

Basket Creek-Hickahala Creek Watershed Plan**9 Key Elements****HUC 080302040403****MWS 9105****GY17 Proposed Project Area****September 20, 2018****Element a: Identification of Causes and Sources of Impairment**

The Basket Creek-Hickahala Creek watershed is located in Tate County and covers 35,085 acres. This watershed contains many landuse types including agricultural land, pastureland, and forest areas; however, the dominant landuses identified in the 2011 National Land Cover Database (NLCD) within the watershed are cropland (11%), forest (17%) and pasture/grass (44%) (Figure 1).

The Basket Creek-Hickahala Creek Watershed has a long history with Mississippi's Section 303(d) List of Impaired Waters. The identification of water bodies not meeting their designated use and the development of total maximum daily loads (TMDLs) for those water bodies are required by Section 303(d) of the Clean Water Act (CWA) of the Environmental Protection Agency's (EPA) Water Quality Planning and Management Regulation (40 CFR part 130). The TMDL process is designated to restore and maintain the quality of those impaired water bodies through the establishment of pollutant specific allowable loads. Hickahala Creek Drainage Area (DA) (MS305E) was included on MS's 1996 and 1998 Section 303(d) List as an "evaluated" impairment versus "monitored" impairment as there were no water quality data to verify impairment status of the stream. In 2000, MDEQ developed a comprehensive biological monitoring program to add another assessment tool their monitoring program as well as address the large number of "evaluated" water bodies on the state's Section 303(d) List. As part of this effort, a robust multi-metric benthic macroinvertebrate index, the Mississippi Benthic Index of Stream Quality (M-BISQ), was developed for wadeable streams outside of the MS Alluvial Plain. Using biological data, the evaluated listings for pesticides and sedimentation/siltation were replaced with biological impairment. The biological impairment was determined to be caused by nutrients and organic enrichment/low dissolved oxygen and in 2003, a [TMDL](#) was developed to address those pollutants.

A segment of Hickahala Creek (MS305M2) was also included on the "monitored" portion of MS's 1998 Section 303(d) List of Impaired Water Bodies. This segment, along with a segment of James-Wolf Creek (MS305M1) that flows into the watershed and confluences with Hickahala Creek from the southwest, was assessed as impaired for recreational use due to high levels of fecal coliform in the water. A [fecal coliform TMDL](#) for Hickahala Creek was developed in 2003 to address the pathogen impairment. Figure 2 shows the extent of all three impaired reaches in the watershed (MS305E, MS305M2, and MS305M1).

There are five facilities in the Basket Creek-Hickahala Creek watershed listed with NPDES permits. Only two of the five permits remain active.

