Owl Creek-Little Hatchie River 9 Key Element Watershed Plan
HUC 080102070101 (MWS 3014)
GY20 Project Area
April 20, 2021
Revised February 2022

Element a: Identification of Causes and Sources of Impairment

The Owl Creek-Little Hatchie River Watershed is located in Ripley Mississippi (MS). The entirety of the 25,740-acre watershed lies within Tippah County in northeast Mississippi and is part of the North Independent Streams Basin. According to the 2016 National Land Cover Database (NLCD), the landuse in this watershed is comprised of approximately 59% (15,195 acres) forestry, 22 % (5,780 acres) pastureland, and 2% (455 acres) cropland (Figure 1).

The water-use classification for streams in the Owl Creek-Little Hatchie River Watershed, as established by *Regulations for Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (11 Miss. Admin. Code Pt. 6, Ch. 2)*, is *Fish and Wildlife*. Waters with this classification are intended for fishing and propagation of fish, aquatic life, and wildlife. Waters included in the *Fish and Wildlife Classification* should also be suitable for secondary contact recreation, which is defined as incidental contact with water including wading and occasional swimming.

The largest water body in the Owl Creek-Little Hatchie River Watershed is Little Hatchie River and serves as the receiving stream for the majority of the drainage in the watershed. The only other named stream in the watershed is Owl Creek, which flows into the Little Hatchie River. Both Little Hatchie River and Owl Creek have a history with Mississippi's Section 303(d) List of Impaired Water Bodies. Little Hatchie River, water body segment MS201E, was initially listed as evaluated on the 1996 Section 303(d) List as impaired for pesticides, nutrients, siltation, pathogens, and organic enrichment (O.E.)/low dissolved oxygen (D.O.). It remained on the 1998 list for the same pollutants. The entire drainage area was considered as an "evaluated" §303(d) listing versus a "monitored" listing as there were no water quality data to verify impairment status of the water bodies in the watershed. In 2002, the impairment to Little Hatchie River was changed to biological impairment and the listing was moved from the "evaluated" portion of the §303(d) list to the "monitored" portion of the list. This same listing was included in the 2004 §303(d) List. After performing a stressor identification study, sedimentation was identified as the primary probable pollutant causing the biological impairment. In 2005, a sediment TMDL was developed for Little Hatchie River.

The Mississippi Department of Environmental Quality (MDEQ) has conducted statewide biological monitoring using benthic macroinvertebrates as the indicator to develop a regionally calibrated Index of Biological Integrity (IBI) for wadeable streams. This index, known as the *Mississippi Benthic Index of Stream Quality (M-BISQ*), was used in the biological assessment of the state's wadeable streams and rivers. In 2010, Owl Creek (segment 301412) was assessed as biologically impaired and added to the Section 303(d) List. Owl Creek remains on the list of impaired waters and a stressor identification study was completed in January 2021 to determine the cause of impairment to the stream. As a result of this stressor identification study, the primary probable cause of impairment to the biological community was determined to be sedimentation. Now that sediment has been identified as the pollutant of concern, a total

maximum daily load (TMDL) will be developed. Figure 1 shows the location of the impaired segments within the Owl Creek-Little Hatchie River Watershed.

