best professional judgment and will be targeted to reflect water quality downstream of BMP activity. Once BMP installation is complete, and there has been sufficient time for the stream to stabilize, post BMP monitoring will be initiated. Post BMP monitoring will be conducted in a way that allows for comparison with the pre-implementation data. Because recovery periods of streams can be dependent on type and amount of BMPs installed, more than 1 year of post BMP data may be needed to observe a change in water quality. In some cases, it may take 5 or more years to see full benefits of BMPs. All data collection efforts will be conducted using trained personnel following established Standard Operating Procedures and adhering to agency Quality Assurance protocols.