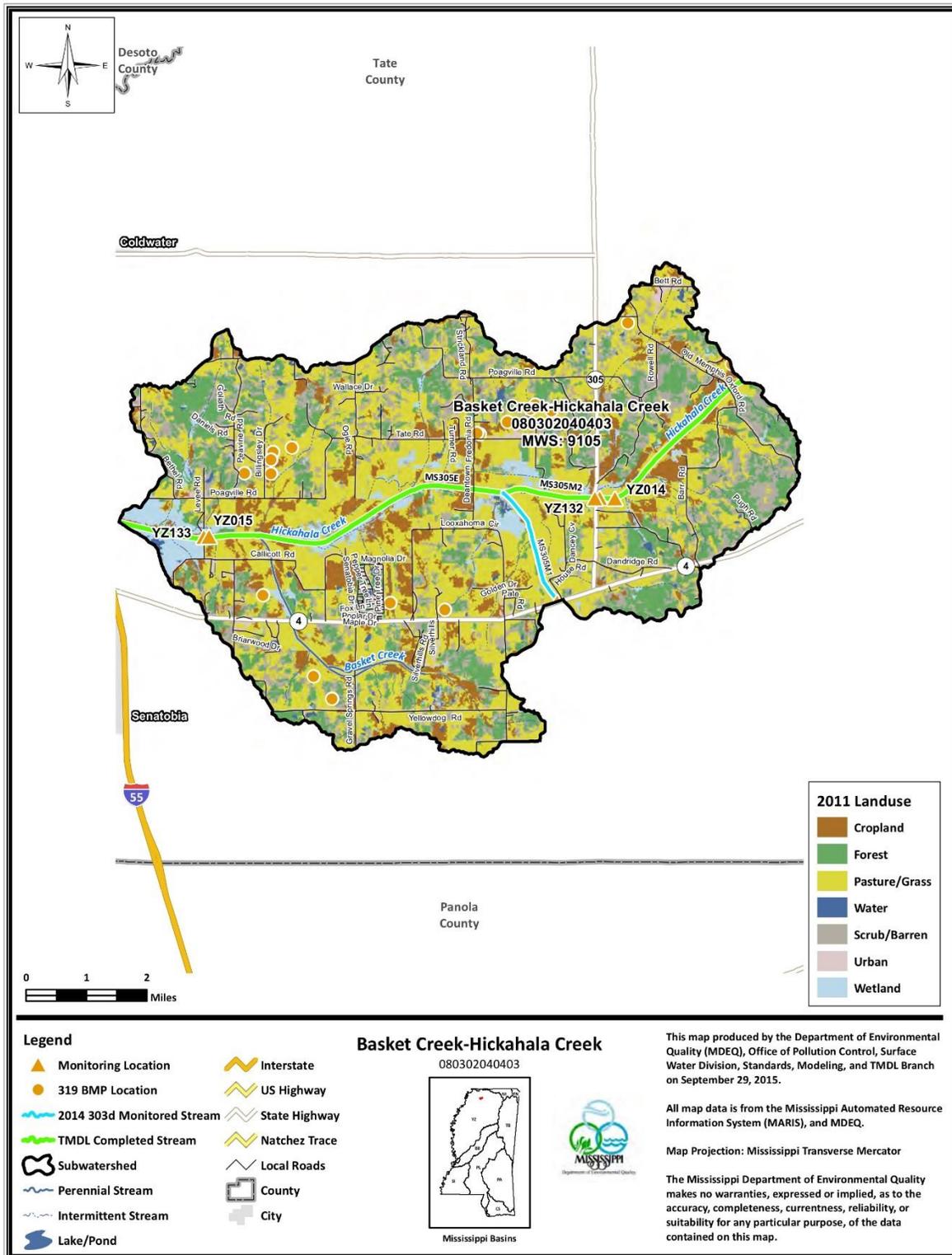


Figure 1: Basket Creek-Hickahala Creek Watershed Landuse Map, 2011 NLCD

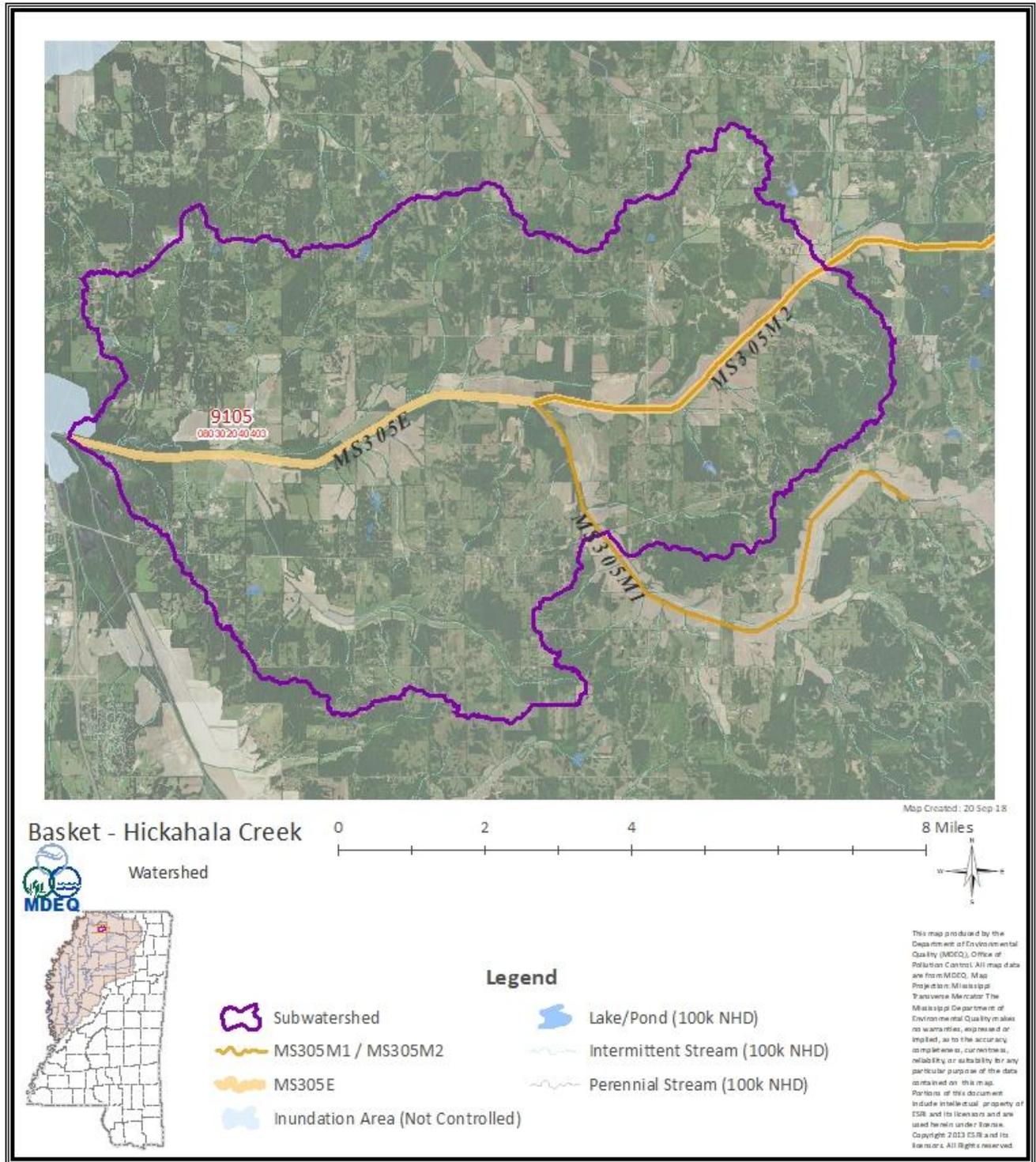


Figure 2: Basket Creek Segments (MS305E, MS305M1, and MS305M2)

Element b: Expected Load Reduction

The TMDL for Organic Enrichment, Low DO, and Nutrients for Hickahala and Senatobia Creeks (MS305E), which encompasses Basket Creek-Hickahala Creek Watershed, states that restrictions on NPDES permitting activities will be put in place. These restrictions will ensure the maximum load of TBODu specified in the TMDL of 1,317 lbs/day will not be exceeded. Therefore, no further action will need to be implemented to meet the standards of this TMDL. As part of the TMDL development process, the NPS load was estimated using assumed background concentrations of CBODu and NH₃-N. In order to achieve the modeled NPS loads in the TMDL, nutrient BMPs will be implemented watershed. This will be done by implementing in-field conservation practices that target both TN, TP and sediment reduction as soils in MS are known to have high phosphorus content.

The Fecal Coliform TMDL for Hickahala Creek is calling for a 50% reduction in the section of Hickahala Creek that is located within the Basket Creek-Hickahala Creek Watershed. The same TMDL also calls for a 70% reduction in James Wolf Creek. This creek flows into Hickahala Creek from the southeast. According to the TMDL, no future impacts are expected to water quality from permitted facilities as long as the effluent is disinfected to meet water quality standards for pathogens. Following regulation, MDEQ will not approve any NPDES permit application that does not plan to meet water quality standards for disinfection. In order to mitigate any NPS contributors to pathogens in the watershed, the watershed team will work to identify opportunities to implement BMPs on pasturelands and lands used for grazing to limit livestock access to streams.

The Natural Resources Conservation Service has a list of approved BMPs to address nutrients, sedimentation and pathogens. This list will be used to identify candidate BMPs to be installed in the Basket Creek-Hickahala Creek Watershed.