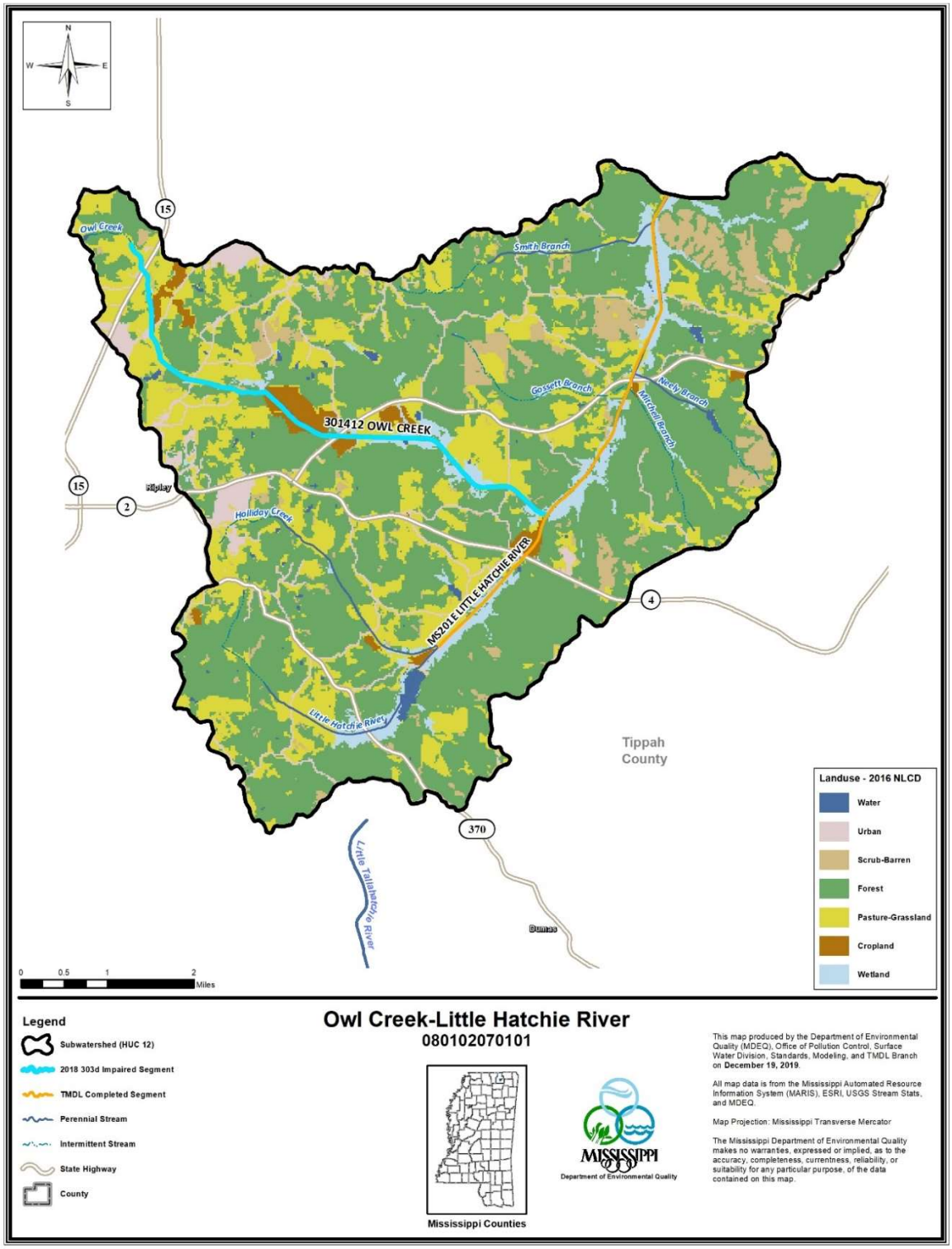

Figure 1: Landuse Distribution and Impaired Segments in Owl Creek-Little Hatchie River Watershed

There are no facilities in the Owl Creek-Little Hatchie River 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 TMDL for Little Hatchie River, *Total Maximum Daily Load Little Hatchie River Watershed (08010207) North Independent Streams Basin for Biological Impairment Due to Sediment, (MDEQ, 2005)* was completed for clean sediment. The *State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters (11 Miss. Admin. Code Pt. 6, Ch. 2)* (MDEQ, 2020) regulation does not include a numeric 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 this TMDL is based on reference sediment yields developed by the Channel and Watershed Processes Research Unit (CWPRU) at the U.S. Department of Agriculture, Agricultural Research Service, 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. For the Owl Creek – Little Hatchie River watershed, the estimated allowable range of sediment loads for stable streams is 0.000757 to 0.00459 tons per acre per day at effective discharge. Also based on this analysis, a range of unstable values was assigned to the listed waterbodies within HUC 08010207 based on the level III ecoregion unstable stream values. The unstable range is representative of the existing loads that would be expected for water bodies within HUC 08010207. The unstable range for water bodies within HUC 08010207 is 0.000151 to 0.0761 tons per acre per day at the effective discharge. The unstable yields are larger than the target yields; therefore, a reduction is recommended for HUC 08010207. Based on the ranges of stable and unstable yield values, a reduction of 50% to 94% is recommended in HUC 08010207.

Nonpoint loading of sediment in a water body results from the transport of the material into receiving waters by several processes including mass wasting, head cutting, gullying, and sheet and rill erosion. Sources of sediment come from improper agricultural and silviculture practices as well as from a plethora of other improper land-use activities, e.g. construction, mining, channel alterations.

Element b: Expected Load Reduction

The sediment TMDL developed for Little Hatchie River (MS201E) and applicable for waters within the Owl Creek-Little Hatchie River watershed concluded that yields would need to be reduced by 50-94% in order to reflect stable conditions. The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) has a list of approved BMPS to address sedimentation and this list will be used to identify candidate BMPs in Owl Creek-Little Hatchie River watershed.