Element c: Proposed Management Measures

Coordinating partners with MDEQ include the Mississippi Soil and Water Conservation Commission (MSWCC), the Natural Resources 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 USDA Service Centers handle federal assistance programs offered through the Farm Bill. As part of these services, SWCD staff communicate regularly with the local landowners and operators within the watershed as they work to support sign-ups for Farm Bill initiatives. Staff from MSWCC and the SWCD depend upon assistance from their NRCS partners in determining landowner interest in the watershed because they are on the farms and in the fields with the landowners, understand the needs at the local level, and have knowledge of the amount of unfunded applications for federal program assistance which meet Section 319 eligibility requirements. Based on their analysis, installation of the following BMPs would mitigate sediment and nutrient issues in the Basket Creek-Hickahala Creek watershed helping the stream recover: fencing, watering facilities, heavy use areas, ponds, streambank and shoreline protection, and grade stabilization structures. As such, BMPs will be prioritized for implementation in the newly converted pasture

areas. Factors considered for determining specific locations for the placement of BMPs included the following attributes based upon best professional judgement:

1. Likely water quality benefit;
2. Willing landowners;
3. Implementation of the recommendations of the TMDLs (this includes implementation of BMPs appropriate for nutrients, sediment, and pathogens);
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);

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 that may contribute match include MSWCC, Tate County Soil and Water Conservation District, NRCS, USGS (monitoring), and/or local landowners. 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 project costs and potential BMPS:

| Activity | Size/Amount | Estimated Cost | Project Match |
|---|----------------------|-----------------------|----------------------|
| BMPs | | | |
| Fencing | 10,000ft @\$2.33 | 23,300 | 15,533 |
| Tank/Trough | 3@\$3,500 | 10,500 | 7,500 |
| Ponds | 4 ea @ \$9,000 | 36,000 | 24,000 |
| Streambank and Shoreline Protection | 500 ft @ \$161.00 ft | 80,500 | 54,167 |
| Grade Stabilization Structure | 8 ac @ \$6,609.80 | 52,878 | 35,252 |
| Heavy Use Area Protection | 1,240 ft @ \$2.84 | 3,522 | 2,348 |
| Monitoring | | 9,000 | |
| Education/Outreach | | 20,000 | 4,000 |
| Technical Assistance | | 15,000 | 10,000 |
| Project Management, Implementation, Coordination, Plan Revision | | 25,300 | 15,867 |

Total Estimated Project Cost

\$276,000

Total Estimated Project Match

\$168,667

To maximize education and outreach activities and monitoring efforts, MDEQ plans to leverage with existing programs already allocated for funding where possible.

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, namely; 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 Basket Creek-Hickahala Creek watershed project by tailoring them to address the pollutants addressed in the TMDLs. 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, as well as, the history of the community and a sense of economics. Stakeholders and coordinators join together to participate in problem-solving, brainstorming, plan development, training workshops, festival event planning, soil and water conservation field days, tree boards, poster, art and writing projects 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 Basket Creek-Hickahala 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 Dry Creek Watershed.
- **Watershed Harmony Mobile Classroom** - for ages kindergarten – adults with state and federal public education objectives tailored for 4th and 5th grade students.
- **Storm Drain Marking** - projects for scouts, environmental clubs, and citizen groups.
- **“Train the Trainer”** - workshops and materials for Soil and Water districts, Extension Service, etc.

As part of the education outreach efforts, the stakeholder group forming the Basket Creek-Hickahala Creek Watershed Implementation Team (WIT) will participate in a minimum of 3 face-to-face meetings. The purpose of these meetings is to provide updates on implementation activities, education events and review and modify the watershed plan. 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. The purpose of the meetings will be for updating the watershed plan, and hosting field days to showcase the implemented BMPs for the public. 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

In the event of a Section 319 NPS funding award from MDEQ to support implementation of this watershed-based plan for this HUC 12 sub-watershed, MDEQ, along with support from the Watershed Implementation Team and Project Manager (where applicable), will:

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 Tate 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 monitor baseline water quality conditions in the watershed and track changes in water quality over time resulting from the BMPs implemented through this project. (Plan Completion: Months 1-2); Implementation: Months 3-36)
6. Submit blank copies of standard maintenance agreements to MDEQ. (Months 13-36)
7. Conduct inspections of BMPs during construction (Months 3-36)
8. Coordinate with and support the local SWCD, MACD, 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, USGS, and the Tate Co. Soil and Water District to determine priority areas that are contributing significant pollutant loads to Basket Creek-Hickahala Creek watershed | Target priority areas for BMPs | Months 1-2 |
| Establish Watershed Implementation Team to begin refinement of Watershed Based Plan for Basket Creek-Hickahala Creek watershed | Establish WIT | Months 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 1-6 |
| Establish routine meeting schedule for WIT to support WBP revision | WIT meetings | Months 1-36 |
| Implement BMPs | BMP installation | Months 6-36 |
| Coordinate with Landowners to inspect BMPs that were installed using Section 319 funds | BMP Inspection | Months 3-36 |
| Begin monitoring to collect data on post-BMP water quality | Post-BMP Monitoring | Months 42-48 |
| Finalize education and outreach plan | Education/Outreach events scheduled | Months 8-36 |
| Finalize revised WBP | Final Revised WBP | Months 30-36 |

Element h: Load Reduction Evaluation

According to the State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters, the water quality standard for dissolved oxygen is a daily average of 5.0 mg/L with an instantaneous minimum of 4.0 mg/L. There is no numeric criteria applicable to aquatic life protection due to nutrients/organic enrichment. However, a narrative standard for the protection of aquatic life does apply to all waters in the state. 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 nutrients, the monitoring will be conducted to collect data on nutrient parameters as well as parameters that are considered response measures for nutrient concentrations as well as parameters that measure dissolved oxygen and oxygen

demand. These parameters may include measurements for: Dissolved Oxygen, Dissolved Oxygen Percent Saturation (%Sat), Chemical Oxygen Demand, Total Nitrogen (TN), Total Phosphorus (TP), and turbidity along with conventional parameters generally measured to determine aquatic health (e.g. pH, Temperature, Conductivity). For pathogens, waters must meet a 30-day geometric mean of 126 per 100 ml, nor should the samples examined during the 30-day period exceed 410 per 100 ml more than 105 of the time for *E. coli*. The following thresholds will be used to measure compliance with water quality criteria:

| Parameter | Threshold |
|------------------------|--|
| Dissolved Oxygen | Daily Average of 5.0 mg/L; Instantaneous threshold of 4.0 mg/L |
| Dissolved Oxygen % Sat | ≥ 70% - ≤ 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 | 35 mg/L |
| Total Nitrogen | 0.940-1.110 mg/L (threshold range based on healthy biologically attaining streams in West Bioregion) |
| Total Phosphorus | 0.080-0.120 mg/L (threshold range based on healthy biologically attaining streams in West Bioregion) |
| <i>E. coli</i> | 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 |

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 use a calibrated and verified index of biotic integrity (IBI) to make water quality assessment decisions referred to as the [Mississippi Benthic Index of Stream Quality \(M-BISQ\)](#). This index, 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. Basket Creek-Hickahala Creek is in the West bioregion and the attainment threshold is 43.7. Along with overall MBISQ scores, the in-stream habitat surveys will also be used to determine change over time.

When biological data indicate a stream is not meeting its designate use, the stream is assessed as being biologically impaired and a stressor identification analysis is performed. 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. If biological community data indicate that a water body

segment is impaired, an investigative, stressor identification analysis using a 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, 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 most probable stressors causing biological impairment to provide the information necessary to develop required TMDLs that will guide restoration activities.

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 they indicate improvements to water quality in the Basket Creek-Hickahala Creek watershed. 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, water quality chemical and biological monitoring was conducted and will serve as baseline data for the project along with any historical data available on Basket Creek and Hickahala Creek. Historical monitoring stations are shown in Figure 3. The most recent biological monitoring conducted on Hickahala Creek from 2014 resulted in a M-BISQ score 10 points below the attainment threshold for the West Bioregion. Based on this information, the stream is not meeting its designated use for aquatic life use support. This information from this sampling event, as well as older sampling data, will serve as pre-implementation monitoring for the project. Post-BMP monitoring locations will be selected using best professional judgement 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.

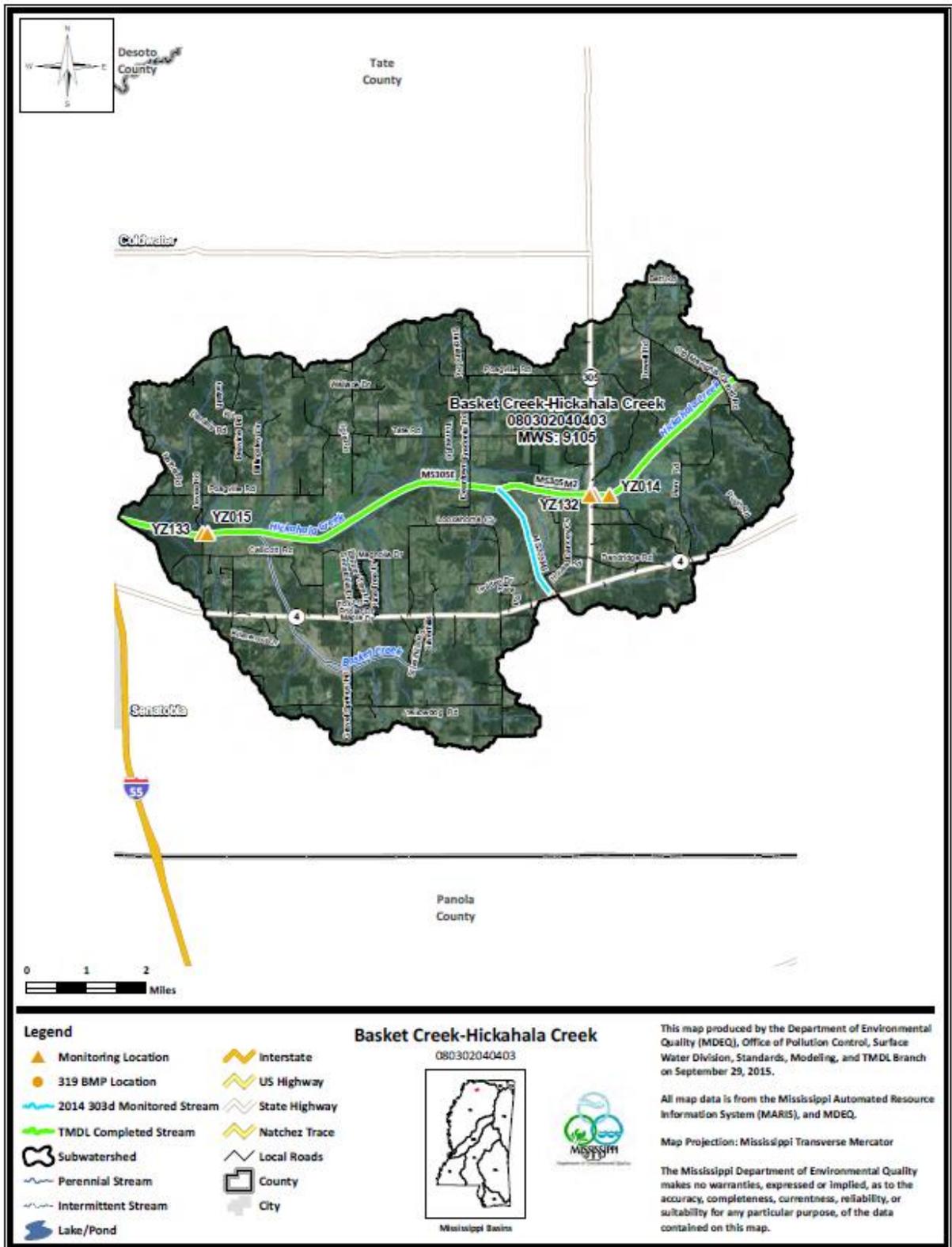


Figure 3: Basket Creek-Hickahala Creek Watershed Historical Monitoring Stations