While these sedimentation practices are for sedimentation, there is an additional benefit in the reduction of nutrients because nutrients attach to sediment particles. This list will be used to identify candidate BMPs in the Owl Creek-Little Hatchie River 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 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 potential BMPs would mitigate sediment issues in the Owl Creek-Little Hatchie River watershed, helping the stream recover: fencing, watering facilities, heavy use areas, stream crossings, streambank and shoreline protection, and grade stabilization structures. 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 TMDL (i.e., "It is recommended that water bodies within [the watershed] be considered a priority for streambank and riparian buffer zone restoration and any sediment reduction BMPs, especially for road crossings, agricultural activities, and construction activities);
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 who may contribute match include MSWCC, Tippah County Soil and Water Conservation District, NRCS, United States Geological Survey (USGS) for additional monitoring, 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

Practice Name	Unit	No of Units	Unit Cost	Estimated Cost
Grade Stabilization Structure	ea	40	$10,000.00	$400,000
Streambank and Shoreline Protection	ea	40	$7,500.00	$300,000
Fencing	ft	90000	$4.00	$360,000
Heavy Use Area	sq ft	30000	$4.72	$141,600
Watering Facility	ea	55	$2,045.00	$112,475
Stream Crossing	ea	6	$10,000.00	$60,000
***Monitoring**				$70,328
***Technical Assistance**				$60,000
***Education/Outreach**				$27,800
***Project Management, Implementation, Coordination, Plan Revision**				$101,490

Total Estimated Project Cost **$1,633,693**

* - Denotes fields that are estimated based upon three incremental funding cycles.

Due to the magnitude of this project, funds will need to be allocated incrementally across multiple grant cycles. In order 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:

Phase 1 Cost Estimate: Project Implementation:

Practice Name	Unit	No of Units	Unit Cost	Estimated Cost
Grade Stabilization Structure	ea	15	$10,000.00	$150,000.00
Streambank and Shoreline Protection	ea	15	$7,500.00	$112,500.00
Fencing	ft	6000	$2.50	$15,000.00
Heavy Use Area	sq ft	4800	$3.50	$16,800.00
Watering Facility	ea	4	$1,000.00	$4,000.00
Stream Crossing	ea	2	$10,000.00	$20,000.00
*Monitoring				$70,328.00
*Technical Assistance				$20,000.00
*Education/Outreach				$13,900.00
*Project Management, Implementation, Coordination, Plan Revision				$33,830.00

Estimated Project Cost **$456,358.00**

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 land-use 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 Owl Creek-Little Hatchie River watershed project by tailoring them to address the sedimentation. 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 Owl Creek-Little Hatchie River 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 Owl Creek-Little Hatchie River Watershed.
- ***Watershed Harmony Mobile Classroom*** - for ages kindergarten – adults with state and federal public education objectives tailored for K through 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.
- **"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 Owl Creek-Little Hatchie River 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 Clean Water Act (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 Tippah 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, 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 Tippah Co. Soil and Water District to determine priority areas that are contributing significant pollutant loads to Owl Creek-Little Hatchie River Watershed	Target priority areas for BMPs	Months 1-2
Establish Watershed Implementation Team to begin refinement of Watershed Based Plan (WBP) for Owl Creek-Little Hatchie River 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 3-36
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 scheduled	Education/Outreach events	Months 8-36
Finalize revised WBP	Final Revised WBP	Months 30-36

Goal: Reduce the Nutrient and Sediment loads entering into the Owl Creek-Little Hatchie River Watershed.

Element h: Load Reduction Evaluation

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. However, a narrative standard for the protection of aquatic life was interpreted to determine an applicable target for the Little Hatchie River 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, the monitoring will be conducted to collect data on parameters that are considered surrogates for sediment concentrations and may include measurements for Total Suspended Solids, Total Suspended Sediment, and turbidity along with conventional parameters generally measured to determine aquatic health (e.g. Dissolved Oxygen, pH, Temperature, Conductivity, Dissolved Solids). The following thresholds will be used to measure compliance with water quality criteria and/or target thresholds:

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
Total Suspended Solids	65 mg/L
Turbidity	75 NTU
Dissolved Solids	Monthly average less than 750 mg/L; instantaneous threshold less than 1500 mg/L
Chemical Oxygen Demand	35 mg/L
M-BISQ East Bioregion	71.6 Calibration 3 (Applicable to waters outside the Mississippi Alluvial Plain)

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. For freshwater wadeable streams, not including the Mississippi Alluvial Plain (i.e. Delta), 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. Owl Creek and Little Hatchie River are both located in the East bioregion and both have M-BISQ scores that are below the attainment threshold. After implementation is completed and the stream is given sufficient time to recover, MDEQ will collect new benthic macroinvertebrate community data on Little Hatchie River and Owl Creek. 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 Owl Creek and Little Hatchie River. 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 monitoring will be conducted to serve as a baseline for the project. Historical monitoring data are also used as baseline data where available. Historical monitoring data is available in the Owl Creek-Little Hatchie River Watershed and these data were collect at 2 sites: Owl Creek and Little Hatchie River. This varied water quality monitoring included water chemistry sample data (nutrients, suspended solids, oxygen demand, etc.), in-situ water chemistry (i.e. pH, temperature, specific conductance, and turbidity), as well as biological community monitoring for benthic macroinvertebrates and aquatic habitat assessment. A list of this historical water quality monitoring is provided in the table below, and their sample locations are shown in Figures 1 and 2.

Station ID	Water Body	Sampling Year (s)	Agency	Project Type	Water Chem	In-Situ	Sonde	Benthics and/or Algal
112B43	Owl Creek	2008, 2013	MDEQ	MBISQ	X	X		X
NI005	Little Hatchie River	2001	MDEQ	MBISQ	X	X		X

Monitoring locations for this project will be selected using best professional judgment and will be targeted to reflect water quality downstream of BMP activity. Physical, chemical and/or biological data will be collected and specific parameters will be selected for monitoring based on the impairment cause being addressed by the BMP(s). 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.

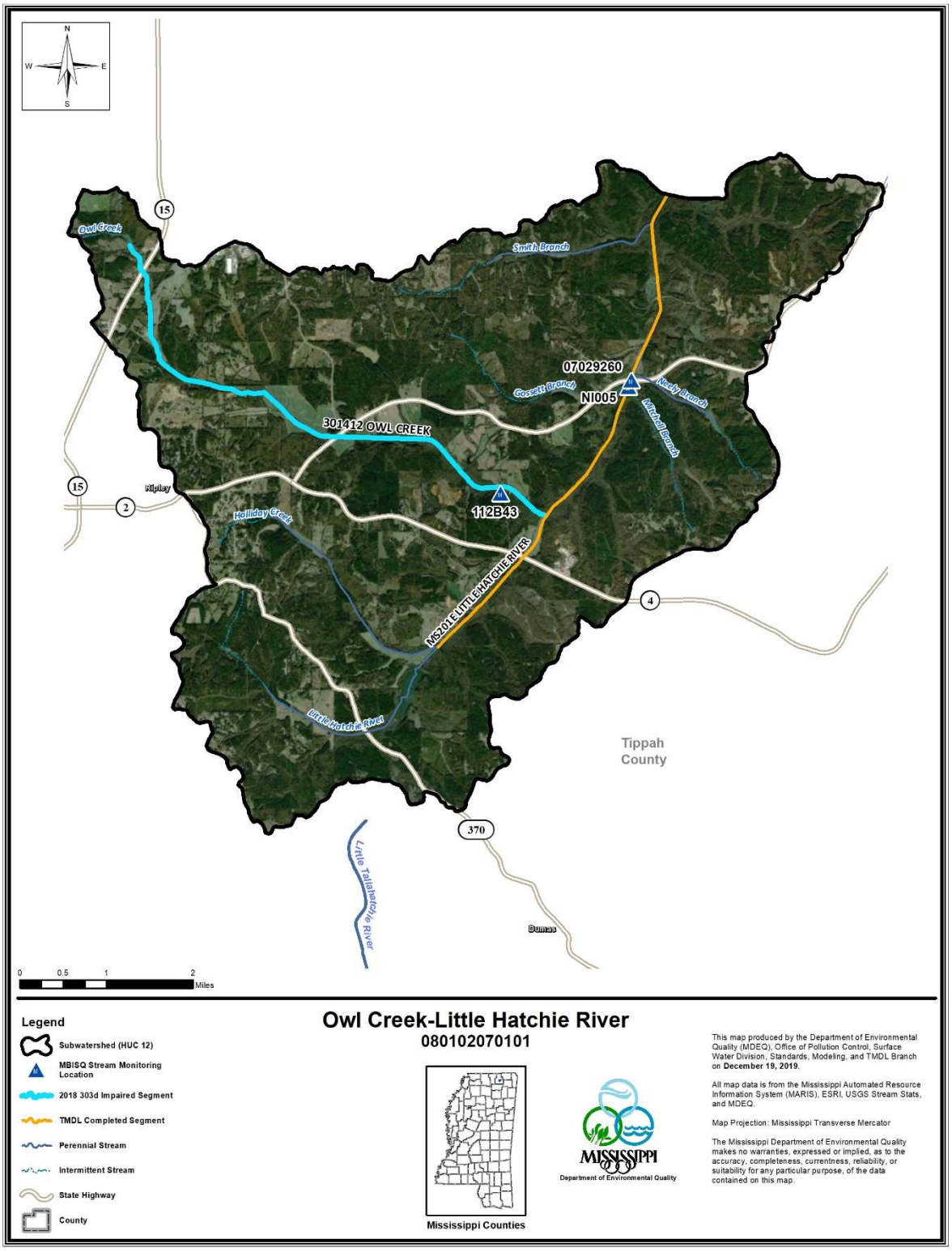

***Figure 2**: Monitoring Stations and Impaired Segments in Owl Creek-Little Hatchie River Watershed*